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SOTICS 2017

Forward

The Seventh International Conference on Social Media Technologies, Communication, and Informatics (SOTICS 2017), held on October 8 - 12, 2017- Athens, Greece, was an event on social eco-informatics, bridging different social and informatics concepts by considering digital domains, social metrics, social applications, services, and challenges.

The systems comprising human and information features form a complex mix of social sciences and informatics concepts embraced by the so-called social eco-systems. These are interdisciplinary approaches on social phenomena supported by advanced informatics solutions. It is quit intriguing that the impact on society is little studied despite a few experiments. Recently, also Google was labeled as a company that does not contribute to brain development by instantly showing the response for a query. This is in contrast to the fact that it has been proven that not showing the definitive answer directly facilitates a learning process better. Also, studies show that e-book reading takes more times than reading a printed one. Digital libraries and deep web offer a vast spectrum of information. Large scale digital library and access-free digital libraries, as well as social networks and tools constitute challenges in terms of accessibility, trust, privacy, and user satisfaction. The current questions concern the trade-off, where our actions must focus, and how to increase the accessibility to eSocial resources.

We take here the opportunity to warmly thank all the members of the SOTICS 2017 technical program committee, as well as all of the reviewers. We also kindly thank all the authors who dedicated much of their time and effort to contribute to SOTICS 2017. We truly believe that, thanks to all these efforts, the final conference program consisted of top quality contributions.

We also gratefully thank the members of the SOTICS 2017 organizing committee for their help in handling the logistics and for their work that made this professional meeting a success.

We hope that SOTICS 2017 was a successful international forum for the exchange of ideas and results between academia and industry and to promote further progress in the area of social eco-informatics. We also hope Athens provided a pleasant environment during the conference and everyone saved some time for exploring this beautiful historic city.

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Voting Rights on Equity used as Financial Collateral

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Abstract— **The right to vote in a company's general meeting is one of the key statutory rights for shareholders. Regularly it is an irrefutable presumption that a shareholder is only the person who is registered as a shareholder. In the case of equity used as financial collateral, it can be questionable who is entitled to voting rights attached to the financial collateral. Securities lending and repos are the two main types of securities financing transactions in the European market. In both, the collateral provider transfers the legal ownership of equities to the collateral taker. If a collateral provider wishes to exercise the voting rights attached to the transferred equities, he needs to recall the collateral. The main master agreements widely used in the European repo and securities lending market employ different solutions regarding the right of a collateral provider to substitute the financial collateral. These distinctions are explored in the paper, along with the analysis of the relevant provisions of the Financial Collateral Directive.**

Keywords- voting rights; securities lending; repurchase agreement; financial collateral; Financial Collateral Directive.

I. INTRODUCTION

Repos and securities lending are the two main types of the securities financing transactions in the European cross-border market. Securities financing transactions are transactions under which securities are used as collateral to borrow cash or other securities. Due to their similarities, repos and securities lending can be used as substitutes for each other, depending on the economic motives of the parties which drive these transactions.

In both repos and securities lending, one party transfers the full legal title to securities to the other party for a limited period of time. Therefore, repo and securities lending agreement are both covered by the definition of a 'title transfer financial collateral arrangement' provided in the Article 2/1/b of the Financial Collateral Directive [1], which states that a 'title transfer financial collateral arrangement' means an arrangement 'under which a collateral provider transfers full ownership of financial collateral to a collateral taker for the purpose of securing or otherwise covering the performance of relevant financial obligations'.

The Financial Collateral Directive is intended to eliminate the so-called re-characterization risk associated with the collateralized transactions which transfer the ownership of the collateral from the collateral provider to the collateral taker. The re-characterization risk is a risk that the transfer of title in these transactions would be treated under national law as a security interest, under which not ownership but only a limited property interest is delivered. Article 6/1 of the Financial Collateral Directives imposes the obligation of the Member States to 'ensure that a title transfer financial collateral arrangement can take effect in accordance with its terms'. The elimination of the re-characterization risk in title transfer financial collateral arrangements is explicitly stated as the aim of the Financial Collateral Directive in its recital 13: 'This Directive seeks to protect the validity of financial collateral arrangements which are based upon the transfer of the full ownership of the financial collateral, such as by eliminating the so-called re-characterization of such financial collateral arrangements (including repurchase agreements) as security interests'.

The provisions of the Financial Collateral Directive are to be applied to the title transfer financial collateral arrangements, as well as to the security financial collateral arrangements, regardless of 'whether or not these are covered by a master agreement or general terms and conditions' (Article 2/1/a of the Financial Collateral Directive). Both repos and securities lending transactions are typically entered into under a master agreement concluded between the parties to these transactions. The purpose of the master agreement is to provide a framework under which individual transactions can be concluded and documented. The industry's standard master agreements are widely used in the European repo and securities lending market. The repo market in Europe is represented by the European Repo and Collateral Council (ERCC) of the International Capital Market Association (ICMA), whereas the securities lending market is represented by the International Securities Lending Association (ISLA). The standard master agreement for repos published by ICMA is the Global Master Repurchase Agreement (GMRA). The present version of the GMRA is the one revised in 2011 [2]. Securities lending transactions are typically documented and governed by the Global Master Securities Lending Agreement (GMSLA), which was updated by ISLA in 2012 [3].

Securities lending market typically uses government bonds and equity securities, such as ordinary shares, as a collateral. In repos the fixed-income instruments, such as bonds, are most-widely used as collateral, but a part of the repo market also deals with equities as collateral. As GMRA generally does not apply to equity repos (see paragraph 1(a) of the GMRA), parties wishing to use equity as collateral in

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repo have to amend and supplement their master repo agreement with a separate annex. For this purpose, a standard annex to the GMRA is provided by ICMA and widely used in the repo market: GMRA Equities Annex [4].

Section II of the paper highlights the main features of repos, while the structure of the securities lending transactions is explained in the Section III. The provisions of the standard master agreements governing these two types of transactions which are concerned with the voting rights attached to the equity used as collateral are analyzed in the Section IV. Conclusion is given in the Section V of the paper.

II. THE MAIN FEATURES OF REPOS

Although the modern form of repo and a cross-border repo market emerged in Europe in the late 1980s, the European repo market started to rapidly grow in mid-1990s [5]. According to the latest survey conducted by the ERCC of the ICMA, the total value of European cross-border and domestic repos in December 2016 was 5,656.2 billion euro [6].

'Repo' is an abbreviation of 'sale and repurchase agreement'. The term 'repo' is commonly used in the market jargon as a generic term for two similar transactions: (1) repurchase agreement (also known as classic repo, US-style repo or all-in repo), and (2) sell/buy-back transaction.

A repurchase agreement or classic repo is an agreement that one party (the seller) will sell securities to another party (the buyer) at a certain date (the purchase date) at an agreed price (the purchase price), with a simultaneous commitment by the seller to buy equivalent securities from buyer at a future date or on demand (the repurchase date) at a different price (the repurchase price). The transaction is referred to as a 'repo' when looked at from the point of view of the seller, whereas from the buyer's point of view the same transaction is referred to as a 'reverse repo'. 'Every repo is a reverse repo, and the name given is dependent on whose viewpoint one is looking at the transaction' [7].

In the repo market jargon, the securities sold on the opening leg of the repurchase transaction are referred to as 'collateral'. However, these securities are not collateral in the traditional legal sense of this term. While in secured lending the secured lender is given a property interest in the asset provided as collateral and the borrower remains the owner of the asset, in classic repo the full legal title to the securities delivered as 'collateral' is transferred outright from the seller to the buyer. The buyer in a classic repo can deal with the securities as he wishes, while his main contractual obligation is to deliver the equivalent securities to the seller at the closing leg of the repurchase transaction.

At the repurchase date the securities equivalent to the securities purchased at the purchase date (i.e., the securities that are of the same issuer, are part of the same issue and are of an identical type, nominal value, description and amount as the purchased securities) are delivered to the seller against the payment of the repurchase price, which is higher than the purchase price paid by the buyer on the purchase date. The repurchase price equals the sum of the purchase price and the agreed pricing differential, which is calculated on the basis of the agreed repo rate [8].

Although the transaction is legally structured by the parties as a combination of two sale agreements, parties to the repurchase agreement are usually not economically motivated by the need for securities that are sold and repurchased between them. Most repurchase agreements are for general collateral and therefore are usually cash-driven transactions in which the parties are motivated by the need to borrow and lend cash. Cash-driven repurchase agreements are in their economic substance essentially secured loans of cash (see [7]). However, a segment of the repo market is driven by the demand to borrow particular securities (special collaterals or 'specials'). The party that needs collateral that is 'on special' will be willing to lend funds at a lower repo rate in order to obtain the collateral [9]. The difference between general and special collaterals in equity repo market is of little significance; since almost all trades in equity repo market are specific securities-driven transactions (see [7] and [10]).

The same practical effects as with the repurchase agreements or classic repos can be achieved through similar transactions known as sell/buy-backs [11]. As in repurchase transaction, in a sell/buy-back transaction the full legal title to the securities delivered as collateral is transferred outright to the buyer. Therefore, sell/buy-backs are also covered by the definition of a 'title transfer financial collateral arrangement' provided in the Article 2/1/b of the Financial Collateral Directive. Unlike repurchase agreements, in which the two legs of the transaction form a single contract, in a sell/buy-back transaction the opening and the closing leg of the transaction form two separate contracts. In a sell/buy-back transaction, parties enter simultaneously in a spot sale and a forward repurchase. The repo rate is not explicit as in repurchase agreement, but is however implied in the forward price agreed on the onset of transaction [7]. Parties wishing to document their sell/buy-back transactions may do so by supplementing their master repurchase agreement with a separate annex. The standard GMRA Buy/Sell-Back Annex is published by ISMA for this purpose [12]. Despite the availability of the standard GMRA Buy/Sell-Back Annex, in Europe still exists a large market in undocumented sell/buy-backs which is mainly concentrated in domestic markets, whereas in the European cross-border market documented sell/buy-backs are more common [5].

III. THE MAIN FEATURES OF SECURITY LENDING

The structure of the security lending transaction is similar to the structure of a classic repo. A security lending agreement is an agreement that one party (the lender) will transfer securities to another party (the borrower) at a certain date against the transfer of collateral (cash or other securities) by borrower to lender, with a simultaneous commitment by the borrower to transfer to the lender equivalent securities at a future date or on demand against the transfer of assets equivalent to collateral to borrower by lender (see [8] and [13]).

Although securities lending market jargon uses the expressions 'borrower' and 'lender', in secured lending

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transaction the full legal title to the 'borrowed' securities is transferred outright from the 'lender' to the 'borrower' (see paragraph 2.3 of the GMSLA). Similar to repurchase agreement, the main contractual obligation of the borrower is to deliver equivalent securities to the lender at the closing leg of the security financing transaction.

The securities lending agreement is legally structured as a combination of two loan agreements under a single contract. From the perspective of the borrower, securities lending is a specific securities-driven transaction in which the borrower is motivated by the need to borrow special securities. These special securities are typically either equity securities or government bonds. In recent years, the European securities lending market has seen most growth in the segment which deals with the government bonds [14].

IV. VOTING RIGHTS ATTACHED TO THE EQUITIES USED IN REPOS AND SECURITIES LENDING

When equities are used as financial collateral in repos and security lending transactions, the question arises who is entitled to exercise the voting rights attached to the equities during the lifetime of the transaction. As both repos and security lending transactions transfer the full legal title to the equities used in transaction, in both types of transactions the new owner is entitled to exercise the voting rights.

Both GMRA Equities Annex and GMSLA explicitly regulate the question of whether the original owner of the transferred equities can give voting instructions that have to be carried out by the new title-holder. Paragraph 6.6 of the GMSLA provides that where any voting rights fall to be exercised in relation to either to loaned equities or the equities used as collateral, neither the borrower nor the lender have any obligations to arrange for voting rights to be exercised in accordance with the instructions of the other party. The parties to the securities lending agreement can agree otherwise in writing (see paragraph 6.6 in connection with paragraph 1.2 of the GMSLA). Whereas the previous version of the Equities Annex to GMRA provided as the main rule that the original title-holder can give voting instructions that have to be carried out by the transferee of equity securities (see [15]), Equities Annex to the GMRA 2011 has taken the equal stance as GMSLA. Paragraph 5(b) of the GMRA Equities Annex provides that where any voting rights fall to be exercised in relation to any purchased equities, the buyer is not obligated to arrange for voting rights to be exercised in accordance with the instruction of the seller, unless otherwise agreed between the parties. It should be noted that, even if the parties to the security lending agreement or to the repurchase agreement have expressly agreed that a new title-holder of equities is obliged to vote according to the instructions of the original owner, voting contrary to the given instructions nonetheless does not render void the decision delivered on the basis of that vote.

If the original title-holder of equities wishes to exercise the voting rights attached to the equities transferred under a security lending agreement or a repurchase agreement before the equivalent securities are delivered to him at the closing leg of the transaction, he can only do so if he is entitled to activate the technique of substitution of collateral. A right of substitution is governed in different manner in GMRA and GMSLA.

Paragraph 5.3 of the GMSLA entitles the borrower to call for the delivery of equities equivalent to those delivered to the lender at the opening leg, prior to the date on which the same would otherwise be deliverable. The borrower's right to recall of collateral is conditioned with the delivery of alternative collateral from borrower to lender. Alternative collateral must have a market value equal to the substituted collateral. The right of the lender to substitute the loaned securities is not explicitly governed by the GMSLA.

GMRA contains provisions on substitution of the delivered securities during the life of a repurchase transaction in the paragraph 8 of the GMRA. Under these provisions, the seller is not generally entitled to a right to substitute the previously sold securities. He may request the substitution from the buyer but the substitution technique will be executed only if the buyer agrees to the requested substitution. In exchange for the buyer's permission to substitute the collateral at any time between the purchase date and the repurchase date, the seller will usually agree to pay a higher repo rate [16].

In case of documented sell/buy-backs the provisions of GMRA regarding the substitution of securities are applicable in the same manner as in the case of repurchase agreements. In general, a seller in an undocumented sell/buy-back does not have the right to substitute collateral.

The Financial Collateral Directive seeks to protect the validity of such substitution mechanisms developed in the marked practice. Under the Article 8/3/b of the Financial Collateral Directive, where a financial collateral arrangements contains 'a right to withdraw financial collateral on providing, by way of substitution or exchange, financial collateral of substantially the same value', the Member States are obliged to ensure that substitution of the financial collateral shall not be treated as invalid or reversed or declared void on the sole basis that, inter alia, the relevant financial obligations were incurred prior to the date of substitution.

V. CONCLUSION AND FUTURE WORK

The paper intended to explore and highlight the main common features as well as the basic differences between securities lending and repurchase agreements, in particular those connected to the issues of voting rights attached to the equities used as financial collateral in these transactions. As both transactions belong to the family of title transfer financial collateral arrangements, in both security lending agreement and repurchase agreement the voting rights are transferred to the new title-holder together with the transfer of the title to equity securities used in transaction. Under the current versions of standard master agreements, in both security lending and repurchase transactions the new title-holder is not obliged to vote in accordance to the instructions of the original title-holder, unless the parties had expressly agreed otherwise. A party wishing to exercise voting rights attached to the equities transferred to the other party may do so only if entitled with a right to substitute the transferred equities with equities equal in market value to the transferred

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equities. Whereas the borrower in security lending transaction usually has the right of recall of collateral, the seller in repurchase transaction is not allowed to recall the delivered securities unless a right of substitution is specifically agreed between him and the buyer.

A particular problem with the securities lending agreements and equity repos, which was not addressed in this short paper, is that these transactions may be used as means of obtaining voting control. As the voting rights attached to the borrowed securities will be transferred together with the full legal title to the borrower, while also in the case of equities used as collateral the voting rights attached to the collateral will be transferred to the lender, securities lending transactions could be used by the board of directors with an aim to influence the voting in the company's general meeting. The same can occur with the equity repurchase agreements. These issues will be explored in the continuation of the research.

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Social Networks as a Communication Tool in Social Supermarkets

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***Abstract*— Social supermarkets are a form of non-profit organizations, which use the workforce of volunteers and generated income (if there is any) is used for charitable activities. Their main purpose is to serve to customers which are in material deprivation. By definition, their operational activities include: (1) collecting donations in money, (2) organization of acceptance of donations in form of food and toiletries from traditional supply chains, (3) acquiring food and other stuff from other sources and (4) distribution of food, toiletries and other stuff for free and/or (5) selling goods at extremely discounted prices to socially endangered people. In their operational activities, there are numerous possibilities of social networks implementation in various stages of their everyday business. The aim of this paper is to analyze application of social networks in communication with donors, volunteers, end users and general public in case of social supermarkets. In the paper, we will analyze some real examples of application of social networks in active social supermarkets.**

Keywords - ***social supermarkets; social networks; digital communication***

I. INTRODUCTION

Social supermarkets emerged as the answer to the recent economic crisis across Europe. Their main purpose is to serve those groups of customers which have low income or which are in severe material deprivation. The purpose of social supermarket is twofold: (1) the poverty reduction trough distribution of food and toiletries to needy people and (2) reduction of inefficiency in traditional (dominantly food) supply chains trough removal of surpluses of produced food (and other goods). Intensive communication with end users, volunteers and donors increases operational efficiency of social supermarkets.

The penetration rate of Internet and mobile phones within population of EU-28 exceeded 60% of inhabitants. Therefore, digital communications already play a significant role in promotional activities of social supermarkets. However, in literature, the scope and role of digital communication usage in social supermarkets is not adequately analyzed and described.

The aim of this paper is to show how social supermarkets use social networks as a communication tool for interaction with interested publics.

Paper is divided into three sections. In Section 2, we are going to define social supermarkets, in Section 3, we will explain what social networks are and what is the level of their development and in Section 4, based on a primary research we are going to explain good practices of social network usage in everyday operation of social supermarkets. The primary research is done by case study method on three practical examples in Croatia.

II. DEFINITION OF SOCIAL SUPERMARKETS

Across Europe there are many different types of social supermarkets but their level of existence and development is very different from country to country. Level of existence and development of social supermarkets is influenced by the economic situation of the country and countries level of development. According to previously mentioned issues, there is no common definition of social supermarkets because it should be broad enough to integrate all the variations which are developed and existing on different markets. As a relatively new phenomenon, social supermarkets are not sufficiently analyzed in the literature, but still we can find a lot of different definitions and determinations of a term social supermarkets.

A social supermarket is defined [1] as “a small, non-profit oriented retailing operation offering a limited assortment of products at symbolic prices primary in self-service manner. Authorized for shopping are needy people only. The products are donated by food production and retail companies free of charge as they are edible but not marketable due to small blemishes. Achieved profit is reinvested into social projects”. Another definition [2] states that “social supermarkets are organizations, which provide

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food that is no longer useful for the common trade cheaply to people who are in situations of poverty".

According to [3], social supermarkets is a new retail format that fosters positive social change by fulfilling material needs of the socially disadvantaged groups and giving them an opportunity to preserve their dignity in an environment where they can choose various kinds of goods at extremely low prices.

All definitions of social supermarkets put the emphasis on selling or distributing goods to people in severe material deprivation. In addition, according to analyzed definitions, social supermarkets can be viewed as a new type of intermediaries within the food distribution chain because they have been developed in order to transfer surpluses of food or products to people in need.

When analyzing social supermarkets, some benefits should be pointed out [4] emphasize three types of benefits of social supermarkets: (1) social benefits such as: reduction of food insecurity and life quality improvement of socially endangered citizens, improvement of their social inclusion, growth of self-confidence in communication with others and fostering feeling of belonging to a certain community by treating their users as clients rather than charity users, what strengthens their sense of dignity, (2) environmental benefits which are related with food waste reduction throughout distribution of food surplus from companies and individuals to final users, and (3) economic benefits which are related with better reallocation of scarce budget because users can make by purchasing products at lower prices in social supermarkets and then to use those assets to acquire other necessities.

As initially is emphasized, there are different models of social supermarkets. Main distinctive characteristics are: (a) workforce organization because some social supermarkets have paid employees, while others function only trough usage volunteers as a workforce. (b) type and layout of shops (c) assortment offered, (d) sourcing and fundraising activities, (f) availability and implementation of various technologies starting from distribution organization to communication with users.

Social supermarkets mostly rely on volunteers as the key part of the workforce of volunteers, but some of them have paid employees as well. Even though, social supermarkets are trying to develop stores to be as similar as possible to regular supermarkets, due to the lack of resources, some of them are very simple and unpresentable in layout and interior design. Mostly their assortment contains food, as well as other basic products like hygiene products, cleaning detergents or clothes. But, it is necessary to point out that assortment in social supermarkets heavily depends on success of donations and fundraising activities. Mostly the products are donated, but in some cases surpluses are bought directly from producers at discount prices. Usually, they rely on public subsidies or support from other charities in their operations, but there are some examples of private initiatives in Switzerland and United Kingdom, which aim to develop total commercial sustainability (see [4]).

Some authors claim that role of social supermarkets can be beyond the redistribution because they can offer some complementary activities to their users in order to improve public recognition and to foster involvement of end users in their everyday operation. For instance it is known that some social supermarket in France organize skills workshops for their users, while some social supermarkets in Austria provide lunch offer within the coffee area of their store.

However, Klindzic et al. [5] point to some characteristics which are specific for social supermarkets as an emerging retail format: (a) number of stock keeping units (SKUs) in their assortment depends on donations, while food accounts for approximately 90% of their assortment; (b) goods are usually distributed to the most vulnerable social groups for free; in some cases, if goods are not given for free, then every day low price policy (EDLP) is applied with prices lower by more than 30% compared to other stores; (c) service is provided by volunteers and/or previously unemployed persons, (d) opening hours are limited, (e) promotional activities are scarce and are done via welfare centers, citizen associations and religious organizations, (f) more intensive promotional activities are done for the benefit of donors through various activities of citizen associations, religious organizations and supporting media.

III. SOCIAL NETWORKS AS A TOOL FOR EFFECTIVE COMMUNICATION

Business processes changed in the XXI century, and one of causes is the Internet, which has become a necessary business communication tool. Development of social networks goes in line with development of Information and Communication technologies (ICT) and Internet. Social networks extremely useful as consumers are deeply involved in creating information and using it in various situations, such as buying decisions making, leisure and entertainment, advertising, etc. [6]. Hubspot reports that 70% of business-to-consumer marketers have acquired customers through Facebook [7]. Research of social networks are focused and run in different areas such as B2C communication [8]–[12], B2B communication [13][14], role of social networks in e-marketing, e-commerce [7][15][16]. Cultural differences in social networking site use were presented in the study of Jackson and Wang [17], the peculiarities in China and the US were presented. The study of the impact of social media on consumers was presented by Hajli [18] where he examined the role of social media in the adoption of e-commerce and social commerce. Al sources confirms the importance of social networks, so nowadays attention to trends and market peculiarities should be emphasized.

Social networks could be classified according to the main purpose and target audience: personal (e.g. AsianAve, Badoo, Facebook, Google+, Hi5, Highlight, Instagram, Myspace, Odnoklassniki) and professional (e.g. Brainly, LinkedIn, ResearchGate, Sciencescape) [6].

It should be emphasized that specialized categories, such as vertical social networks and linked to portals networks were declined in this research, as all types of business organizations were decided to be included in the research, and such networks are more likely to be related to one or

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other activity. The results of analysis and comparison of social networks are presented in Table 1.

TABLE 1. COMPARISON OF SOCIAL NETWORKS

Social net-work	Users	Percentage of marketers that use the social network	Percentage of brands that have a presence in the social network	Top countries using the social network
Facebook	1.490 million	No Data	No Data	US (25 %), Other (75 %)
Google+	375 million	40 %	70 %	US (55 %), India (18 %)
Instagram	302 million	No Data	No Data	US (40 %/ 77.6M), Other (60 %)
LinkedIn	336 million	No Data	No Data	India (27M), Brazil (18M), US (16M), Canada (9M), France (8M), Italy (7M), Mexico (6M), Australia (6M), Spain (6M), China (5M), the Netherlands (5M)
MySpace	50 million	No Data	14.2 million artists	No Data
Pinterest	100 million	0.5 million; 67 % of content	No Data	US (47 %)
QZone	755 million	No Data	No Data	Mostly China
Sina Weibo	600 million	No Data	No Data	Mostly China
Snapchat	115 million	1 % of marketers	No Data	4 % of adult Internet users
Tumblr	425 million	No Data	No Data	No Data
Twitter	645 million	12 % of US businesses 85 % of B2B marketers	63 % have multiple accounts	US (53M)
Vkontakte	100 million	No Data	No Data	Russia and NVS countries
YouTube	1.300 million	9 % of US SMEs	No Data	US (20 %), Other (80 %)

Source [1]

The dominance of Facebook was observed all over the globe, and of course new social media sites were becoming popular and competing for consumers such as QZone, SnapChart,QQ, etc. [19]. Of course, Facebook should be treated as the leader since it is still the most powerful social media channel. More than 1.5 million local businesses have active pages on Facebook. An average user of Facebook spends there more than 55 minutes per day. 22% of teenagers connect to Facebook at least 10 times per day; 48% of users in the age group of 18–34 years connect in the morning (just waked up), and 28% connect before going to sleep [20].

The point is that it is not enough to know the types and possibilities of various social networks, the understanding of peculiarities and consumer perception of each is necessary as well. This is a challenge because of dynamics of the sector, and organizations should still consider the field of activities, potential consumers' habits and follow novelties in social networks.

Therefore, in advance we will focus to application of social networks, especially Facebook, in operation of a specific type of organization, i.e., in social supermarkets.

IV. EXPERIENCE OF ACTIVE SOCIAL NETWORK USE IN SOCIAL SUPERMARKETS IN CROATIA

Upon conducted in-field research and deep interviews with social entrepreneurs in social supermarkets in Croatia, which were done from June 2017 till nowadays, there are more than 15 social supermarkets located in various cities dominantly they are run by non-profit organizations. In this paper, we will analyze case of social supermarkets in Rijeka, Osijek and Varaždin as examples of good practice for active and effective usage of social networks in communication with various types of users. Firstly, we will give a profile of each social supermarket. Profiles are done according to in-field visits and interviews with social entrepreneurs who are responsible for social supermarket's operation and upon information available in public sources where available. Secondly, we will analyze how they implement social networks as a mean of communication with their stakeholders.

A. The profile of the social supermarket in Rijeka

Social supermarket „"Kruh sv. Elizabete" (in English: St Elisabeth's bread) in Rijeka is the first social supermarket opened in Croatia. It was established in 2001. Even though it is conceived by the Franciscan Order and their volunteer, it is a separate non-profit organization which consists of three coordinated departments dealing with [21]: (1) end users and donors, (2) clothing/footwear and finance and (3) food, volunteers and media.

The Rijeka social supermarket has more than 50 regular volunteers and around 400 occasional volunteers who distribute approximately 800 packages each month to the 500 most socially endangered families in the local community, i.e., it has around 2000 users.

The most important donors are individual citizens and fundraising actions are organized at three levels [21]: (1) the annual "Young against hunger" initiative (2) Saturday fundraisers at traditional retail chains stores, and (3) participation in local city events. "Young against hunger" is the key fundraiser and it is organized in cooperation with regional elementary schools where children are asked to voluntarily give one product in order to learn how to practically show solidary with citizens in need. In addition, "orange" volunteers of the social supermarket Rijeka are present in one of the shopping malls each and every Saturday

during the whole day. Occasionally, the Futsal tournament is organized. It takes place in the Hall of youth on Trsat under the moto: "entertainment for us, rescue to others" because each registered futsal team, instead of paying the registration fee in cash, is "paying" in food donations to the social supermarket. Also, the anniversary celebration of Social Supermarket Rijeka is an important and open door event for all stakeholders in the local community. At the event a joint lunch is served bringing journalists and citizens together with volunteers and homeless people of Rijeka.

Due to numerous events and fundraising activities, the social supermarket Rijeka is very exposed to traditional and electronic media. For instance, newspaper Novi list, magazine JaTrgovac and numerous portals are covering their activities in positive manner on regular basis.. Therefore, this social supermarket is very well known both on local and on national level.

B. The profile of the social supermarket in Osijek

Social supermarket in Osijek is operated by Civil Association "River of Love" (in Croatian: Udruga Rijeka ljubavi). It has regular working hours during the week. Additionally, each month to each household a "package of life" containing 14 food products sufficient for 10 days is prepared and distributed to households in need [22]. Dependable on quantity of donation special distribution events are organized, for instance donations for kids during the Christmas or Easter period. The social supermarket serves to approximately 1000 households, i.e., around 4000 end users (persons). Approximately 15 volunteers are fully engaged in everyday activities.

Data on end users are kept in database and are updated regularly upon data on financial census collected from the City Government welfare office and local employment service. Operation space is donated by the Osijek City Government and there is an occasional cooperation with Croatian Army for hosting large donation events.

The donation structure includes: 80% of individual donations, 10% donations by local companies and 10% donations collected throughout cooperation with schools and universities. Social supermarket forces active interaction with local public, actively promotes its operation through national traditional and electronic media, but also intensively uses all sorts of digital communication including social networks.

C. The profile of the social supermarket in Varaždin

According to the interview done with the managerial team, social supermarket "Kruh Sv. Antuna" (in English: St Anthony's bread) in Varaždin is founded by Franciscan Order and their volunteers. It functions as a project within the Roman Chatolic Church and it is not registered as a separate non-profit organization. It serves to approximately 1100 households, i.e., 3000 users. The social supermarket in Varaždin operates in space donated by the local government. Dominantly foodstuff and toiletries are distributed to households on a monthly basis and occasionally wheen some large donation of perishable goods is received (such as milk products or diaries). Users have to come to pick up goods and no delivery is organized. Data on users are kept in database according to legal rules for non-profit organization in field of social services and each user has to renew the status each six months.

There is defined dynamics of donation collection that is organized each Saturday in local Churches. Operation is supported by local companies in donations and in discount rates or transport organization when foodstuff and toiletries are purchased from traditional supply chains (producers, wholesales companies and retailers).

However, individual donations are dominant (almost 80%). On monthly basis, around 50 volunteers are actively involved in social supermarket's operation. This social supermarket actively uses all means of public communication such as leaflets, traditional and electronic media reporting (newspapers, journals, TV, radio etc.), organization of events in local churches, schools and Universities. In addition, they organize open-door day in order to promote their activities within the local community.

D. Usage of Social Networks in Chosen Social Supermarkets

Social supermarkets in Rijeka, Osijek and Varaždin intensively use social networks, especially Facebook, as the vital communication channel in their everyday operation. Therefore, we analyzed their Facebook pages in order to explain the means of use of this social network and its suitability in operation of social supermarkets. Results of analysis are shown in Table 2.

All analyzed Facebook pages are in Croatian language only, but this is expected as social supermarkets, per se, are oriented towards narrow, local geographic area such as city or county. Social supermarket Osijek is the most active according to number of followers, number of published pictures and video materials, but also according to interactivity level with the community (because there are between 5 and 10 comments given by followers per one published status). Besides Facebook page, only Rijeka has active YouTube channel at which activities are promoted. However, video materials published directly at Facebook page are more frequently viewed in Osijek's case.

In social supermarkets, there are three groups which can be communicated via social networks, those are: (1) end users, (2) volunteers and donors, (3) general public. In Table 3, ways of communication with all groups is shown. Even though, end users are people in severe material deprivation, social supermarket Osijek uses Facebook to reach them and to share information on package distribution and distribution of unplanned large donations of perishable goods. Also, social network is used to communicate events being organized for end users as well. In addition, during the in-field interview we asked manager of social supermarket Osijek does it make sense to use social networks in communication with end users in case of social supermarkets and she responded: "*If the end user does not possess a cell phone or a computer to see the announcement on his or her own, some of their neighbors will pass them information. After all, Osijek is, known for its solidarity and information*

sharing culture. And this way of information sharing functions perfectly". Regarding communication with volunteers and donors the most active is social supermarket Rijeka, but this is due to their wide base of volunteers (50 regular and 400 occasional volunteers). However, Osijek is striving to give online individual appraisal for each donation and for each donation they publish the report and acknowledgement with the clear "thank you" notice for the donor. The reports are always illustrated by numerous photos.

TABLE 2. COMPARISON OF FACEBOOK PAGES OF SOCIAL SUPERMARKETS

Title (page name)	**Socijalna Samoposluga "Kruh sv. Elizabete" Rijeka**	**Rijeka Ljubavi**	**Socijalna samoposluga "Kruh sv. Antuna" Varaždin**
Location; Prhone number; E-mail address, Messernger address	+	+	+
Web address	+	+	-
Working hours	-	-	+
Keywords	3 keywords (includes social supemarket and/or grocery retail)	2 keywords	2 keywords (includes grocery retail)
Description	+	Only goal	+
Story	+	-	+
Other	Rewards	-	-
Frequency of publishing	At least once a week; last status published this week	Almost on daily basis; last status published yesterday	2-3 status per month, last status last status one month ago
Followers	1662	4689	760
Page likes	1681	4744	778
Check in on physical location	112	156	44
Cover pictures	6	7	2
Profile pictures	4	5	2
Pictures in Gallery	More than 100	More than 3000	More than 100

Note: + available information, - unavailable information; presented data is the result own analysis of Facebook activities of selected social supermarkets in Croatia on 30th August 2017

Also, Facebook is recognized as a tool for communication with the general public. All analyzed social supermarkets publish announcements on events and/or reports on organized events. But, usually, events notifications are done via Facebook status publication and, therefore, the functionality is not at the same level as it would be if the event is announced by entering Facebook event. If the event information is published as a status, followers cannot easily invite participants, nor export event to their personal calendars. Therefore, there is a place to improve this segment in the future. Regarding information sharing, we found that links to other Facebook pages are shared only in case of Rijeka social supermarkets, links to other portals (such as newspapers and magazines) are done at all social supermarkets, especially to articles regarding operation of the certain social supermarket.

TABLE 3. FACEBOOK COMMUNICATION WITH RELEVANT GROUPS

Information	**Rijeka**	**Osijek**	**Varaždin**
Announcements on package distribution to end user	-	Frequently	-
Announcements on the urgent distribution of unplanned / large donations	-	Frequently	-
Announces future events organized for end users	+	Frequently	-
Call for volunteers	Frequently	-	Rarely
Requests for donations	Frequently	-	Rarely
"Thank you" notices for donors	Periodically but not individualized	Frequent per individual donor	Occasionally, Individual and general
Announcement of events	Periodically, on the FB wall, only a few created events	Very intense, on the FB wall, not as FB events	Occasionally, as a status not created event
Events Reports	Occasionally	Very intense, photos always included	-
Own video	More than 30 shots, some are also available on your own YouTube channel	More than 50, highly visited, an average of over 10000 views per video	-
Links to other Facebook pages	+	-	-
Links to other portals (such as newspapers and magezines)	Rarely, only publications regarding this social supermarket	Approximately one per month, only publications regarding this social supermarket	Rarely, publications regarding this social supermarket and publications on poverty and sharing
Links to video produced by others	Approximately one per month	Approximately one per month	Rarely
Specifics	Own Youtube channel „Socka na YouTube-u"	Intensive comments of followers; 5-10 comments per status; on home page FB messenger chat	Motivational pictures and quotations on giving, poverty, nobility and sharing

Note: + available information, - unavailable information; presented data is the result own analysis of Facebook activities of selected social supermarkets in Croatia on 30th August 2017

In case of Rijeka and Osijek video materials produced by others is shared regularly if it is concerned with the operation of given social supermarket.

V. CONCLUSIONS

Social supermarkets as new intermediators emerged due to the economic crisis in Europe. Their main function is to

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efficiently distribute surpluses of products from traditional supply chains to people in severe material deprivation. As good examples, we analyzed the usage of social networks in three social supermarkets in Croatia, particularly Rijeka, Osijek and Varaždin. All three analyzed social supermarkets use Facebook as the social network suitable for public relations. Upon given examples we isolated 3 groups of social supermarkets' stakeholders addressed through social networks, those are: (1) end users, who search information on time, place and means of distribution of necessary goods within the supermarket (2) volunteers and donors to whom we can place various calls and requests, but also to whom we can make public appraisal via social networks, and (3) general public to whom we can share information on events, fundraising activities, give report on previously organized events, share links to other media and other social networks etc. All social supermarkets analyzed in the case foster active communication and share multimedia via social networks. They promote their activities and events on regularly basis, but relation to donors, volunteers and end users could be more improved in a near future. However, in order to explain the real efficiency of social network in everyday operation further research have to be done, this research could consist of survey within social network users population and further interviews with social supermarkets' managers. In addition, there are some raising questions to be addressed in the future papers and discussed both on national and international level. One of them is protection of privacy of individuals, especially end users, who, as socially endangered group of people, attend donation events and without their expressed will their pictures appears at social network pages of the social supermarket. The question of privacy protection is even more problematic if we know that some events are organized for children. Therefore, in the near future, in-field interviews and focus group research could be applied to address those questions.

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Assessing General Data Protection Regulation for Personal Data Privacy: is the End of "Take it or Leave it" Approach for Downloading Apps?

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***Abstract*—On a daily basis, an enormous amount of data are generated from several personal and non-personal devices, such as mobile phones, tablets, computers, sensors for the Internet of Things applications, etc. In most cases, the data are stored and analyzed aiming to improve the quality of the provided services. In cases, where these data are correlated, directly or indirectly, with a person are characterized as personal data. The collection, storage and processing of personal data raise several issues on personal data privacy, in particular when users are not well informed regarding the processing of their personal data. The aim of this paper is to examine to what extent the procedures currently followed in one of the most popular personal applications stores (Google Play), which contains more than 3 million mobile applications including social media applications, are in compliance with the provisions of the General Data Protection Regulation (GDPR). Our analysis shows that the current procedures, followed by Google Play store, are not fully in compliance with the upcoming framework, in particular with issues related to, users awareness regarding the scope of personal data process, non availability of user option to install an app without giving full access to his/her personal data and protection of minor users. It is argued that several modifications should be done, both from apps developers and stores, in order to harmonize the relevant procedures with the provisions laid out in the upcoming EU Regulation.**

Keywords- data privacy; personal data; GDPR; Google Play store; Android; EU framework.

I. INTRODUCTION

World is moving in fully digitalized societies, where citizens are using electronic communication services, mainly internet based, for entertainment, communication and work. Most of us, are always connected to internet with personal devices, such as smartphones in which several applications (apps) are installed. The increased demand for personal apps leads to the development of millions of apps, which are available for downloading in internet app stores, such as Google Play store. The vast majority of these apps require access to data, stored in users devices, which directly or indirectly could lead to personal identification, therefore are characterized as personal data. Indeed, as shown in [10] the majority of the examined mobile applications (84%), require access to almost every single file stored in mobile devices, while users are evaluating mobile applications, without taking into account the level of data access, requested by each mobile application. That leads to a preliminary conclusion that users, either are not aware about the level of required data access by mobile applications, or they choose to install mobile applications, regardless of the length of the required data access.

The framework of personal data and personal privacy remained the same in European Union (EU), for almost two decades. After four years of public consultations and discussions, within EU [8], in 2016 the General Data Protection Regulation (GDPR) was approved by the European Parliament, aiming to protect users from collecting, storing and processing of their personal data. The upcoming EU Regulation, introduces new principles to several issues related to personal data privacy in electronic communication sector, such as, the fully awareness of user about the purpose of personal data collection, the obligation of the existence of user consent, prior the personal data storage and process, the protection of minor users personal data introducing as mandatory the existence of parental consent, and several other issues.

Currently, the majority of internet stores and personal apps follow a "take it or leave it" approach, which means that users are not allowed to restrict or minimize the extent of the required personal data access, prior the installation of the selected app in their personal devices. If a user wants to download and install an app, has to accept the full set of personal data access types, determined by app developer, even though some of the required personal data types are not necessary for the provided app running, at least with the basic functionality. The scope of this paper is twofold: first, to designate the main principles, laid down in the GDPR, in relation to protection of user personal data privacy, when a user downloads an app to his/her personal device and second, to examine whether the procedures and principles currently followed by internet app stores and by app developers are in accordance with the relevant principles contained in the GDPR. To do so, one of the most popular internet app store was chosen (Google Play store) and an indicative, free of charge, popular personal app was selected ("Temple Run 2"). It should be noted that the scope of this paper is not to criticize the procedures, followed by the selected app, but to examine in general the harmonization of the principles followed in Google Play store, by millions of apps, with the provisions of the forthcoming Regulation. In this context, it models the relevant procedures contained in the GDPR and compared them, with the current procedures followed by Google Play store, in order to determine the

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GDPR provisions that are violated by the procedures currently followed in Google Play store.

The rest of this paper is organized as follows: in Section II, a literature review is discussed, while in Section III, first are modeled the procedures laid down in the GDPR and then are compared with the relevant procedures, in relation to personal data collection/storage/processing, followed by Google Play store. Finally, in the last section, the findings of this paper are discussed.

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II. LITERATURE REVIEW

The issues of personal data protection and in general data privacy, have drawn the attention of several researchers. The majority of existing research deals with the awareness of users in relation to the extent of personal data access, development of applications for personal data management, type of personal data that apps shared with third parties, sufficiency of information provided by app developers in relation to purposes of personal data collection and several other issues. In particular in [5], researchers concluded that the majority of apps does not provide sufficient information to users, in relation to the purposes and necessity of personal data collection. In addition they found that for 31% of the examined apps, the requested types of personal data access is excessive in relation to the apps functionality. In another study [6], researchers developed an app permission manager that showed users nudges about the data handling performed by the installed personal apps. They concluded, that a large percentage of users, given the right information, will modify the permissions initially granted to the apps in their smartphones. In [7], users were paid, in order to assert their level of comfort, with respect to giving apps access to privacy-related information in their smartphone. Researchers concluded that users, have different expectations compared to the developers of the applications, moreover they find it difficult to assess, why an app may require certain privacy-related data. In addition, it was found that when users are properly informed, then they feel more comfortable in providing access to the required information.

As regards, the compliance of the framework in relation to protection of personal data privacy, researchers are focused on minors protection, user consent, portability of personal data and several other issues. More specific, in [1] researchers critically assess the provisions of the new EU Regulation, related to the consent of minors, and makes a comparative analysis with the requirements stipulated in the relevant framework in the USA, in order to identify pitfalls and lessons to be learnt before the new rules in the EU become applicable. In [2], they discuss the provisions of new EU Regulation, in relation with the associated data protection and user privacy concerns, making reference to such Internet of Things (IoT) service offerings, as smart retail, the smart home, smart wearables, smart health devices, smart television and smart toys. In [3], researchers deal with a new obligation introduced by the GDPR, in relation to personal data portability. As personal data portability is defined the user right firstly, to receive his/her personal data, which he/she has provided to service provider, such as web service provider, and secondly, to transmit those data to another provider without hindrance from the controller to which the personal data have been initially provided. The researchers suggest that, in order to ensure comprehensive data portability that reaches out to all relevant stakeholders, including businesses, the provisions in the GDPR need to be analyzed by taking into account EU competition rules. Another interesting approach is related to the provisions included in the GDPR, in relation to the requirements and the implications put in place for the design of learning analytics systems [4].

III. GDPR AND GOOGLE PLAY STORE

A. Modelling the main GDPR provisions

The new EU Regulation published in 2016, introduced a new framework at EU level in relation to users personal data privacy. The provisions included in the new Regulation, are aiming to protect users' personal data, taking into account the digitalized environment of our societies. The scope of this study is to examine the provisions of the new Regulation, in relation to the principles that should be followed by app stores and developers, in relation to user awareness regarding the personal data protection. In addition a comparative analysis is made between the provisions included in GDPR and the relevant, followed by app developers and Google Play store.

In the following paragraphs are analyzed the main relevant provisions of the Regulation in relation to personal data privacy.

First of all, the scope of the GDPR (article 1) is related, among others, to the protection of natural persons (hereafter users), regarding the processing of personal data, regardless of whether the storage and processing of personal data take place in the EU, or not. As personal data (article 4), are considered all information relating to an identified or identifiable user, such as name, location data, an online identifier, etc. The principles, in relation to personal data collection/storage/processing, should be characterized by lawfulness, fairness, transparency, purpose limitation and data minimization (article 5). Purpose limitation means, that data shall be collected and processed for specified, explicit and legitimate purposes and not further processed is permitted, in a manner that is incompatible with those purposes. Data minimization means that collected and processed data, shall be adequate relevant and limited to what is necessary, in relation to the purposes for which they are processed. In addition the process of personal data is lawful, only if and to extent, the users have given consent for the processing (article 6). It should be noted that there are few more cases, in relation to the lawfulness of personal data processing, where user consent is not required such as, protection of user vital interest, performance of user contract, etc., but these issues are out of the scope of this paper. In article 7 of the Regulation, are contained the conditions for user consent. First of all, the controller of personal data (in our case, Google Stores and app developers), shall be able to demonstrate that the user has consented to personal data

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processing, when personal data processing is based on user's consent. In addition in cases, where users have given consent, in the context of a written declaration which also includes and other matters, the request of consent shall be presented in a manner, which is clearly distinguishable from the other matters, in a intelligible and easily accessible form, using clear and plain language. In order to assess, whether the consent has been given in a freely manner, utmost account shall be given, whether the provision of a service is conditional on content to the personal data, that are not necessary for the provision of the service. Last but not least, it should also be pointed out, that the Regulation introduces new provisions in relation to the collection and process of minors' personal data. In particular in article 8, it is mentioned that in case that user is under 16 years old, then the collection/storage/processing of his/her personal data, in relation to the provision of a service, is lawful, only if and to the extent that the consent has been given, or authorized, by the person who has the parental responsibility over the child.
In the following figure (Figure 1), are modeled the procedures that shall be followed when a user is downloading an app, to his/her personal device, according to GDPR provisions.

The first step, is related to whether the provision of an electronic communication service, concerns the collection and process of personal data. In the case, that the provision of a service is related with personal data collection, then the next step deals with the user consent. In particular, in the case that user has not give his/her consent, for the collection/process of his/her data, then the whole procedure is incompatible with the provisions of GDPR. In case, that user is under 16 years old, then the consent of the person, who has the parental responsibility over the minor user, is required otherwise the whole process is unlawful. In case, that user has give his/her consent, then it is crucial to examine, whether user has been informed about the purpose of personal data collection and process. If user is not aware about the purpose, then again the whole process is not compliant with GDPR provisions. The next step is dealing with the principles of data collection/processing, which shall follow the rational of purpose limitation and data minimization. For example, if data are collected / processed only for reasons relevant to service provision, then the collection of personal data, for advertising reasons is not lawful. In addition, if personal data are collected, which are not necessary and relevant to the informed purposes, then the whole process is not compliant with the provisions of GDPR. In the case, that user consent related to collection/processing of personal data, has been given within the context of other matters, such as, the terms and conditions of an offered service, then the request for personal data, shall be clearly distinguished from the other matters. Last but not least, it should be examined whether the user has the option to receive the requested service, but at the same time to deny the collection and process of his/her personal data, that are not necessary for the provision of the service.

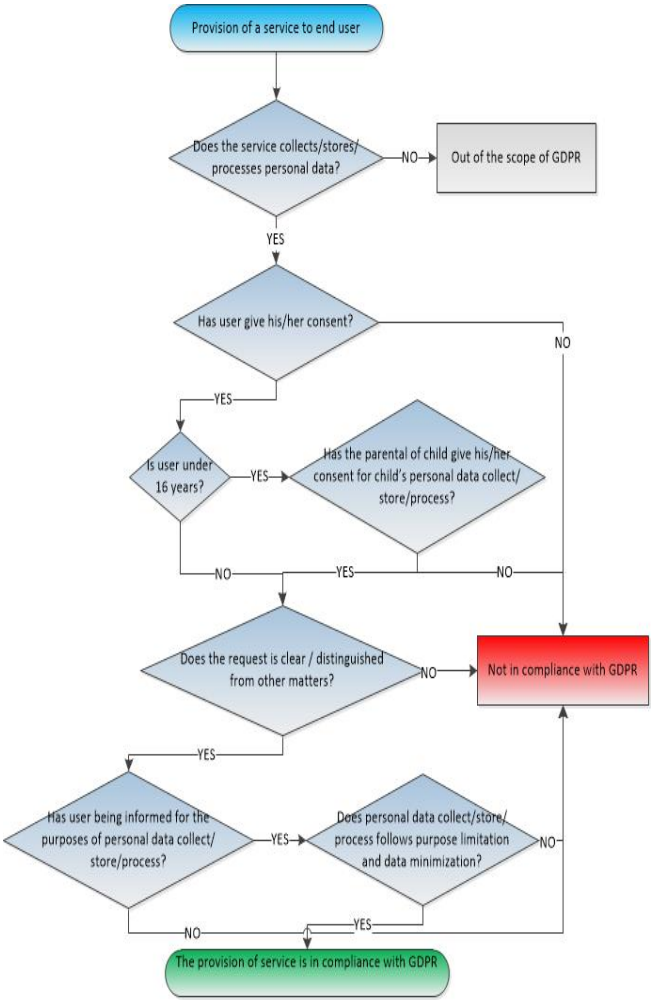

Figure 1. Main GDPR personal data privacy provisions during an app downloading.

B. *Downloading an app from Google Play store*

In the next paragraphs, the current procedure followed in Google Play store for downloading an application, is described. Google Play store is organized in four main categories: Apps, Movies, Music and Books. The Google Play store, contained (June 2016) more than three million mobile applications grouped in the following three main categories: the first one which contains 28 sub-categories, the second titled Games, contained about 17 sub-categories and the third one named Family contained about 9 sub-categories. Each sub-category contained hundreds or thousands mobile applications available for downloading either, free of charge or, paid. A precondition to download an app, from Google Play store, is the existence of a subscription to Google services and a personal device running Android operating system. It should be noted that subscription to Google services is allowed to a user, which is older than 13 years old (at EU level). In order to analyze the steps required for the installation of a Google Play application, one free of charge popular mobile app was

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selected and installed, named "Temple Run 2", which up to June 2017 had more than 100M installations. It should be noted that we logged in, with an account of a 15 years old user. The user of Google Store has the option to click the button "install", or before that, has the option to scroll down the page, in order to get information for several issues including the "Permissions", required by the app, as well as, the "Privacy Policy" of the app developer. By clicking "view details", under the header of "Permission", user is informed about the access, required prior the installation of the app. For the selected app user is informed, that the app will have access to "in app purchase", "photos/media/files", "storage", "view WiFi connection information", "view network connections" and "full network access". According to the explanation, given by app developer, "app purchase" means that the app may ask the user to make purchases inside the app, while access to "photos/media/files" means, that the app will be able to read, modify or delete the content of usb storage. The same explanation is given, by the app developer, in relation to access to "storage". The potential categories of permissions, required by any app in Google Store, are categorized and explained by Google Store site, in the terms and conditions of Google Store. The following table compares, for each permission category required in the selected app, the relevant description provided by the selected app, and Google Play store.

TABLE I. DESCRIPTION OF THE REQUIRED PERMISSIONS

Type of access	**Description / Explanation**	
	Google Play store	***Selected App***
In-app purchases	An app can ask you to make purchases inside the app.	not explained
Photo / Media / Files	An app can use files or data stored on your device. Photos/Media/Files access may include the ability to:Read the contents of your USB storage (example: SD card), Modify or delete the contents of your USB storage, Format external storage, Mount or unmount external storage.	read the contents of your USB storage modify or delete the content of your USB storage
WiFi connection information	An app can access your device's Wi-Fi connection information, like if Wi-Fi is turned on and the name(s) of connected devices. Wi-Fi connection information access may include the ability to view Wi-Fi connections.	view WiFi connections
Other	Other types of acces such as receive data from internet.	view network connections full network access
Storage	NA	read the contents of your USB storage modify or delete the content of your USB storage

It is obvious that the explanation given, by the selected app, is more generic and less specific than those included in the Google Store privacy policy, while it was expected the opposite. In addition, it was expected that the explanation provided by a specific app, will be easily understandable using plain and clear language.

C. Comparative analysis

Coming back to the awareness and understanding of a user, who is willing to download the selected app, an intermediate user is not aware what does mean "access to USB storage". The first question that may come in his/her mind is "does my phone has a USB connection / capability?". The vast majority of intermediate users correlates the "USB connection" with the memory USB sticks, used in laptops and desktops as external disks. So this kind of explanation, may confuse users, rather than assist them to understand the purpose, scope and type of the required permission. From an expert user point of view, all these required types of permissions arise several additional reasonable questions such as "for what reasons an app game requires, as a precondition for the installation, full access to all files stored in my personal device?". Furthermore, several other reasonable questions may arise for expert and non-expert users such as: "Do all these required permissions are necessary for the running of the app?" or "Can the app run, even with limited capabilities, if users deny the access to the full range of the required permissions?". Regarding the last question we did the following test. After downloading the app, an option, provided by Android operating system, was used to view and modify the permissions given in each app, installed in a personal device. So, the initial permissions of the selected app were modified, by reducing the permission related to "Photo/Media/Files". The app was still running, in the personal device, without noticing any limitation to the app functionalities / capabilities. So, a new important question arises: "why all these permissions are set as precondition for app installation, since are not necessary for the app basic functions?".

Coming back to the options, that a Google Play user has prior the installation of an app, we noticed that a user hasn't the option to install an app, without giving full access to all required permissions by an app. To our understanding a phrase that can perfectly describe the practice currently followed by app stores and millions of personal app developers, is "take it or leave it" approach.

The above analysis reveals discrepancies between the current approach, followed by millions of apps in Google Store, with the relevant principles, laid down in the forthcoming GDPR Regulation, as regards the personal data privacy. In particular, it was shown that the current followed practices, are in contrast with the provisions of the EU Regulation, in relation to the protection of minors' personal data. As described above a minor user (15 years old) is able to download and install an app, which requires access to his/her personal data (access to stored files in the device), without the consent of the person who has the minor's responsibility. This is fully incompatible with the provisions of EU Regulation. In addition, the selected app requires, as

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precondition for downloading and installation, access to personal data that, as proved, are not necessary for the running of the selected app, at least with the basic features of the provided app. Furthermore, we noticed that the description provided by Google Play store and the developer of the selected app, in relation to the required access to user's personal data, is generic without providing to user a clear, specific and understandable explanation, in relation to the purpose, as well as, the extent of personal data access.

IV. CONCLUSIONS

This paper assesses to what degree the current procedures, followed by Google Play store, are in compliance with the provisions of the General Data Protection Regulation, in relation to personal data. It was critically examined issues such as, the existence of user consent for personal data access, protection of minor users, existence of specific and understandable explanation, in relation to the types of personal data access and the clarification of the purposes for which access to personal data is required. Furthermore, focus was given to the procedures that should being followed by a user, who is willing to download and install a mobile app to his/her personal device. To do so, an app was selected from Google Play store app and downloaded / installed in a personal device.

The findings of this paper reveal incompatibilities between the new EU Regulation (GDPR) and the procedures currently followed in one of the most popular personal app store (Google Play store). In particular, the currently followed approach, we call it "take it or leave it" approach, does not allow users, to download and install a personal app without, prior the installation, giving full access to all, required by app developer, set of personal data. This approach is not compliant with the provisions of the GDPR. Furthermore, users are currently not well informed, neither for the purposes of the required personal data access, either for the extent of required access. Another important incompatibility deals with the protection of minors and the requirement set by new EU Regulation, regarding the mandatory existence of parental consent, in case, an app requires access to children's personal data.

It is argued, that the current Google Play store procedures, failed to be in accordance with the new EU framework, which requires that users of electronic communication services, need to be fully aware about the purposes of personal data selection and the extent of personal data access. In addition users shall have simple tools in order to understand how their privacy can be compromised and have the means to deny the use of their personal data, or to minimize the extent of personal data access.

Further research could be done in relation to the procedures followed by other popular stores, like IOS store, as well as, to examine several other indicative apps in order to verify or not, the findings of this paper.

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Is the News Deceptive? Fake News Detection using Topic Authenticity

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***Abstract*—In this paper, we propose an approach for the detection of fake news in online social media (OSM). The approach is based on the authenticity of online discussions published by *fake news promoters* and *legitimate accounts*. Authenticity is quantified using a machine learning (ML) classifier that distinguishes between *fake news promoters* and *legitimate accounts*. In addition, we introduce novel link prediction features that were shown to be useful for classification. A description of the processes used to divide the dataset into categories representing topics or online discussions and measuring the authenticity of online discussions is provided. We also discuss new data collection methods for OSM, describe the process used to retrieve accounts and their posts in order to train traditional ML classifiers, and present guidelines for manually labeling accounts. The proposed approach is demonstrated using a Twitter pro-ISIS fanboy dataset provided by Kaggle. Our results show that the method can determine a topic's authenticity from *fake news promoters*, and *legitimate accounts*. Thus, the suggested approach is effective for discriminating between topics that were strongly promoted by *fake news promoters* and those that attracted authentic public interest.**

Keywords–Fake News Detection; Link Prediction; Data Collection; Topic Authenticity.

I. INTRODUCTION

Traditionally, television and newspapers were the kinds of media devices used to inform people about the news and other topics of interest. However, in recent decades new vehicles for news delivery have been introduced, such as computers and mobile devices. Moreover, the popularity of viewing news on these devices has grown due to the easy access of online news using smart devices, and content generators, that provide users with a steady stream of personalized news, derived from a wide variety of news sources. As a result, online news is rapidly replacing traditional media devices [1].

Although online news provides numerous benefits, this domain is also problematic. For example, the nature of online news publication has changed, to the point that traditional fact checking and vetting performed to prevent potential deception are sometimes absent or incomplete due to the flood of material from content generators [2]. The flood of unchecked news has contributed to the growing problem of fake news publication, which has been defined as particular news articles, which are intentionally deceptive and their publication and propagation [2].

There are dangers associated with the publication of deceptive news. In many cases, these news are published for spreading rumors, influence, and intentionally mislead people [3]. For example, nasty rumors about organizations, which are published by malicious users, can result in serious reputation damage [4].

In many cases, a *fake news promoter* takes over a specific online discussion and may have a strong influence on the other participants writing on the topic. In this study, we propose a method for detecting fake news in online social media (OSM) based on a machine learning (ML) classifier capable of distinguishing between *fake news promoters* and *legitimate accounts* participating in the same online discussion. The classifier is based on behavioral features (e.g., total number of retweets), network analysis features (e.g., co-citation closeness centrality), and link prediction features (e.g., max total friends in common posts graph from *fake news promoters*), which are used to compare OSM accounts participating in a particular online discussion to both confirmed *fake news promoters* and *legitimate accounts*. The classifier attempts to quantify the authenticity level of accounts, where *fake news promoters* and *legitimate accounts* are placed on opposite ends of the authenticity scale. We demonstrate that the distribution of accounts' authenticity is different in topics that are prone to OSM manipulation and in those topics that attract authentic public interest. In order to evaluate our method, we used the Twitter Propaganda dataset provided by Kaggle [5].

The contributions of this paper are:

- identifying link prediction-based features that are found useful for account classification. To the best of our knowledge, we are the first to identify link prediction features that address the account type classification;
- developing a novel method for data collection for cases in which the samples come from only one class. The method is based on topic detection and is useful for retrieving unlabeled samples with the same context;
- providing guidelines for manually labeling accounts with respect to fake news; and
- demonstrating the account authenticity distribution within OSM discussions;

The rest of this paper is organized as follows: In Section II, we review approaches for the detection of fake news, and abusers who are capable of spreading fake news within OSM, and review the concept of topic modeling. We describe the proposed method, including: a new method for data collection (Section III-A), the general guidelines for labeling accounts manually with respect to fake news (Section III-B), a novel classifier, which was found useful for the classification of *fake news promoters* and *legitimate accounts* (Section III-C) and the proposed topic authenticity estimation approach (Section III-D). Section III-E discusses ethical considerations, and we conclude the paper in Section IV with a summary and our plans for future work.

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II. Related Work

In this section, we provide the necessary background information regarding the major issues focused on this study: fake news detection methods, methods for identifying abusers, and topic modeling in OSM.

A. Fake News Detection

The approaches for fake news detection can be divided into two categories as depicted by [2]: linguistic and network analysis. The linguistic approach is based on extraction of the content of deceptive messages, and analysis to associate language patterns related to deception. One of the simplest models based on this approach is the bag-of-words. The methods based on this model rely on shallow lexico-syntactic cues. Most of them are based on dictionary-based word counting using Linguistic Inquiry and Word Count (LIWC) [6], such as [7]. Others take advantage of ML techniques using simple lexico-syntactic patterns, such as n-grams and part-of-speech (POS) tags [8], or location-based words [9]. Recently, [10] developed hybrid convolutional neural network model which integrates metadata with text. They showed that hybrid model improves a text-only deep learning model. The shortcoming of this approach is that it relies solely on language: it does not differentiate between various meanings of words that look the same, and word counting does not categorize combinations of words or phrases that might imply different meanings [11].

Syntax analysis is a more sophisticated approach that attempts to detect fake news. Feng et al. [12] extended Ott et al.'s n-gram feature set [13] by incorporating deep syntax features derived from probability context free grammar (PCFG) parse trees. It was found to be useful for deception detection with about 90% accuracy. Later, others developed third party tools in order to automate this process, such as the Stanford Parser [14], and AutoSlog-TS syntax analyzer [15].

Semantic analysis is an other means of deception detection. [16] proposed a method that uses profile compatibility in order to differentiate between genuine and fake product reviews. They extended their previous n-gram plus syntax model [12] by mixing profile compatibility features. The researchers proposed the use of additional signals of truthfulness by characterizing the degree of compatibility between the personal experience described in a test review and a product profile derived from a collection of reference reviews about the same product. They showed that such additional signals of truthfulness significantly improve their model's performance. The shortcomings of this approach include the fact that it is restricted to the domain of application, and the limited ability to select alignment between features and descriptors that are dependent on the content of a profile.

Discourse analysis is another method that can help in the detection of fake news. Rubin et al. [17] used rhetorical structure theory (RST) that served as the analytic framework for the identification of systematic differences between deceptive and truthful stories in terms of their coherence and structure. They used a vector space model (VSM) that estimates each story's position in a multi-dimensional RST space with respect to its distance from truth and deceptive centers as a measure of the story level of deception and truthfulness. Recently, automatic tools for rhetorical classification have become available, but they have not yet been employed in the context of veracity assessment.

One more common method for the detection of deceptive cues is the use of ML classifiers, such as support vector machines (SVM) [18], and Naive Bayesian models [15].

As opposed to the linguistic approach there is the network analysis approach that provides aggregate deception measures, based on network, along with behavior features, such as message metadata or structured knowledge network queries. This approach is used in many applications, which involve real-time content, such as micro-blogging applications (e.g., Twitter) [2]. For example, [19] attempted to differentiate between human, bot, and cyborg users in terms of tweeting behavior.

B. Identification of Abusers

Several studies involving the identification of abusers have been conducted. [20] proposed a method for clustering accounts based on the similarity of the posted URL; they classified each cluster as either malicious or not by extracting behavioral and content features of each cluster. A method for the identification of crowdturfers on Twitter was presented by [21]. They extracted features that were related to account properties, activity patterns, and linguistic properties. [22] proposed a method for detection of artificially promoted objects, such as posts, pages, and hyper-links, as part of crowdturfing tasks. In this study, we extracted variety of features in order to classify an object as artificially promoted or not. [23] and [24] used supervised ML techniques for bot detection. [23] based their detection on sentiment analysis, social network analysis, posted content, and account property features. [24] presented BotOrNot, a bot identification platform that can be used through a Web user interface. They detected bots based on all the features like [23], including behavior features.

Recently, [25] identified hoaxes within Facebook based on the users who interacted with them rather than their content. [26] found evidence that socialbots play a key role in the spread of fake news. [27] proposed a method for estimating the authenticity of online discussions based on several similarity functions of OSM accounts participating in the online discussion. They found that the similarity function with the best performance across all the datasets was bag-of-words. This study is different from the current study in the goal (estimating the authenticity of online discussions within the domain of 'Virtual TV' versus fake news detection), the datasets, the method for account labeling, and the evaluation method (KNN with similarity function versus ML classifiers).

C. Topic Modeling

[28] introduced a technique called Latent Dirichlet Allocation (LDA) for identifying topic proportions in documents. k topics are defined for the entire corpus and each document in the corpus contains these topics in different proportions. LDA has been applied in a large number of areas, including text summarization, document search, and clustering. In LDA, topics are defined as probability distributions over a fixed set of terms within a corpus [28]. It means that a topic related to specific issue will include all of the words in the corpus, but words co-occurring together across multiple documents in the corpus revolving around this issue will have the highest probability in that topic's distribution, whereas words that appear less frequently will have a lower probability. In this study, we used LDA for identifying prominent online discussions or topics.

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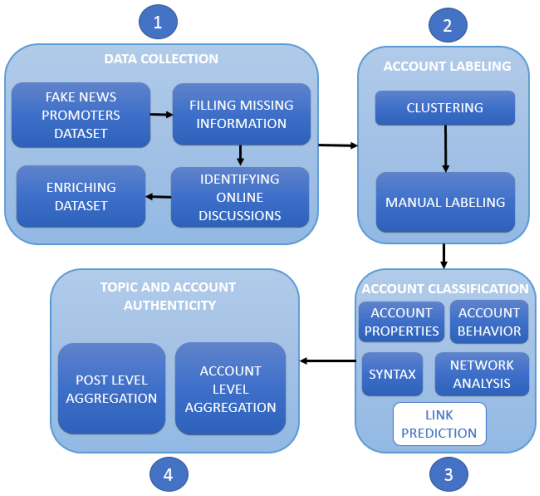

Figure 1. Estimation of account and topic authenticity.

III. PROPOSED METHOD

We propose an approach for detecting fake news based on estimating the prevalence of *fake news promoters* among the accounts that contributed to the given online discussion. In this section, we provide a comprehensive description of the proposed method, from data collection to authenticity of accounts and topics (depicted in Figure 1).

A. Data Collection

We used the Twitter Propaganda dataset which includes solely *fake news promoters*: 17,410 tweets published by 112 pro-ISIS fanboys from around the world from the November 2015 Paris terrorist attacks until May 2016. The dataset includes information about the account, such as account's full name, username, description, location, number of statuses, and number of followers. The information regarding the tweet included content, publication date, and time-stamp.

The first step in the data collection process includes using provider services in order to fill in the missing information regarding the given accounts. The more information we are able to obtain, the greater the number of helpful features that can be extracted. In this case, we used the Twitter REST API public service [29] to obtain the missing information about the *fake promoters*' accounts (e.g., number of friends). However, in the case of the Twitter Propaganda dataset, all of these accounts were suspended by Twitter administrators. It is important to note that at this point we only have samples of *fake news promoters*; we also need samples of *legitimate accounts* in order to use traditional binary supervised learning techniques (described in Section III-C). The next step is to use topic detection algorithms, such as LDA or latent semantic analysis (LSA) in order to identify online discussions. Each online discussion or topic is composed of several terms. We took the top ten terms in each topic by probability and retrieved 100 recent tweets that included these terms using the Twitter REST API. We decided on the top ten terms, because we believe that this number is sufficient to cover a topic. Additional terms are not necessarily provide posts, which are directly related to a given topic. Moreover, increasing the number from ten to a greater number would increase the amount of time spent crawling. Eventually, we collected 27,654 tweets that were published by 360 unlabeled accounts.

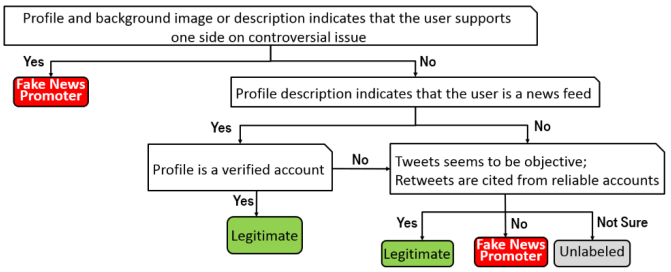

Figure 2. The manual labeling guidelines.

B. Account Labeling

In order to train a ML classifier or directly estimate the authenticity of the rest of the accounts in the dataset, we need samples of *legitimate accounts*. The overall approach is based on selection of the 'right' accounts for labeling, as well as strict unambiguous labeling guidelines. There are too many unlabeled accounts to manually label all of them. The simplest idea is to randomly choose unlabeled accounts and label them. However, by doing this we may inadvertently choose accounts from one type and not from the other. For this reason, we clustered the accounts, i.e., grouping a set of accounts in such a way that similar accounts will be in the same group. The clustering was carried out using features described in Section III-C. Selecting an equal number of samples from each cluster will preserve the highest variability among accounts.

Next, we manually inspect the unlabeled accounts and assign labels to them. We developed guidelines for the manual classification of an OSM account as a *fake news promoter* or *legitimate account*. The manual labeling process is presented in Figure 2 and described below.

(1) First, we look at self-descriptors, such as the profile, background image, and the description section of the account. A profile image is one of the most important personal attributes on OSM [30]. In many cases, it expresses the user's main motto or idea. In cases in which the profile image expresses support for one side of a controversial issue, we mark it as a potential *fake news promoter*. For example, an account in which the profile and background image contain extreme statements, such as 'Free Palestine' with clenched fists soaked in blood, would be marked as a potential *fake news promoter* due to its subjective opinions regarding the Israeli-Palestinian conflict. Likewise, extreme statements in the description like 'Evil Assad' with a profile image of the flag of Syrian Arab Republic (opposition) or Kurdish forces in Syria would be marked as a potential *fake news promoter* due to its subjective opinions regarding the Syrian civil war.

(2) Then, in cases in which an OSM account declares itself as a news feed or any other type of content aggregator, we check to determine whether it is a verified account. Tweets that are published by an authority are likely more reliable than tweets from an account with less credibility [31]. In cases, such as those mentioned above, we mark the account as a *legitimate account*. In those cases in which the news feed account remains unverified we look closer at the content published. If the tweets present an objective perception, or retweets from other reliable news feeds, we mark it as *legitimate*. If the tweets seem to be subjective or surrounding one side of a conflict, we mark it as a *fake news promoter*. If no clear decision can be

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made regarding the source and nature of the news, the account remains *unlabeled*.

(3) Finally, we inspect the account's published content. If the majority of the posts published by the given account contain authentic content or the account retweets from a reliable account, we mark it as a *legitimate account*. In cases in which the posts are subjective and bias toward one side, we mark it as a *fake news promoter*. If no clear decision can be made regarding the source and nature of the posts, the account remains *unlabeled*.

We used the Committee of Experts approach in order to reach an agreement on the account labels. Three annotators (students) participated in the manual labeling process. They independently reviewed the same groups of unlabeled accounts and analyzed their Twitter profiles and posts. The annotators then assigned a label of either *legitimate account* or *fake news promoter* to each account. In case of full agreement among them, the label was set. It is important to reach full agreement in order to avoid biased labeling in case that the annotators belong to a specific cultural background or political community while the unlabeled accounts belong to the opposite community that protests against the annotators' community.

C. Account Classification

In this section, we describe the features used to classify Twitter accounts and present the results of our evaluation. In this study, we used features that were reported to perform well in the past [21], including a mixture of static account properties, behavioral features, and content / syntax related features. Moreover, we present the link-prediction features, which were found to be useful for classification.

Features based on account properties: screen name length. Other features (e.g., account age, friend-follower ratio, and others) were calculated, but later removed. Due to the suspension of the pro-ISIS fanboys, we could not complete these features.

Features based on account behavior: number of retweets, average retweets, and number of received retweets.

Features based on syntactic characteristics: average hashtags, average links, average user mentions, and average post length.

Features based on network analysis: we created two graphs: common posts, and co-citation.

- Common posts. OSM accounts that publish the same content might be part of a crowdturfing campaign [32]. *Common-posts* graphs emphasize which OSM accounts spread the same content across the OSM.
- Co-citation. There is significant evidence that one of the main malicious tasks is to spread hyperlinks across the OSM [33]. A *co-citation* graph shows which OSM accounts share the same hyperlinks, thereby discovering potential malicious activities.

The network analysis features were calculated as a Cartesian product between 1) the two graphs described above, 2) algorithms for calculating centrality in graphs, such as closeness centrality, clustering, and degree centrality, and 3) aggregation functions, such as mean, standard deviation, kurtosis, and skewness.

Features based on link prediction: these features are novel and they were identified during the current research and are not part of previous studies. These new features are used to assess the likelihood of each account to be a *fake news promoter*. First, we choose small number of known *fake news promoters* randomly. Afterwards, we create the common posts and co-citation graphs as described previously. Later, for each account, which is a node in the given graph, we calculate how much it has in common with other *fake news promoters*. For example, feature named 'Link prediction - max - total friends - common posts - fake news promoter' depicts the maximal number of friends a given account has in common posts graph with all the random *fake news promoters*. Actually, these features are a Cartesian product between 1) the two previously described graphs (common posts and co-citation), 2) the link prediction measures: Jaccard's coefficient, common neighbors, preferential attachment [34], Adamic-Adar index [35], total friends, transitive friends, opposite direction friends [36], and Bayesian promising [37], and 3) the aggregation functions: minimum, maximum, mean, median, skewness, and kurtosis.

In order to evaluate the predictive power of the extracted features, we applied information gain feature selection [38]. The most significant features are described in Table I. Among the top ten most significant features, six features are related to link prediction. These results suggest that it is important to consider both the topic affinity of an author and the behavioral properties of the account during classification.

TABLE I. TOP FEATURES ORDERED BY INFORMATION GAIN.

Rank	Feature	InfoGain
1	Average post length	0.2731
2	Average retweets	0.2352
3	Average user mentions	0.2231
4	Link prediction - max - total friends - common posts - fake news promoter	0.1894
5	Link prediction - median - total friends - common posts - fake news promoter	0.1894
6	Link prediction - min - total friends - common posts - fake news promoter	0.1894
7	Link prediction - mean - total friends - common posts - fake news promoter	0.1894
8	Average links	0.1062
9	Link prediction - kurtosis - total friends - common posts - fake news promoter	0.0672
10	Link prediction - skewness - total friends - common posts - fake news promoter	0.0672

We trained several ML classifiers (XGBoost showed the best results) in order to determine the differences between *fake news promoters* and *legitimate accounts*. Each classifier was trained with multiple sets of features having the highest information gain score. The performance of the classifiers was evaluated in terms of the area under ROC curve (AUC), accuracy, precision, and recall during internal 10-fold cross-validation. The results of the best classifier for each algorithm are summarized in Table II. We note that the best classifier was trained using XGBoost on all the features with an AUC of 0.935, accuracy of 0.89, and precision and recall of 0.913, and 0.923 respectively.

TABLE II. THE PERFORMANCE OF THE BEST CLASSIFIERS.

Algorithm	Num of features	AUC	Accuracy	Precision	Recall
XGBoost	All	0.935	0.89	0.913	0.923
Random Forest	All	0.93	0.85	0.87	0.911
Random Forest	20	0.919	0.87	0.88	0.941
XGBoost	20	0.89	0.83	0.85	0.912
AdaBoost	All	0.86	0.832	0.875	0.875
Decision Tree	All	0.83	0.84	0.89	0.87

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D. Authenticity of Accounts and Topics

We estimate the authenticity of accounts using the confidence level provided by the best trained classifier. We define authenticity of the account x as the confidence of x being a *legitimate* account. The last step of the proposed approach is aggregating the authenticity of individual OSM accounts into authenticity of topics. We consider the following two aggregations:

a) Post level aggregation: In this case, every post is associated with the authenticity of its account. The authenticities are accumulated in terms of topic probabilities. The LDA-based topic detection determines the probability $T_{p,i}$ that post p belongs to topic i. Next, for each OSM account x and each topic i, we compute the average probability that x's posts belong to topic i.

$$topic\text{-}auth\text{-}1(i) = \sum_{p \in P} T_{p,i} \cdot acc\text{-}auth(A(p)) \qquad (1)$$

b) Author level aggregation: First, a set of authors of posts for a specific topic is determined. Then, the authenticities of the author accounts are aggregated. We define the set of accounts involved in a specific topic i as

$$D(i) = \{A(p) : T_{p,i} = MAX_j \{T_{p,j}\}\}.$$

Here, every post is associated with a single topic – the one it belongs to with the highest probability. An account is associated with a topic if at least one of its posts is associated with that topic. The account level authenticity of the topic i is then determined as follows:

$$topic\text{-}auth\text{-}2(i) = \sum_{x \in D(i)} acc\text{-}auth(x). \qquad (2)$$

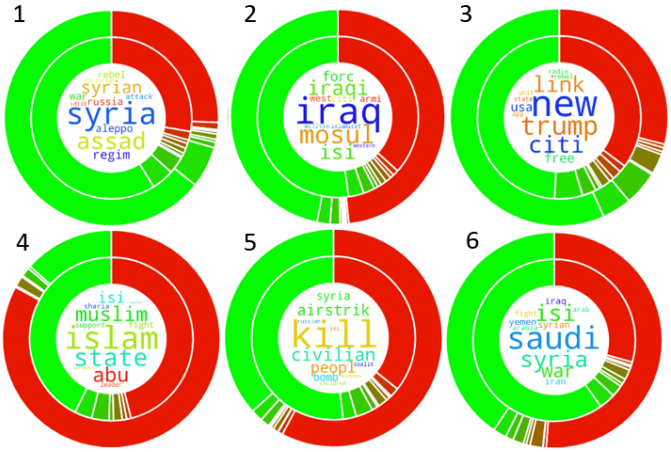

Figure 3. Authenticity distribution in six topics from Twitter Propaganda

In order to visually represent the authenticity of each topic, we used donut charts as depicted in Figure 3. The number of topics in the collected dataset was optimized empirically to produce coherent topics. In total, we found twenty-three coherent topics. For the sake of brevity, we show the authenticity distribution of six topics. In the middle of each donut chart, we include the word cloud representing the topic. Each word cloud includes the terms with the highest probabilities. For example, topic 1 includes the terms: 'Syria', 'Assad', 'regime', 'Aleppo', 'Russia', 'war', 'attack', etc. The inner cycle of the donut chart enclosing each word cloud represents the account authenticity distribution. Similarly, the outer cycle depicts the post level authenticity distribution. Green and red color represent authenticity scores that equal to 1, and 0 respectively. High and low authenticity scores resemble *a legitimate account*, and *fake news promoter* respectively.

We can see, that in some cases (e.g., topics 4, 5, and 6) the fraction of posts is disproportional to the fraction of accounts having the same authenticity level. This means that a few *fake news promoters* took over the online discussion in these topics and may have had strong influence on the rest of the accounts who wrote on this topic. Moreover, we succeeded in detecting several meaningful topics: topic 1 focused on reports of the Syrian civil war in Aleppo, along with the intervention of Russia in support of the Assad regime; topic 2 focused on the war between ISIS and the Iraqi forces in Mosul; topic 3 centered on President Trump and U.S.; topic 4 focused on ISIS and Islamic issues; topic 5 focused on the air strike in Syria during Syrian civil war with emphasis on the killing of civilians; and topic 6 centered on ISIS operations in several locations in the Middle East, such as Saudi Arabia, Yemen, Iraq, and Syria. Based on these results, we believe that the online discussions surrounding the reports of the Syrian civil war in Aleppo regarding Russia forces and the Assad regime, as well as the reports regarding President Trump are genuine. In addition, we can see a higher level of *fake news promoter* participation in topics centering on ISIS and the air strikes in Syria, which raise doubts about the reliability of this news.

E. Ethical Considerations

Collecting information from OSM has raised ethical concerns in recent years [39]. In order to minimize the potential risks that may arise from such activities, this study follows recommendations presented by [40], which deal with ethical challenges regarding OSM and Internet communities.

For this study, we used the Twitter REST API public service for two purposes: first, for obtaining the missing information about the pro-ISIS fanboys (e.g., number of followers), and second, in order to enrich the Twitter Propaganda dataset of unlabeled posts and accounts who posted the same context as the pro-ISIS fanboys. The Twitter REST API collects the information of accounts that agree to share their information publicly. Moreover, the research protocol was approved by the Ben-Gurion University of the Negev Human Research Ethics Committee.

IV. Conclusion

In this paper, we proposed a method for detecting fake news based on distinguishing between *fake news promoters* and *legitimate accounts* participating in the same online discussion. Using the proposed method, we demonstrated the distribution of accounts' authenticity for each topic. As a result, we could identify topics that are prone to OSM manipulation, as well as topics that attract authentic public interest. We believe that the proposed method can be useful for users to detect fake news and misinformation within OSM. Moreover, we introduced an approach for collecting data when there is only information from one class. We believe that this method can be valuable to others when there is a need of collecting samples from the other class in the same context.

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Finally, the discovery that link prediction features are capable of improving author type classification is very important and may be an indication of the key role these features play in the domain of fake news identification. In the future, we plan to evaluate the presented approach on additional datasets spanning fake news in multiple domains, such as politics, product reviews, etc. We think that it would be interesting to estimate whether the link prediction features are useful only in the domain of ISIS fake news or they are also useful for classification in other different domains.

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Assessing Situation Awareness through Blogosphere: A Case Study on Venezuelan Socio-Political Crisis and the Migrant Influx

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***Abstract*—The objective of this research is to determine whether the blogosphere, as a type of social media platform, can be used to disseminate information regarding the socio-political views and concerns of citizens within a community. As an example case, we focus on examining information relative to the Venezuelan community regarding the current Venezuelan socio-economic crisis. Are Venezuelan blogs being used to express quality of life concerns that are associated with the crisis? Are Venezuelans using blogs to discuss possible migration away from the region as a result of these concerns? The Blogtrackers tool was used to analyze almost 30,000 Venezuelan blog posts collected between August 2003 and March 2017. Our analysis showed that the blogosphere is indeed being used as a platform for citizens to discuss these issues. We show how the posting frequency, sentiment, and keyword trends have changed over time relative to the changes in the socio-political landscape of the region. Of particular interest is the keyword trend analysis that shows that blogs are being used to discuss issues associated with quality of life factors and interest in migration away from Venezuela as a result of the crisis. We believe that this study can be used as a starting point to show the value of analyzing blogs in facilitating humanitarian assistance efforts.**

Keywords-blogosphere; situation awareness; socio-political; social media data analysis; migrant influx.

I. INTRODUCTION

Social media platforms, such as Twitter, Facebook, YouTube, and blogs have changed the way citizens express and share their sentiments regarding socio-political situations within their communities, and have created a space for citizen journalism [14]. These new mediums of communication have also allowed for citizen sentiment to be channelized from the online forum to the streets in the form of public debates and protests. Tufekci and Wilson [27], for example, demonstrated that participation in protests, both before and on the first day of the Tahrir Square demonstrations was elicited by information that citizens posted on blogs, Facebook, and Twitter.

A blog is a "personalized webpage, kept by the author in reverse chronological diary form" [10]. Blogs give people a social identity and are a medium for association, self-expression, and dissemination of information [30]. Blogs can be a very effective way to gain an in-depth understanding of issues and events due to the fact that recording, revisiting, and reflecting on the past is possible through previous blog entries. The ability for readers to leave comments in an interactive environment is an important part of blogging.

Blogs serve as an interactive platform for information exchange and discussion, and provide useful information about events. [2] Blogs serve as a way for citizens to gain situational awareness of the socio-political landscape of their environment, and data experts who track and analyze blogs can gain an understanding of the perspectives and intentions that exist among citizens. In this paper, the Blogtrackers tool [35] was used to analyze a large dataset of Venezuelan blogs to determine whether the blogosphere is being used to disseminate information about issues stemming from the Venezuelan socio-economic crisis, and, if so, how this content is changing over time. This information is particularly helpful for emergency responders, and policy and decision makers leading humanitarian assistance efforts.

The rest of this paper is organized as follows. Section II reviews the currently published literature regarding citizen use of social media platforms relative to the attainment of situational awareness of socio-political issues. Section III explains the methodology used such as the data collection process and the Blogtrackers tool. Section IV provides a discussion of the data analysis results. Section V concludes the study outlining future research directions.

II. LITERATURE REVIEW

Next, we present a review of the literature relevant to this research.

A. Informational Power of Social Media Platforms

Many sources highlight the power of Social Media Platforms such as blogs, Twitter, Facebook and YouTube to be effective tools for allowing citizens to engage in socio-political scenarios such as obtaining information, disseminating information, participating in socio-political discussions, and becoming mobilized to act or to participate in impactful events [1][7][9][15][18][20][26][28][29]. Additionally, some sources focus on or add that the effectiveness of social media platforms as informational and motivational tools can be leveraged by organizations for crisis management and emergency response [6][7][18][21] [22][29][31][33]. Much of the literature highlights the power of social media platforms by using the example of the 2010 protests in Egypt, followed by an Egyptian Revolution in 2011, wherein the public used social media to communicate their dissatisfaction with socio-political issues such as

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poverty, unemployment, corruption, high prices, repression, and human rights abuse [1][3][9][15][18][32].

B. New Media Versus Traditional Media

Many sources refer to Social Media Platforms as "New Media" [1][19][26], "Participatory Media" [9][17], and "Modern Information and Communication Technologies (ICTs)" [1][3][26][32], and draw a contrast with "Traditional Media" platforms such as television, newspaper, and radio (especially state-controlled traditional media) [1][3][9][17] [18][19][26][28]. Valentini et al. [28]. showed that crises tend to be communicated or framed differently within the writings of new media (specifically blogs) than they are within the writings of traditional media. Some sources contend that citizens are increasingly using social media sites for obtaining and disseminating socio-political information due to the perceived or real incompetence of or censoring by state-owned media outlets [1][3][19].

C. A Focus on the Blogosphere

A small pool of sources focuses specifically on blogs as a means for obtaining and disseminating socio-political information [3][5][26][28]. The number of blogs has been said to double every five months; they are easily found and can be accessed freely by anyone with an internet connection [26]. Al-Ani et al. [3] highlighted the power blogs played in mobilizing citizens during the Egyptian revolution of early 2011. Blogs represent a "counter-narrative" to the government-controlled media especially during times of crisis, and provide a means to voice dissent and to challenge authoritative power [3]. Blogs provide a means to potentially develop and maintain a strong sense of community among citizens interested in certain themed topics [5]. Additionally, blogs often-times represent "citizen-based news sources" that challenge traditional media in terms of the ability to form public opinion [28]. The information posted on blogs and the commentary reactions to the posts, therefore, have become of increasing interest to social media researchers.

D. Cybersecurity Issues

Some sources highlight the potential cybersecurity issues related to the use of social media platforms for spreading situational awareness in terms of socio-political issues [12] [17][18]. Fearn [12] warns that "cybercriminals" are increasingly using programs called "bots" to attack social media users via Twitter, Facebook, and YouTube with negative comments and to spread disinformation or fake news via these platforms. Since the blogosphere is also a social media platform, the potential for blogs to be used nefariously by bots can be argued [17]. Goolsby et al. [17] also argue that social media can be used to broadcast "hoax messages", which can "hide among the stream of natural messages and be accepted…".

E. Methodologies for Analyzing Blog Data

A review of the literature shows a variety of methodologies for conducting data analysis on blog data. Al-Ani et al. [3] utilized the technique of topic modeling on blog data to ascertain how blog topics changed over time between 2004 and 2011. The topic modeling technique revealed time-specific themes in the blog data that could then be compared with public events and citizen actions such as protests [3]. Berendt et al. [5] used text and graph mining to analyze blog data. The text mining revealed the word themes in the data; whereas the graph mining exposed the connections between the bloggers in terms of their use of these words/themes [5]. In addition to longitudinal content analysis, Valentini et al. [28] applied sentiment analysis to blog data wherein they attempted to assign the sentiment values of neutral, positive, or negative to each blog post. Their analysis revealed interesting time-relevant topics and associated sentiments, such as a strong lack of trust in public and private governing entities surrounding political issues [28].

F. Migration Potential Resulting from Socio-Political Crisis?

Google [16] created an interactive data visualization for tracking the interest in migrating to various countries of destination from specific countries of origin. Of particular interest is the data visualization showing a ranking of 1 to 211 based on user search counts about migrating to the United States from within a particular country. For example, Venezuela is "ranked 105 out of 211 countries for Google searches for immigration to the United States from 2014-2015" [16]. According to numerous sources, Venezuelans are protesting against their government due to such reasons as unemployment or low income, lack of access to basic needs such as food and medicine for themselves and their children, and political corruption [13][18][23]. Although the Google search data visualizations [16] precludes many of the Venezuelan issues that have been recently reported, one can still ask the question of whether or not there is potential for Venezuelans to migrate away from the many problems that they have been experiencing in their specific socio-political crisis? An analysis of numerous active Venezuelan-specific blogs was conducted to provide some insights.

III. METHODOLOGY

Next, we present our proposed methodology.

A. Data Collection, Cleaning, and Indexing

Using the Blogtrackers tool, three steps were executed in order to crawl and collect the data from an identified set of Venezuelan blogs: (1) exploring the blog site, (2) crawling the blog site, and (3) cleaning and storing the data in a database for analysis and retrieval (Fig. 1). Hussain et al. provide a detailed explanation of the mechanics of the Blogtrackers tool in "Analyzing the Voices during European Migrant Crisis in Blogosphere" [34].

*1) Exploring the blog site: S*everal blog sites were identified that specifically discussed issues relevant to Venezuela. Subsequently, each site was explored to determine whether their structure was ideal for use with the Blogtrackers tool. It was also important that the blog continually be focused on Venezuelan topics and contain

specific meta-data attributes for each post such as author, title, and date.

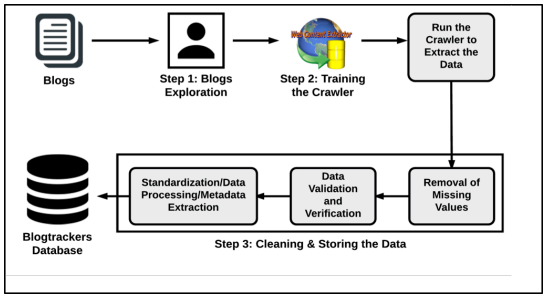

Figure 1. Data collection process.

2) Crawling the data: The Web Content Extractor (WCE) tool [36] (Fig. 2) was then used to collect data from each blog site. Once the crawler is set up, the tool begins from a set of seed URLs—the blog sites' home pages—and advances through each blog post to extract all of the desired attributes.

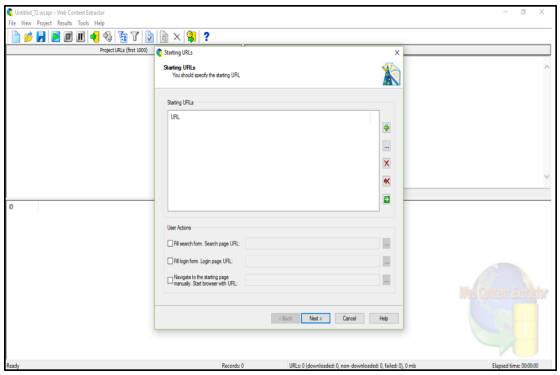

Figure 2. Web Content Extractor.

3) Cleaning and Storing the Data: A three-step cleaning process was used. (1) Clean from within WCE by deleting empty fields and advertisement URLs. (2) Clean with SQL queries to select validated and verified data. (3) Clean with a script to standardize attributes, extract metadata, sentiments, and outbound URLs.

B. Analyzing the Data with Blogtrackers

Blogtrackers is a tool designed to explore the blogosphere and gain insights about events and how these events are perceived in the blogging community [25]. After setting up a Venezuelan blog tracker, five features of the Blogtrackers tool were used to analyze the resultant dataset.

1) Posting Frequency

The "Posting Frequency" feature was utilized to identify any unusual patterns in the blog postings. This aids in detecting real-time events that interested the blogging community. The user can click on any data point on the graph to get a detailed list of the named-entities mentioned in blog posts during that time-period. This feature also displays a list of active bloggers with number of posts. Fig. 3 shows the posting frequency for Venezuelan blogs from 2003 to 2017.

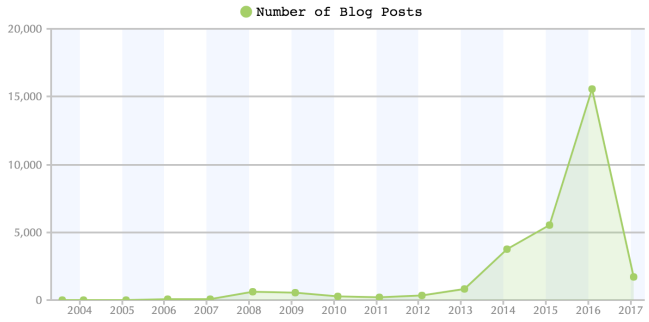

Figure 3. Change in Venezuelan blog posting trends from 2003 to 2017.

2) Keyword Trends

The "Keyword Trends" feature was used to provide an overall trend for keywords of interest. It helps track changes in topics of interest in the blogging community. The user can select any data point on the trendline to view all the blogs and a network of co-occurring named-entities. Fig. 4 shows the keyword trends related to the ongoing Venezuelan socio-political crisis.

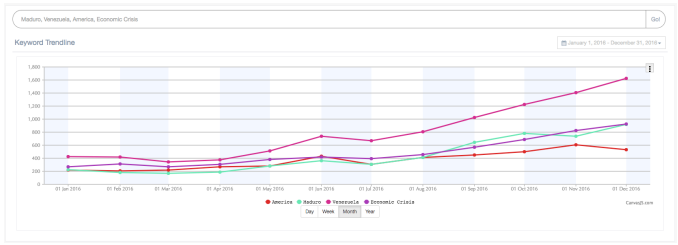

Figure 4. Trends for keywords "Venezuela", "Maduro", "America" and "Economic crisis" for 2016.

3) Sentiments and Tonality

The "Sentiments and Tonality" feature was used to display the trend of positive and negative sentiments of blogs for a selected time-period (Fig. 5).

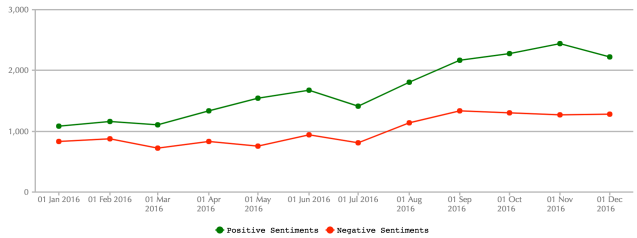

Figure 5. Venezuelan blog sentiment trends for 2016.

The sentiment and tonality features used were as defined by Pennebaker et al. [37][38] and as calculated by the Linguistic Inquiry and Word Count (LIWC) software [39]. Additionally, a data analyst can drill down by clicking on any point of interest and view radar charts (Fig. 6), which display tonality attributes such as personal concerns, time orientation, core drives, and cognitive process.

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Figure 6. Tonality of two random Venezuelan blog posts.

4) Influence

The "Influence" feature was used to identify the influence of a blogger or post. Agarwal et al. discussed the concept of *influence* with regard to bloggers [2]. The "Influence" feature of the Blogtrackers tool can display the influence trends over time for the top 5 influential bloggers (Fig. 7). Clicking on a point on the trend line allows a deeper dive into the data by displaying the most influential posts for that period. Additionally, a user can explore the content themes of active-influential, inactive-influential, active-non influential, and inactive-non influential bloggers.

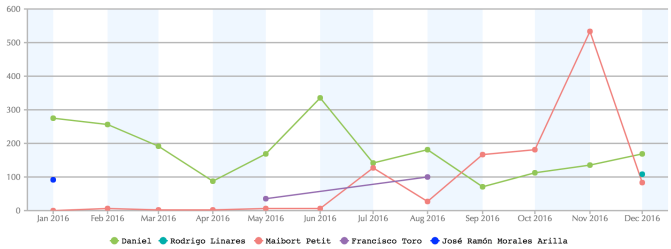

Figure 7. Influence trend for top 5 bloggers for 2016.

5) Additional Blog Info

The "Additional Blog Info" feature was used to provide additional information about a specific blog. A dashboard-like screen is presented to the user, revealing the posting trends and sentiments of the selected blogs, as well as a list of the underlying URLs and domains. Fig. 8 shows this feature being used to look at a specific blog from the database called, "Caracas Chronicles". At a glance, we can see some interesting things about this particular blog; such as, it is most active on Monday's; it was most active during the month of February in 2014, December in 2015, and April in 2016; and more negative sentiment in 2016 than in 2015.

Figure 8. "Additional Blog Info" Blogtrackers feature for selected Venezuelan blog.

IV. DISCUSSION

Next, we present the discussion of the results.

A. Venezuelan Blog Database

To assess whether Venezuelan blogs were discussing issues related to the economic crisis in Venezuela, 40 blog sites were identified. The blogs were found using simple manual search techniques on various platforms, such as google.com, blogsearchengine.org, and fastblogfinder.com. The blogs were reviewed by our research team to ensure that they fit the structure required by the Web Content Extractor and the Blogtrackers tool. A final dataset of 29,493 blog posts was obtained between August 27, 2003 and March 26, 2017. A total of 177,870 links were extracted (120,296 being distinct links) from 13,590 domains and 749,829 entities. The post sentiments were also extracted. Table 1 gives the language distribution for this dataset.

TABLE 1. LANGUAGE STATISTICS

Language	Blogs	Blog Posts
Spanish	23	16,916
English	29	12,490
Italian	3	51
French	3	3
Portuguese	2	2
German	1	2
Breton	1	1
Catalan	1	1
Polish	1	1

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B. *Posting Frequency of Venezuelan Blogs*

Fig. 9 shows a more detailed view of blog posting frequency from January 2015 to March 2017, which indicates a continuous increase. Specifically, blogging activity increased drastically between March 2016 and January 2017. This increase corresponds to news reports of hundreds of thousands of people beginning to take to the streets in protest during early September of 2016 [8].

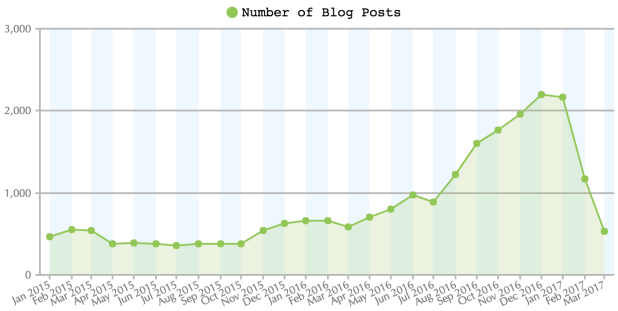

Figure 9. Change in Venezuelan blog posting frequency from January 2015 to May 2017.

C. *Keyword Trendlines for Venezuelan Blog*

To further assess the extent of the impact of the crisis on Venezuelan citizens, the dataset was searched for quality of life keywords such as “need food”, “need water”, “need petrol”, “need medicine”, “high prices”, and “inflation”. The resultant keyword trendlines indicated that the occurrence of these quality of life factors fluctuated over time (Fig. 10).

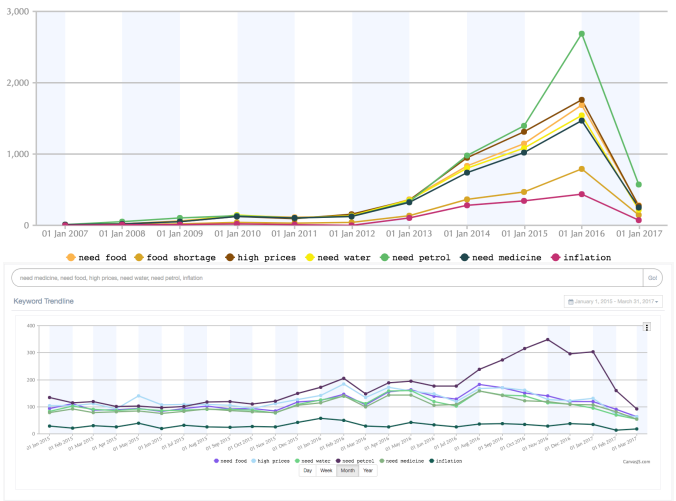

Figure 10. English keyword trendlines for various quality of life keywords over time.

Trendlines for the Spanish equivalents for these quality of life keywords were also generated (Fig. 11). For example, similar to the increase in blog posting frequency, the quality of life keywords trends figures each show a large increase in frequency beginning near early September of 2016 [8][4].

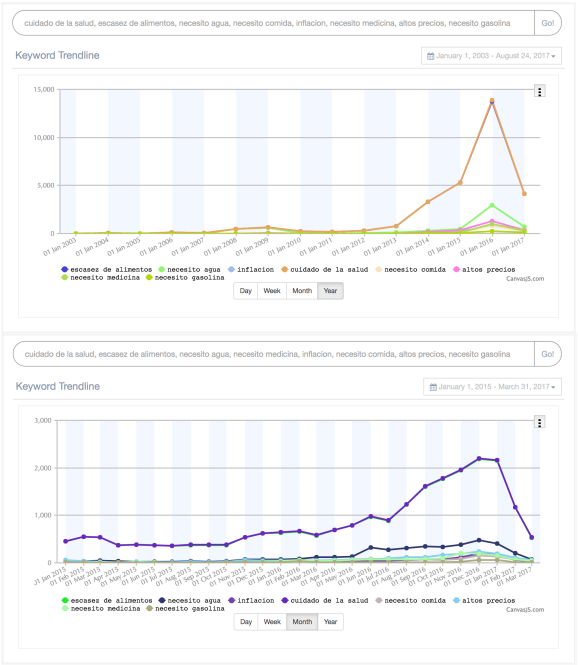

Figure 11. Spanish keyword trendlines for various quality of life keywords over time.

These quality of life keywords may represent a set of motivational factors leading to an interest in Venezuelan citizens migrating away from Venezuela. To explore this suggestion, we generated several trendlines for keywords such as “immigrate”, “migrate”, “emigrate”, and “leave Venezuela” (Fig. 12). The frequency of occurrence of the keyword, “leave Venezuela” seems to drastically increase between the end of 2015 and beginning of 2016.

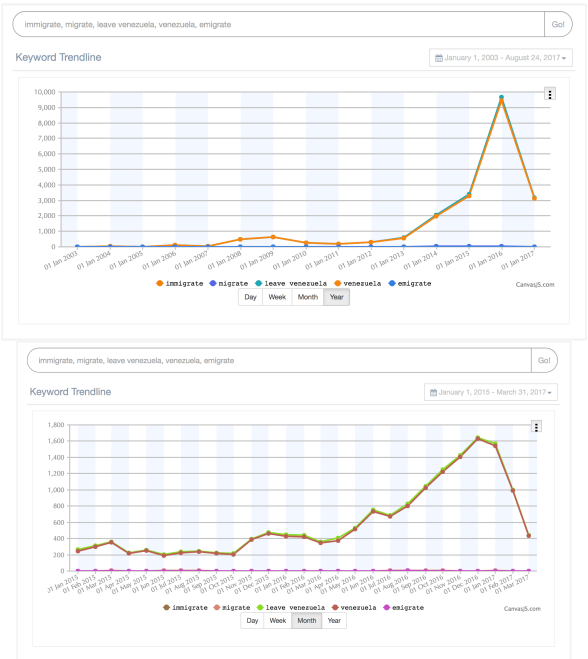

Figure 12. English Keyword Trendlines for various keywords that possibly indicate migration interest over time.

Trendlines for the Spanish equivalents for these migration keywords were also generated (Fig. 13). It was revealed that the keywords "leave Venezuela" and "Venezuela" were almost identical, indicating that every time Venezuela was mentioned it was about leaving or migrating from Venezuela. As with the quality of life indicators, these migration-related keywords trends figures show a large increase in their frequency beginning in 2016, especially near early September.

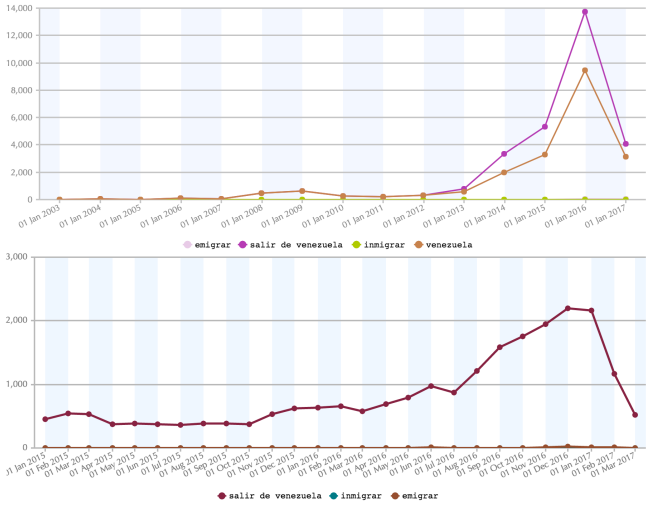

Figure 13. Spanish Keyword Trendlines for various keywords that possibly indicate migration interest over time.

D. *Timeline of Sentiments Among the Venezuelan Blogs*

Recall that Fig. 5 shows the prevailing sentiment of the blogs for a specific time period. Fig. 14 provides a more detailed and various view of how the sentiment of the Venezuelan blogs has changed over time. The graphical output appears to show a sharp shift to a prevailing positive sentiment in early January 2016. This could correspond to the Venezuelan leader, Nicholas Maduro, declaring a 60-day economic emergency for the region in order to give himself power "to pay for welfare services and food imports" [4]. Subsequently, however—and although many blog posts were identified as having a negative sentiment—the prevailing sentiment of the blogs has been positive for the past two years. This prevailing positive sentiment seems counterintuitive, as we expected to see a prevailing negative sentiment due to the ongoing Venezuelan economic crisis and continued reports of Venezuelan citizens protesting in the streets. Therefore, we believe that the concept of sentiment with regard to this dataset needs to be addressed further in future work involving a more detailed dataset and a possible revision of how sentiment is calculated. Consequently, for this paper, we can only conclude that the graphical output at this time does not seem to reveal any significant differences over time, and appears to only fluctuate along with the recorded count of blog posts.

Figure 14. Change in sentiment of Venezuelan blogs over time.

E. *Tonality of Venezuelan Blogs*

Recall that Fig. 6 displays the feature of Blogtrackers that shows tonality attributes of individual blog posts. For example, for two random Venezuelan blog posts in our dataset, the predominant personal concerns were "Work" and "Money". The predominant time orientation was "Present focus". The predominant attribute for core drives and needs was "Power" (and to a lesser extent "Achievement"). The predominant cognitive process was not as clear, varying among that of "Differentiation", "Tentativeness", and "Cause". The predominant summary variable was "Analytical Thinking". Finally, the predominant sentiment/emotion for this timeframe was "Anger". We did not analyze the tonality feature further for this paper, but believe that the concept within the blogosphere should be examined in future work.

F. *Influential Venezuelan Bloggers*

Recall that Fig. 7 shows the top 5 influential bloggers for a specified time period. Blogtrackers calculates influence based on the blog characteristics of inlinks, outlinks,

comment quality, and blog post content quality [25]. Fig. 15 is another example of the feature, using January 2015 to March 2017 as the selected time-period of analysis. One blogger, "Daniel", was consistently more influential than other bloggers. We did not analyze this feature further for this paper, but believe that the concept of influence within the blogosphere should be examined in future work.

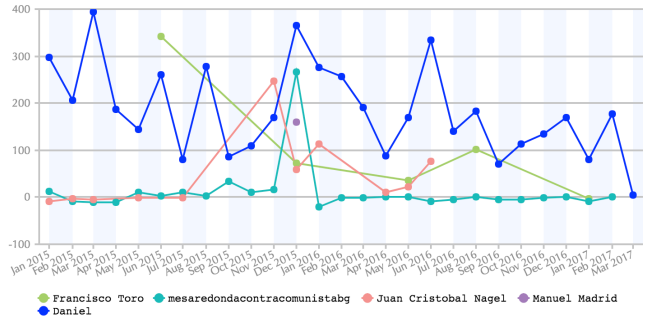

Figure 15. Influence trend of top 5 Venezuelan bloggers from January 2015 to March 2017.

V. Conclusion & Future Work

This paper establishes the basis for using blog analysis for studying socio-political awareness. This approach is novel in that few researchers have specifically focused on analyzing blogs, and instead focus on other social media platforms, such as Twitter and Facebook. As a detailed example, this research showed that Venezuelan blogs are being used to disseminate socio-political information in an attempt to increase awareness during the Venezuelan economic crisis. Our analysis showed that the frequency and content of posts changed over time, reflecting changes in the socio-political landscape of the region—such as protest events, the decline in quality of life factors such as the need for food and medicine, and interest in migration away from Venezuela. The sentiment of the blogs seemed to change over time as well, but the graphical output was inconclusive and the concept needs to be addressed further in future work. We believe, however, that blog analysis—with Blogtrackers and other tools—can continue to be used to gauge socio-political awareness of important issues. This paper sets the stage for future work using Blogtrackers and other natural language processing tools and techniques for blog analysis as a possible approach for anticipating events (e.g., protests, migration, refugee scenarios). Future work may also include further analysis of the concepts of blog tonality and blogger influence. Broadly speaking, this particular study sheds a spotlight on the blogosphere's role in assessing situation awareness of a region engulfed in socio-political crisis. This information can provide actionable insights to emergency responders, humanitarian assistance organizations, policy and decision makers.

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