Gender Inference for Arabic Language in Social Media

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ABSTRACT

The widespread usage of social media has attracted a new group of researchers seeking information on who, what and, where the users are. Some of the information retrieval researchers are interested in identifying the gender, age group, and the educational level of the users. The objective of this work is to identify the gender in the Arabic posts in the social media. Most of the works related to gender classification has been for English based content in the social media. Work for other languages, such as Arabic, is almost next to none. Typically people express themselves in the social media using colloquial, so this study is geared towards the identification of genders using the Saudi dialect of the Arabic language. To solve the gender identification problem the authors, a novel method called k-Top Vector (k-TV), which is based on the k-top words based on the words occurrences and the frequency of the stems, was introduced. Part of this work required compiling a dataset of Saudi dialect words. For this, a well-known widely used social site was relied on. To test the system, we compiled 1200 samples equally split between both genders. The authors trained Support Vector Machine (SVM) and k-NN classifiers using different number of samples for training and testing. SVM did a better job and achieved an accuracy of 95% for gender classification.

Keywords: Arabic Language, Data Mining, Gender Classification in Social Media, k-Nearest Neighbors, Saudi Dialect, Support Vector Machine (SVM)

1. INTRODUCTION

Today, we live today in the “information society,” in which individuals, governments and organizations alike generate and accumulate enormous amounts of information that can no longer be analyzed manually. Data mining, with its various algorithms and applications, is therefore a natural response to this information barrage. According to the McKinsey Global Institute, the amount of generated data will see the annual increase of 40% worldwide, and already today companies with over 1000 employees have stored at least 200 terabytes of data (Larose 2014). Social media plays a significant role in the daily life of many people and organizations. The growth in the number of users has led to a massive increase in the size of social data. In turn this has led to increase the interest in researching this field. There exists

DOI: 10.4018/IJKSR.2014100101
a good deal of researches covering different aspects of social media. This includes, age group estimation, demographic interests, gender, etc. Twitter is considered well-known in Saudi Arabia community where Saudi Arabia ranks second in world’s fastest growing countries on Twitter with 90% of the tweets being in Arabic (Jiffry, 2013). Most of the researches in the field of social media have focused on Twitter (Alwagait and Shahzad, 2014a, 2014b). Some of the works that focused on gender classification for English language are (Pennacchiotti and Popescu, 2011; Marquardt et al., 2014; Liu and Ruths, 2013). Few works have addressed Arabic language in the social media (Abdul-Mageed, Diab and Kubler, 2013).

In this paper we focus on gender classification for Arabic social media using the Saudi dialect. Our work differs from other existing methods because it introduces a system to classify gender using a new feature representation of text called k-Top Vector (k-TV). We generated new dataset that covers the social contents for the Saudi dialect. We found the approach in (Liu and Ruths, 2013) to be quite relevant when doing the gender classification for the Arabic language.

The obtained results in this work are comparable to the state-of-art. The rest of this paper is divided as follows. In Section 2, it examined some related works focusing on feature extraction and classification methods. In Section 3, it introduces the feature vector representation (k-TV) for the gender classification for the Saudi dialect. In Section 4, it covers the proposed solution. Results and discussion presented in Sections 5. Finally, conclusion of paper work with future directions in Section 6.

2. RELATED WORK

A literature review is carried out to analyze different approaches for feature extraction for gender classification in social media sites (especially for Twitter). According to the state-of-the-art there are two categorizes for the features: behavior related and statistical related features. In the behavior related features, it focuses on the lexical and behavior of the social users based on the text, images, metadata … etc. In the statistical related features, it focus on some statistical parameters for the words and characters in the text.

2.1. Behavior Related Features

Pennacchiotti and Popescu (2011) introduced a system to infer user attributes such as political orientation or ethnicity by user behavior information network structure and the linguistic content of the Twitter data. They relied on four general feature classes: user profile, user tweeting behavior, linguistic content of user messages and user social network features. They introduced profile-based features (PROF) to identify the gender of a user. Based on statistics done on 15000 random users, they concluded that profile fields do not contain enough good-quality information to be directly used for user classification purposes.

Marquardt et al. (2014) introduced feature set which maximized accuracy of gender and age prediction. The feature set had two different categories: Content-based features (MRC features, LIWC words and Sentiment) and Stylistic features (Readability, HTML Tags, Spelling and Grammatical Errors, Emoticons and Other Features). They also employed for gender classification a system of heuristics based adjustment for gender prediction using a customized lexicon of phrases. They evaluated their feature set on four online media genres: blogs, Twitter feeds, hotel reviews, and unspecified social media. They trained SVM on their feature set. They obtained the accuracy 71.15% for English based content compare to the baseline 50%.

Alowibdi et al. (2013a) used a large dataset of Twitter profiles to identify the features which classified the users based on genders. They used the phoneme sequences of first names and user names as features. The system was trained using set of KNIME classifiers. The training process used a “ground truth” of a user’s gender by following the links from the profiles to other
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