users we are interested in to analyze in this study. Moreover, we have excluded the Twitter accounts created or have all the activities after 2014 since these accounts are incapable to reflect the continuous change of refugees' conditions and needs.To analyze the development of refugee related issues and events, we focus more on the users for whom we have data that covers the years when refugees arrived to Turkey (See Figure 2).

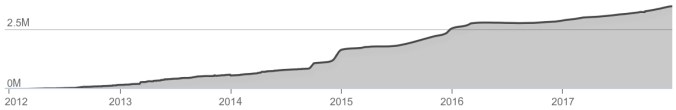

Fig. 2. Number of Refugees in Turkey per year [1].

Table III shows the number of accounts with the date of their oldest tweets collected.

With the aforementioned approach, out of 5707 accounts and 12 million tweets, we have refined the accounts into 633 and the tweets to almost 800 thousands, and classified these tweets into: tweets (435,378) and RT(336,753).

TABLE III
NUMBER OF USERS WITH THEIR OLDEST KNOWN ACTIVITY

Year	2018	2017	2016	2015	2014 & before
N.Users	876	2997	815	397	633

B. Textual analysis

In this study, we are concerned on the direct opinions of refugees. Thus, we didn't include retweets in our analysis. We find out the frequency of occurrence of each word in the combined text from all tweets. Since most of the conjunction and pronouns etc in Arabic have less than three letters, we discarded any word which has less than three letters to select useful and meaningful words.

Conducting an analysis based on the direct count of words, misleadingly favors the commonly used words of daily life rather than the representative words that reflect a specific event or topic. To avoid highlighting such common words we use the following simple approach: subtracting the frequency of occurrence of a word in the whole period from the frequency of occurrence of the word in a specific year.
This approach highlights the representative words in a domain of interest and suppresses the misleadingly high frequency of common words e.g., pronouns, conjunction, suffixes. Using the results, we have created the word clouds seen in Figure 3. The analysis shown is an example which was conducted for the total tweets in Turkey in the whole period, and another example of a yearly based analysis of 2016.

C. Visual analysis

As a result the textual analysis step, we figured out the keywords reflecting the important events in a specific domain of interest. These keywords are still ambiguous out of their

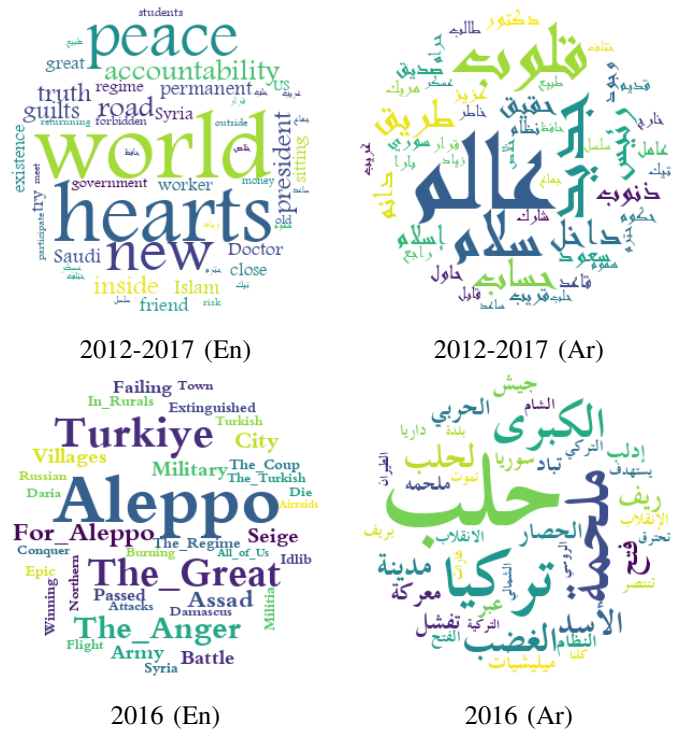

Fig. 3. Generated wordclouds for years 2012 to 2017. Same wordclouds for 2016 presented: Original Arabic words (right), translation to English (left).

context. High complexity of written Arabic language also increases the ambiguity level. Thus, to find out what is really meant by these keywords, associated media can be helpful. Therefore, we download images from tweets including a keyword in its specific time domain. Subsequently, for each keyword, we have media sets containing more than hundreds of images. To determine the most representative images among each set we applied the following method (See Figure 4).

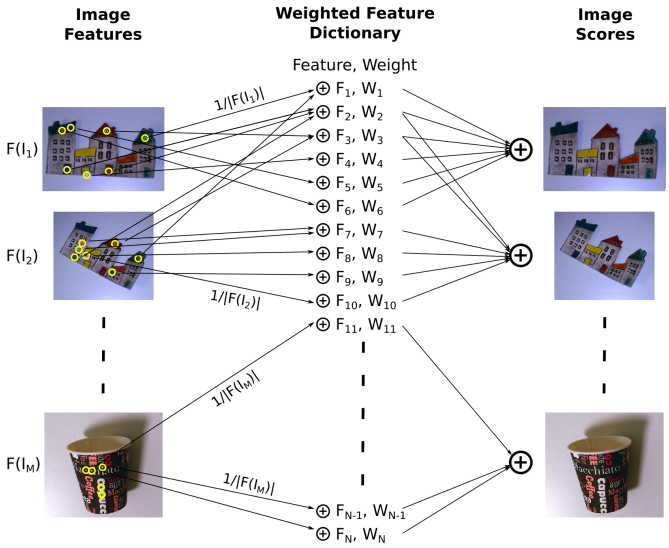

Fig. 4. Calculating image scores.