Hashtag Segmentation of Conversational Tweets in Turkish, Modelling Segmentation Approach Final Report

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Twitter is the latest social networking tool which affects everything related to the person. Twitter allows its users to write at most 140 character long update, it is known off as "tweet". In this research, analyzing segmentation of hashtags from tweets is our main objective. There are several researches in English, but not that much in Turkish. Studying with the Turkish corpus is somehow hard to study, because Turkish resources have grammer problems due to the English effect. The usage of the hashtags differ in country to country. Having more than one word in the hashtag or lapsus calami prevent researchers to work properly. It is the first project in Turkey to segment tweet's hashtags in Turkish. Therefore, the results of our project is milestone in that manner. It will assist oncoming projects in the case of corpus and method needs. The other part of the project is analyzing hashtags in the way of linguistics. Analyzed corpus will give more information about related countries. In the other words, short-term hashtag analyses keep informed about spesific situations which influence the society. After all said and done, we will recognize the strength of computer science on natural languages.

Keywords: Twitter; Tweet; Tweets; Hashtag; Segmentation; Turkish; Conversational Tweets; Hashtag Segmentation

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1. INTRODUCTION AND MOTIVATION

1.1. Introduction

1.1.1. The Story of Hashtag

A hashtag is a type of label or metadata letters used especially on social network and microblogging services which makes it easier for users to find messages with a specific theme or content.

The story is began with Twitter but has extended to other social media platforms as well as “facebook”. In 2007, developer Chris Messina proposed, in a tweet, that Twitter begin grouping topics using the hash symbol. Twitter initially rejected the idea. But in October 2007, citizen journalists began using the hashtag “#SanDiegoFire”, at Messinas suggestion, to tweet updates on a series of forest fires in San Diego.

1.1.2. Decision of Hashtags

Which characters can be defined as #hashtag is the important part of our project.

A hashtag is defined by any string prefixed with a “#”, for instance, #freedomtomark, #shesuggest. The string can be a single word, an acronym, or multiple words joined together, and usually identifies the subject topic of the tweet (e.g., #ENG493) or expresses a comment about it (e.g., #kappamevku).

Spaces are an absolute segmentation rule. Even if hashtag contains multiple words, they should be together. Using capital letters in between words have no meaning. (#CahitArf). Uppercase letters will not alter search results, so searching for #CahitArf will yield the same results as #cahitarf.

Numbers are supported in Twiter, so as #23NisanBayrami. However; punctuation marks, commas, periods, exclamation points, question marks and apostrophes are forbidden characters. In addition to them; asterisks, ampersands or any other special characters are also restricted ones. There is no preset list of hashtags. Creating a brand new hashtag is simple by putting the hash before a series of words, and if it hasn’t been used before, a new hashtag is invented.

1.1.3. Origin of Implementation

The main objective is to implement machine learning based hashtag segmentation application.

The first work was using twitter developer tools to extract tweets from Tweeter’s database. In the case of hashtag extraction, there are several issues. Using large amount of raw data that is recieved from social media is the way of creating corpus. In the field of natural language processing, the essential requirements are datasets. Having realiable training and test data helps to improve current algorithm. Because languages are flexible and few training and test data cause to reproduce wrong idea. It somehow clarifies why there is not enough research in Turkish. That is because, improving datasets might help researchers to test their idea and models in the future.

The starting point of project is primarily based upon gathering sufficient data to avoid backing to drawing point. That is, being blind to quantity of data causes to quit idea. Hence, the researcher should collect large amount of data, but also with well-selected contents. When the research topic comes to natural language processing, size and quantity of data is important. Extending corpus enhances current models to achieve better results.

1.1.4. Word Segmentation

Word segmentation means dividing a text into meaningful words. Human-beings can divide text into words with their mental process, but computer not. Word segmentation became more difficult, meanwhile not using a seperator or using more than one form for seperation. Hence, natural language processing begins after that field.

There are several methods about word segmentation. Methods will be discussed in the case of convenience with Turkish.

1.2. Motivation

The common problem about languages which have Latin alphabet system is deciding the word boundary. There are three types of word boundary type.

First one is using space between words. We can not use space segmentation in our project, because hashtags do not contain spaces. Second type is using uppercase letters at the beginning of words. It is the main seperation rule of our word segmentation. If hashtags have more than one word in it, we can check the uppercase letters to decide word boundaries. However, when it comes to real world the usage of letters in hashtags differs from the second type. The third one is using no uppercase or using nonsense uppercases in hashtags. Because of the natural languages' aspects, datasets contain the hashtags which are the third type of boundary type.

For natural language processing, we have to determine the word's boundaries first. The method that we used tries to work on collected data to create a model that demonstrates the Turkish words' structures.

2. STATE OF ART

2.1. Related Papers and Projects

2.1.1. A Simple and Effective Unsupervised Word Segmentation Approach

2.1.2. Word Segmentation: Quick but not Dirty

2.1.3. A Statistical Learning Algorithm for Word Segmentation

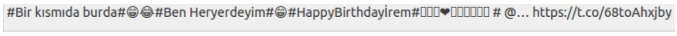
2.1.4. Optimizing Chinese Word Segmentation for Machine Translation Performance

2.2. Improvement of Our Project

3. METHODS

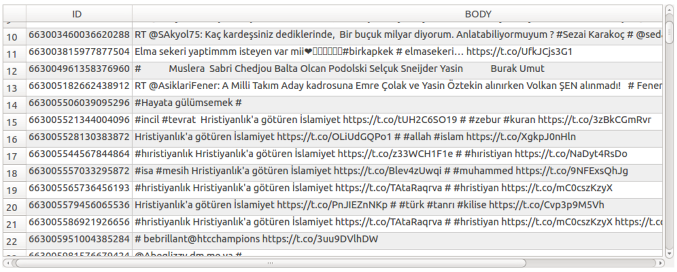
We have tried to discourse manly with 3 methods. Hashtag segmentation can be generally defined as word boundry detection. Because of this, we start with detection of the word boundry. There are two featurebased learning methods, Conditional Random Fields (CRFs)(Laerty et al.,2001) and Maximum Entropy (MaxEnt). CRFs can represent the uncommon parts of the information as elements furthermore, are great at displaying grouping marking problems. MaxEnt is extremely compelling at learning with a high assortment of components, without agonizing over the multifaceted nature of the model. Hidden Markov Model is a simplistic approach for word segmentation. It helps us to built character trigrams. It tries to catch boundary characters that are current and previous ones. Peter Norvig's implementation can be used for word bigrams.

Manual annotation is time consuming task and it limits the amount of trainig data that can be created. We try to achieve utilizing data to create training sets for hashtag segmentation. Synthetic hashtags by concatenating



#Bir kısmıda burda#😁😂#Ben Heryerdeyim#😁#HappyBirthdayİrem#□□□❤□□□□□□ # @... https://t.co/68toAhxjby

FIGURE 1. Tweet example.



	ID	BODY
10	663003460036620288	RT @SAkyol75: Kaç kardeşsiniz dediklerinde, Bir buçuk milyar diyorum. Anlatabiliyormuyum ? #Sezai Karakoç # @sed
11	663003815977877504	Elma sekeri yaptimmm isteyen var mii❤□□□□□□#birkapkek # elmasekeri… https://t.co/UfkJCjs3G1
12	663004961358376960	# Muslera Sabri Chedjou Balta Olcan Podolski Selçuk Sneijder Yasin Burak Umut
13	663005182662438912	RT @AsiklariFener: A Milli Takım Aday kadrosuna Emre Çolak ve Yasin Öztekin alınırken Volkan ŞEN alınmadı! # Fener
14	663005506039095296	#Hayata gülümsemek #
15	663005521344004096	#incil #tevrat Hristiyanlık'a götüren İslamiyet https://t.co/tUH2C6SO19 # #zebur #kuran https://t.co/3zBkCGmRvr
16	663005528130383872	Hristiyanlık'a götüren İslamiyet https://t.co/OLiUdGQPo1 # #allah #islam https://t.co/XgkpJ0nHln
17	663005544567844864	#hıristiyanlık Hristiyanlık'a götüren İslamiyet https://t.co/z33WCH1F1e # #hıristiyan https://t.co/NaDyt4RsDo
18	663005557033295872	#isa #mesih Hristiyanlık'a götüren İslamiyet https://t.co/Blev4zUwqi # #muhammed https://t.co/9NFExsQhJg
19	663005565736456193	#hristiyanlık Hristiyanlık'a götüren İslamiyet https://t.co/TAtaRaqrva # #hristiyan https://t.co/mC0cszKzyX
20	663005579456065536	Hristiyanlık'a götüren İslamiyet https://t.co/PnJIEZnNKp # #türk #tanrı #kilise https://t.co/Cvp3p9M5Vh
21	663005586921926656	#hristiyanlık Hristiyanlık'a götüren İslamiyet https://t.co/TAtaRaqrva # #hristiyan https://t.co/mC0cszKzyX https://t.c
22	663005951004385284	# bebrillant@htcchampions https://t.co/3uu9DVlhDW

FIGURE 2. Text database table representation.

the words in tweets can also be used for training data because word boundries are known. To use concatenating the words in tweets as training dataset, we need to filter nonword tokens. If tweets include nonword token in the beginnig or end of the text, it can be removed and other words can be used as trainig data. On the other side, if a nonword token appear in the middle of the text, the tweet is dicarded because nonword token ib the middle of the tweet may distort the word order. The word order is important point of trainig data.

Word boundry detectiton and word segmentation is very important for Chinese words segmentation. A good research about Chinese word segmentation can be found out in Wu and Tseng's paper. A Chinese senteces do not include delimiters to seperate words. It includes combined of a string of characters. Netural networks and lazy learning (just-in-time learning) approaches are methods that are used in word segmentation. Processing of the examples are collected until a clear request for information is received. When the information recieved, the databse search is completed according to amount of the distance that is most related to query.

We can use each character of training data to represent one function of learning system. Some features should be determined and each character should be examined according to these features to create machine learning system.

4. RESULTS

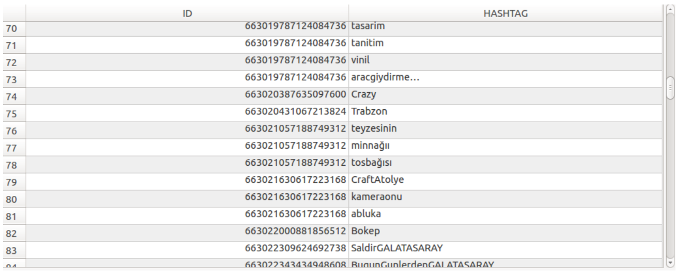
We have collected the tweets from twitter. We tokenize tweets, normalize them and get hashtags from them. We have stored all information related to tweets. That will help us to recognize training and test data. The training data will be the part of the current data.

Implementing a method to get hashtags and insert them database is accomplished. There are two kind of table as well as "TEXTS" which contains unique tweet IDs and tweet text.

The other one is "HASHTAGS" which contains tweet IDs and hashtags. Segmentation algorithm is almost done.

5. CONCLUSION

We proposed a simple and effective unsupervised word segmentation approach. The criterion incorporates boundary information to model words.



	ID	HASHTAG
70	663019787124084736	tasarim
71	663019787124084736	tanitim
72	663019787124084736	vinil
73	663019787124084736	aracgiydirme...
74	663020387635097600	Crazy
75	663020431067213824	Trabzon
76	663021057188749312	teyzesinin
77	663021057188749312	minnağıı
78	663021057188749312	tosbağısı
79	663021630617223168	CraftAtolye
80	663021630617223168	kameraonu
81	663021630617223168	abluka
82	663022000881856512	Bokep
83	663022309624692738	SaldirGALATASARAY
84	663022343434948608	BugunGunlerdenGALATASARAY

FIGURE 3. Hashtag database table representation.

6. FUTURE WORK

We decided to improve our segmentation algorithm. Features of the words will be dicussed. Training and test datasets will be prepared. Every word in the training data will be used to improve machine learning power of our project. Later future works will be consulted to Prof. OZGUR.

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8. APPENDIX