Chapter 73
Sentiment Predictions Using Deep Belief Networks Model for Odd–Even Policy in Delhi

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ABSTRACT

This paper analyzes the odd-even policy in Delhi using tweets posted on Twitter from December 2015 to August 2016. Twitter is a social network where users post their feelings, opinions and sentiments for any event. This paper transforms the unstructured tweets into structured information using open source libraries. Further objective is to build a model using Deep Belief Networks classification (DBN) to classify unseen tweets on the same context. This paper collects tweets on this event under six hashtags. This study explores three freely available resources / Application Programming Interfaces (APIs) for labeling of tweets for academic research. This paper proposes three sentiment prediction models using the sentiment predictions provided by three APIs. DBN classifier is used to build six models. The performances of these six models are evaluated through standard evaluation metrics. The experimental results reveal that the TextBlob API and proposed Preference Model outperformed than the other four sentiment prediction models.

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1. INTRODUCTION

Delhi, a capital city of India has more than 25 million population and more than 9 million registered vehicles. The road traffic in Delhi has grown to a critical level leading to a lot of pollution. The Government of National Capital Territory of Delhi, India has taken shocking decision to implement Odd-Even policy for trial – run basis in two phases of 15 days intervals from 8 A.M to 8 P.M with the objective to reduce air pollution in Delhi. These phases were from 1st – 15th January 2016 and 15th -30th April 2016. The odd-even policy was applied to non-transport four wheeled vehicles and determined which car is allowed to play on roads. On the even dates, only cars with registration number ending with an even number were allowed and on the odd dates, cars with registration number ending with an odd number were allowed on the city roads. The public transport buses, trucks, CNG operated passenger / private cars, two wheelers and three wheelers were exempted from the rule. In addition, selective number of VIP and emergency vehicles and cars driven by women were also exempted from this policy (Government's Notification, 28th December, 2015).

Many studies have analyzed the impact on pollution level in Delhi and traffic conditions in terms of congestion and commuting time. In the first phase, there was a 21% reduction in cars and 18% increase in speed. In the second phase, there was a 17% decrease in car numbers and 13% increase in speed. This study concluded that "marginal" reductions (4-7%) of PM 2.5 pollutants during both phases as private cars made a limited contribution to the fine particles in air pollution (Chaudhari et al., 2016, Panvani et al., 2016, Goel et al., 2016, Parikh et al., 2016). These studies revealed that traffic density and congestion have been reduced significantly. There is a debate on why the pollution is not reduced (Government Report, 2016). The citizens of India and Delhiites are still waiting for an official declaration of failure / success of the experiment. An official declaration may be in the form of implementing the rule permanently or close the pilot project permanently or repeat the similar trial when requires. This study analyses the opinions, thoughts, feelings, attitude, views and sentiments of citizens about this experiment. This paper analyses what the citizens are talking about this pilot project in social media. Social media includes Internet based applications. The well-known social media include Twitter, Facebook, LinkedIn, Stack Overflow and Quora etc. The users of these platforms are increasing day by day due to advancement in Internet and mobile Technologies (Bonzanini, 2016). It is very easy to connect to these social media sites through mobiles for sharing opinions, feelings, and comments on any topic as per interest. This paper analyses the opinion and sentiment expressed in text messages on Twitter in order to understand the attitude and their feelings towards the odd-even policy.

Twitter is a micro-blogging service that allows users to communicate with almost 140-characters text messages corresponding to thoughts, opinion and ideas. More than 1 billion people are registered with over 100 million of them actively engaging their curiosity on a regular monthly basis. Twitter's asymmetric following model exploits a fundamental aspect of human curiosity (Russell 2013). A user can follow any other user according to his/her interest and share his/her opinion and ideas on any topics like government's new policy, events, sports, political election, natural hazards, celebrities and public figures. There is no need to be a real person for being a Twitter user. A company, organization, an inanimate object and imaginary person can also register as a user. Twitter allows users to post short status update called tweet in a form of short text message. Tweet text message also comprises hashtags (#OddEvenPolicy, #OddEvenRule), user mentions (@narendramodi), URLs (http://twitter.com) and places (Delhi).

Nowadays twitter has emerged as one of the most popular platforms for expressing opinions, feelings and thoughts on Internet. It is very useful and obvious to be analyzed for developing many applications.