iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** III **Month of publication:** March 2017

DOI: http://doi.org/10.22214/ijraset.2017.3133

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Tmap: Traffic Detection using Tweet Analysis

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Abstract: ***The increasing population and rapid growth in Urbanization is giving birth to traffic problems, resulting in pollution that affects the overall social health. This system performs real-time monitoring by Twitter stream analysis for traffic event. The system fetches tweets from Twitter as per several search criteria, processes these tweets by text mining and finally classifies these tweets as related to traffic events. This system uses Natural Language Processing for analysing tweets from Twitter stream and Support Vector Machine as classification model. The system is capable of detecting traffic events in real-time and notify it to people, often before broadcasting media.***

Keywords: Twitter stream analysis, traffic event detection, tweet classification, text mining, Natural Language Processing, SUM.

I. INTRODUCTION

Twitter is becoming a most useful tool in daily life for real-time information sharing on a large amount of data. Users post messages related to specific real-time traffic events as they happen, or shortly after. As compared to traditional media, traffic alerts given by Twitter are much faster. Twitter provides direct access to the public tweets and also provides an Application Programming Interface (API) to application developers for receiving at most 100 public tweets at the time when query fired. The life-time of tweets is usually small thus Twitter is the social network platform that can be used to study SUMs related to real-time events. Our aim to detect and analyse traffic related events by processing users' messages belonging to a specific area and written in the English language. We propose a system which is able to extract, analyse SUMs as related to a road traffic event or not. This system is employed for real-time monitoring of several areas of the Indian road network, allowing for detection of traffic events almost in real time, often before online traffic news web sites. We have divided our main project with different module such as Tweets Extraction from twitter, Analysing traffic related tweets, notifying user related to traffic.

A. Problem Statement

The increasing population and rapid growth in Urbanization is giving birth to traffic problems, resulting in pollution that affects the overall social health. The Traffic congestion problems have become a major issue almost all over the world. It is necessary to have a traffic monitoring system which should detect the traffic events and find an alternative path to minimize the congestion.The goal is to perform a continuous monitoring of frequently busy roads and highways in order to detect possible traffic events even in advance with respect to the traditional news media.

B. Objectives

The main aim of this system is to provide innovative services relating to different modes of transport and traffic management. It focuses on enabling the various users to be better informed so as to make safer journey. The goal of this system is to make a SMARTER use of social media for progressing of transport networks. It concentrates on minimizing the traffic congestion problems occurring in the urban as well as rural areas. The system is determined to achieve a 'Smarter', yet efficient way of traffic congestion control, which in turn reduces the different impacts like air and noise pollution, transport delay, etc. and enhances the overall social and environmental health.

II. PROPOSED SYSTEM

In this paper, we propose an intelligent system, based on text mining, for real-time detection of traffic events from Twitter stream analysis.

The system has been designed and developed on a Service Oriented Architecture (SOA) and from the ground as an event-driven infrastructure

The system represents available technologies based on modern techniques of text analysis and pattern classification. These techniques and technologies have been analysed, broken down, adapted, and integrated to build the system.

We present an experimental study, which has been performed for selecting the most suitable among different latest approaches for text classification. The selected approach was integrated into the final system and used for the on-road detection of traffic incidents.

In this paper, we concentrate on a specific event, i.e., road traffic, and we aim to detect and analyse traffic events by processing users' SUMs belonging to a certain area and written in the English language. To achieve this we propose a system that is capable of fetching, describing and classifying tweets as related to all road traffic event or not.

To the best of our knowledge, there are few papers that have been proposed for road-traffic detection using Twitter stream analysis. However, they all concentrate on different languages like German, Italian etc, consider different input features and/or feature selection algorithms.

A. Mathematical Model

1) System Specification:

$S= \{S_i, X_i, Y, T, f_{main}, DD, NDD, f_{friend}, \text{memory shared}, CPU_{count}\}$

Where

S – proposed system

S_i – initial state (GUI of system)

X_i – input to system (query by user)

Y – output of system (related URLs)

T – no. of steps required to process a query

f_{main} - main algorithm, contains i/p, o/p and subordinate functions

DD – Deterministic Data (Twitter DB)

NDD – queries entered by user

f_{friend} - friend functions WC & IE

memory shared – system DB

CPU_{count} - no of CPU required

2) Subordinate Functions:

S = {I, O, P….}

P = {WC, IE}

Where, WC – Web Crawler for Twitter service

IE – Information Extraction which filter the tweets

P – Processes or execution

WC = {U, MAX, OP}

U – i/p query

MAX = (1, 2, 3, n)

OP – output, i.e. traffic information

IE = {OP, NLP techniques, Info}

IP – input (tweets extracted)

NLP – for filtering tweets related to traffic, tokenization & other processes

3) Algorithm:

Step 1: user search for route.

Step 2: Get location of user.

Step 3: decide route to destination

Step 3.1: Get user location co-ordinates

Step 3.2: Get destination location and determine route

Step 3.3: Get traffic status alongside route

Step 3.4: check conflicts if any occurs

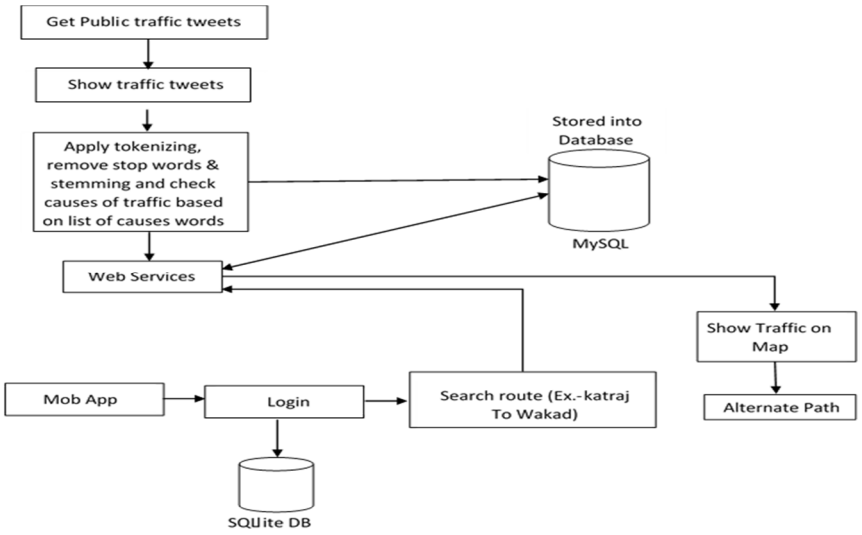
Step 3.5: decide alternate route if needed

Step 4: Show alternate route

Step 4.1: Get congested locations

Step 4.2: Decide alternate paths
Step 4.3: Check traffic on alternate route
Step5: Display Result
Step 6: Stop

B. Architecture of Proposed System



III. MODULES

A. Web Portal GUI

It displays fetched public tweets from Twitter.

B. Complete Web Portal

1) Getting real time tweets from twitter.
2) Apply Natural Language Processing on the tweets
3) Categorization of the tweets.
4) Database connection.

C. Android GUI

User can enter source and destination. Then route will be displayed on map.

D. Android Functionality

Fetching Traffic status from web portal related to searched route.

IV. CONCLUSION

It can be concluded that, this system is capable of detecting traffic-related events from analysis of public tweets fetched from Twitter. We have also discussed the actual causes of traffic events occurred (e.g. Traffic Jams, Vehicle breakdowns, Accidents, etc.). We check these causes in that particular tweet by displaying traffic tweet with causes and Showing traffic between two points.

V. ACKNOWLEDGEMENT

Every orientation work has an imprint of many people and it becomes the job of author to express deep gratitude for the same. We take this opportunity to express my bottomless sense of gratitude towards my esteemed guide *Prof. Nale R.K.* for giving us this splendid opportunity to select and present “TMAP: Traffic Detection Using Tweet Analysis” Project and also providing facilities for successful completion. We thank *Prof. Mali J. N*, Head of Department of Information Technology, SVPM’ college of engineering for opening the doors of the department towards the understanding of the seminar report, all the staff members, for their

indispensable support, priceless suggestions and for most valuable time lent as and when required. With all respect and gratitude, we would like to thank all the people, who have helped us directly or indirectly. We also thank my friends for their help in collecting information without which this Project not have seen the light of the day.

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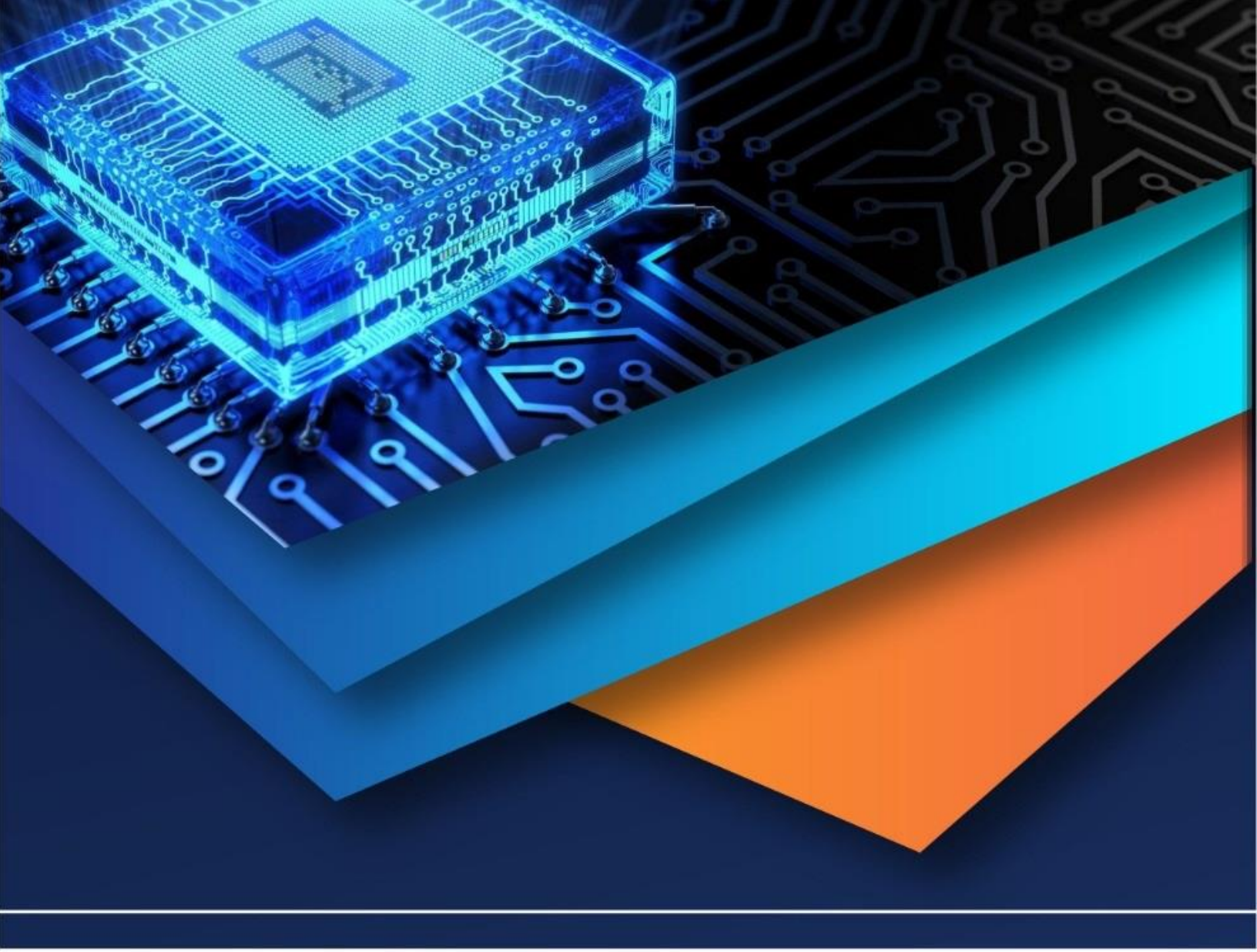

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