Identifying polarity of people based on citizens emotional pulse in a smart city

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ABSTRACT_ Over the previous decade, clever metropolis purposes have received widespread interest in industrial informatics. However, little interest has been given to perceiving the thoughts and perceptions of residents who have a direct influence on clever metropolis initiatives. In this article, we suggest the use of publicly accessible plentiful social media conversations that include contextual statistics encompassing citizens' thoughts and perceptions, which should be regarded to grant the capacity to sense the "emotional pulse" of a city. We endorse an computerized AI-based statement framework to observe the emergence of public thoughts and negativity in conversations. We evaluated the applicability of the framework the use of 29 928 social media conversations towards the much-debated subject of self-driving cars which will turn out to be increasingly more applicable to clever cities. The patterns and transitions of citizens' collective feelings had been modeled using the Natural Language Processing and Markov fashions whilst the negativity (toxicity) in conversations used to be evaluated the use of a deep mastering based totally classifier. The framework may want to be adopted via enterprise leaders and authorities officers for clever commentary of citizen opinions to enhance security, communication, and policymaking.

1.INTRODUCTION

The notion f clever cities is headquartered on growing advanced, automated, and linked smart industrial functions that effectively create a sustainable and livable metropolis for its dwellers [1]. Even although paramount significance is directed towards clever functions in a clever town environment, restricted interest has been paid to perceive the very aspect which continues the

metropolis alive, its residents [2]. In the development of shrewd industrialization towards what is being known as the fourth industrial revolution, it is vital to make use of synthetic brain (AI) to recognize citizens' thoughts and perceptions towards industrial applications. Even in cognitive automation, it is referred to that the similarly optimization and improvement of many clever purposes matter on the subjective desires of the person [3] indicating the significance of recognizing the citizens' perspective. Although tries have been made to measure citizens' emotional reactions by using bodily sensors [4], the use of sensors poses privateness and administration challenges, when it worries non-stop monitoring. In addition, such bodily sensors are now not capable to feel the opinions and emotional reactions of residents that constantly impact clever metropolis initiatives [5]. Nevertheless, residents categorical their opinions, observations, and perceptions every day by way of social media conversations. This paves a pathway and an chance to create clever remark systems, which allow to experience the "emotional pulse" of the town by thoughts expressed together by means of residents in publicly reachable facts sources, such as social media conversations. The creation of social media and the large quantities of records generated through these structures create a massive pool of facts that encompasses emotions, feelings, and ideas of citizens. With the exponential increase in social media, the wealth of records generated on social media can be considered as a "big data" supply taking pictures the citizens' voice [6]. Studies exhibit that social media channels, with their giant repositories of user-generated data, grant an possibility to acquire insights into citizens' well-being, described as the "emotion pulse" of a state [6], [7]. In this article, we relate the idea of emotional pulse to the clever town context in order to apprehend the perceptions of the residents towards the clever town surroundings and applications. As all clever functions are constructed round the every day lives of residents and with the motive of serving the residents better, it is

vital to recognize and "sense" their grasp [8] in order to format future improvements and policies. Despite this importance, making use of citizen opinion and their emotional reactions associated to clever town functions is presently restricted to mere sentiment and emotion extraction and does now not deeply discover the emergence and shift of emotional reactions the use of social media data. Given the truth that free-flowing social media content material has no longer been deeply explored in industrial informatics lookup with the goal of detecting the emotional pulse of residents in a clever town context, we advocate the first realistic use of social media to seize the pulse of the town through growing an AI-based emotion commentary framework. The proposed framework is capable to screen the emotional pulse of residents the usage of social media conversations, for that reason derive the emergence and shift of thoughts as properly as look at the negativity of public opinion in a clever metropolis context.

2.LITERATURE SURVEY

2.1 T. Nam and T. A. Pardo, "Conceptualizing smart city with dimensions of technology, people, and institutions," in Proc. 12th Annu. Int. Digit. Gov. Res. Conf.: Digit. Gov. Innov. Challenging Times, 2011, pp. 282–291

This conceptual paper discusses how we can consider a particular city as a smart one, drawing on recent practices to make cities smart. A set of the common multidimensional components underlying the smart city concept and the core factors for a successful smart city initiative is identified by exploring current working definitions of smart city and a diversity of various conceptual relatives similar to smart city. The paper offers strategic principles aligning to the three main dimensions (technology, people, and institutions) of smart city: integration of infrastructures and technology-mediated services, social learning for strengthening human infrastructure, and governance for institutional improvement and citizen engagement.

2.2 D. Bruckner, H. Zeilinger, and D. Dietrich, "Cognitive automation— Survey of novel artificial general intelligence methods for the automation of human technical environments," IEEE Trans. Ind. Informat., vol. 8, no. 2, pp. 206–215, May 2012

The goal of Ambient Assisted Living Systems is to provide automated technological aids for the elderly to allow for longer independent living in one's own premises without the need for transition to stationary care. Such systems target to overcome problems introduced by particular risks of the target group like falling down, risk of illnesses, risk of dementia, etc. Current systems, however, still impose substantial effort in commissioning the system and they lack accuracy in detecting serious problems of the resident. In this article we present methods for relieved commissioning, i.e. automatic detection of the sensors' types and topology, for added fault tolerance, and for modeling and evaluating human activity patterns with the goal of launching meaningful alarms.

2.3 V. C. C. Roza and O. A. Postolache, "Citizen emotion analysis in Smart City," in Proc. 7th Int. Conf. Inf., Intell., Syst. Appl., Jul. 2016, pp. 1–6.

Objectives: The study reported in this article aimed to identify: (i) the most relevant applications supported by smart city infrastructure with an impact on the provision of healthcare; (ii) the types of technologies being used; (iii) the maturity levels of the applications being reported; and (iv) major barriers for their dissemination. Methods: A systematic review was performed based on a literature search. Results: A total of 44 articles were retrieved. These studies reported on smart city applications to support population surveillance, active ageing, healthy lifestyles, disabled people, response to emergencies, care services organization, and socialization. Conclusions: Most of the included

articles were either of a descriptive and conceptual nature or in an early stage of development, which means that a major barrier for their dissemination is their lack of concreteness.

3.PROPOSED SYSTEM

To monitor citizens' emotions and perceptions in a smart city environment, we propose an AI-based emotion observation framework. The proposed framework collects data from publicly accessible social media and other conversation platforms (Data Layer). Following that, emotional expressions are extracted from the social media content. The extracted emotions are then used to create an emotion transition model that shows how the emotions change.

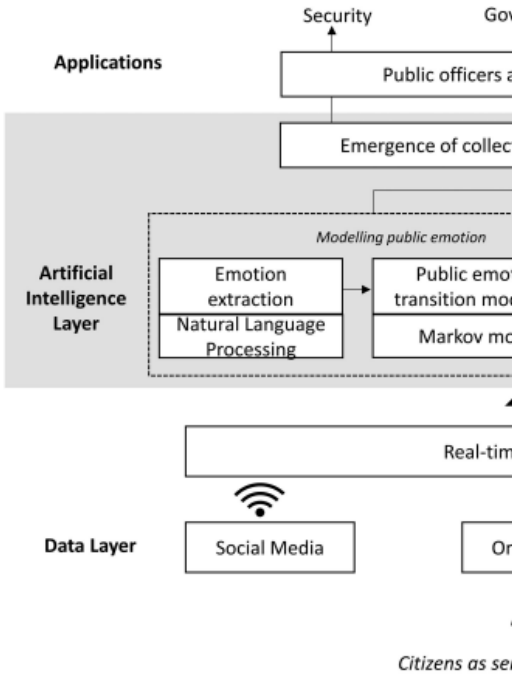


Fig 1:Architecture

3.1 IMPLEMENTAION

3.1.1LSTM-RNN

Long short-term memory (LSTM) is an artificial recurrent neural network (RNN) architecture used in the field of deep learning. It was proposed in 1997 by **Sepp Hochreiter** and **Jurgen schmidhuber**. Unlike standard feed-forward neural networks, LSTM has feedback connections. It can process not only single data points (such as images) but also entire sequences of data (such as speech or video).

For example, LSTM is an application to tasks such as

unsegmented, **connected handwriting recognition,** or **speech recognition**.

A general **LSTM** unit is composed of a cell, an input gate, an output gate, and a forget gate. The cell remembers values over arbitrary time intervals, and three gates regulate the flow of information into and out of the cell. LSTM is well-suited to classify, process, and predict the time series given of unknown duration.

3.1.2 **DT WITH BOW**

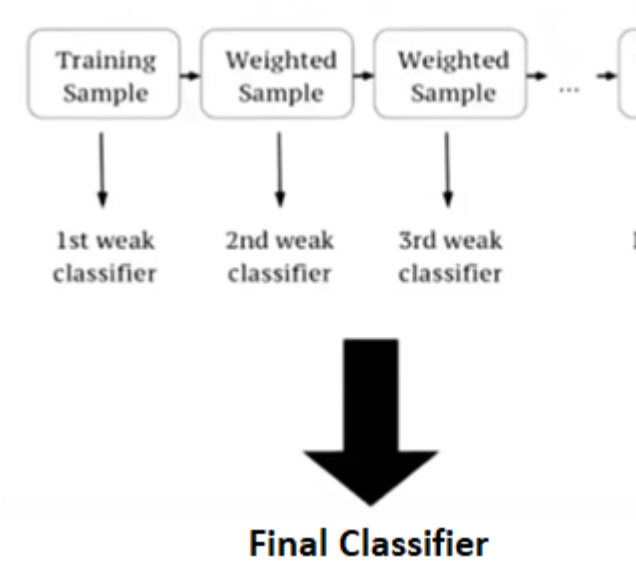
- Decision Tree is a **Supervised learning technique** that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where **internal nodes represent the features of a dataset, branches represent the decision rules** and **each leaf node represents the outcome.**
- In a Decision tree, there are two nodes, which are the **Decision Node** and **Leaf Node.** Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches.
- The decisions or the test are performed on the basis of features of the given dataset.
- ***It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions.***
- It is called a decision tree because, similar to a tree, it starts with the root node, which expands on further branches and constructs a tree-like structure.
- In order to build a tree, we use the **CART algorithm,** which stands for **Classification and Regression Tree algorithm.**
- A decision tree simply asks a question, and based on the answer (Yes/No), it further split the tree into subtrees.
- Below diagram explains the general structure of a decision tree:

3.1.3XGB

XGBoost is an implementation of Gradient Boosted decision trees.

This library was written in C++. It is a type of Software library that was designed basically to improve speed and model performance. It has recently been dominating in applied machine learning. XGBoost models majorly dominate in many Kaggle Competitions.

In this algorithm, decision trees are created in sequential form. Weights play an important role in XGBoost. Weights are assigned to all the independent variables which are then fed into the decision tree which predicts results. Weight of variables predicted wrong by the tree is increased and these the variables are then fed to the second decision tree. These individual classifiers/predictors then ensemble to give a strong and more precise model. It can work on regression, classification, ranking, and user-defined prediction problems.



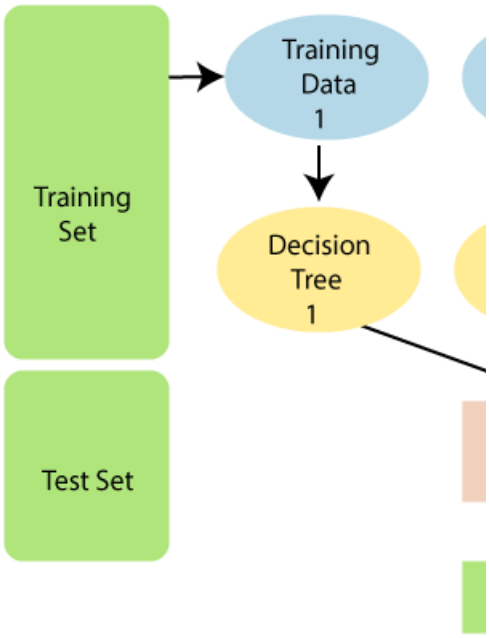
3.1.4 Random Forest Algorithm

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML. It is based on the concept of **ensemble learning,** which is a process of *combining multiple classifiers to solve a complex problem and to improve the performance of the model.*

As the name suggests, ***"Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset."*** Instead of relying on one decision tree, the random forest takes the prediction from each tree and based on the majority votes of predictions, and it predicts the final output.

The greater number of trees in the forest leads to higher

accuracy and prevents the problem of overfitting.



3.1.5 Naïve Bayes Classifier Algorithm

- Naïve Bayes algorithm is a supervised learning algorithm, which is based on **Bayes theorem** and used for solving classification problems.
- It is mainly used in *text classification* that includes a high-dimensional training dataset.
- Naïve Bayes Classifier is one of the simple and most effective Classification algorithms which helps in building the fast machine learning models that can make quick predictions.
- **It is a probabilistic classifier, which means it predicts on the basis of the probability of an object**.
- Some popular examples of Naïve Bayes Algorithm are **spam filtration, Sentimental analysis, and classifying articles**.

4.RESULTS AND DISCUSSION

Add OUTPUT SCREENS HERE

SnO	ALGORITHM	ACCURACY
1	LSTM-RRN	90%
2	DT	74%
3	XGB	76%
4	RANDOMFOREST	77%
5	Naïve Bayes	77%

5.CONCLUSION

In this article, we introduced an AI-based emotion remark framework to reveal the thoughts and perceptions of residents by means of publicly on hand social media data. Using Twitter responses towards self-driving vehicles, we established how the thoughts and negativity emerge at some stage in an incident time and shift over time. We used a aggregate of NLP, probabilistic models, and deep getting to know to create emotion modeling and toxicity detection abilities of the proposed framework. By growing and evaluating this AI framework, we enabled the seize and illustration of the emotional pulse of the city. We located this amongst pioneering research to use AI to seize citizens' emotional pulse from digital records channels, hence created an overview of citizens' feelings associated to clever town initiatives. Compared to typical survey opinions, social media statistics have severa benefits as they seize publicly available, often updated, and voluminous data, which are enriched with brazenly expressed thoughts and emotions of citizens. This will serve as a robust basis to make use of statistics by way of social media and different clever dialog platforms for representing citizens' emotions. The consequences and the functionality of the use of AI for perception citizens' emotional pulse have the conceivable to inform approach improvement and policymaking for industrial leaders as properly as for elections, political campaigns, and governance

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