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SUBWAY PASSNGER FLOW FORECASTING WITH MULTIPLE STATIONS AND EXTERNAL FACTORS

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ABSTRACT:

With the fast expansion of urban rail transit, more and more individuals are opting to take the subway instead. Passengers and municipal projects benefit greatly from accurate passenger flow forecasts, which is a smart city service. When it comes to forecasting subway passenger flow, we offer a multi-type attention-based network. Multistation, external influences, and previous data are all taken into account in the proposed network's attention processes. It is also used to simulate subway lines and stations' hierarchical relationships. Encryption is used to better integrate the various types of information. Using real data from a Chinese subway system, our solution outperforms five other baseline methods. The impact of different stations and other factors on traffic may also be seen using our method, which is useful for passenger travel and subway dispatch.

I.INTRODUCTION:

Rail transit has grown rapidly in recent years. Subway travel has become the primary mode of transportation for many individuals due to its speed and convenience. As a result, precise and dependable subway passenger flow forecasting is critical for all parties involved. Smart city research also includes the analysis of subway passenger movement. As a measure of how many people are using a certain station in a given amount of time, we use the term "passenger flow." Both the subway companies and the customers value smooth traffic flow in the station. Depending on the amount of people in the station, metro administrators and passengers can both adjust the number of subway gates and the subway's running intervals. Because of this, this article focuses on how people move around subway stations. A lot of research has been done on passenger flow forecasting, which is a kind of time series data prediction. This research relies solely on a single set of time series data., which attempt to find the time dimension's link. MiltiadisLytras, an assistant editor, oversaw the assessment of this material and gave his approval for publication. A common time-space problem, such as the forecasting of subway passenger flow, requires consideration of both the time and the space dimensions. There are three main categories we use to analyse passenger flow in urban subways: station interactions with each other, external influences, and historical data.

II. Literature survey:

2.1 Spatiotemporal Patterns of Urban Human Mobility:

Authors: Samiul Hasan · Christian M. Schneider.

In human mobility modelling, new directions are being explored as a result of the growing accessibility of massive amounts of data generated by human activities. Many people will be able to get digital information on the places they visit on a daily basis through these sources. Mobile phone calls and credit card transactions are only two instances of the data that can be gathered. Smart subway fare card transactions are used to describe and model urban mobility trends in this study.' We build a rudimentary mobility model for predicting where people will travel based on the popularity of a city's areas as an interaction parameter between individuals. There are many observed elements of travel behaviour, such as the frequency with which people visit various locations across a city and also how often they return to the same one, that may be accounted for by this simple formula. There are still concerns with current statistical models of human movement, and our model has limits that need to be addressed as well.

In this paper YU ZHENG, LICIA CAPRA proposed urbanisation has moved many people's lives into the 21st century, there have been substantial drawbacks, such as traffic congestion, excessive energy consumption, and pollution. Metropolitan computing aims to address these issues by analysing data generated in urban areas (e.g., traffic flow, human mobility, and geographical data). Urban computing blends city sensing and data management with analytics and service provision in a recurrent process in order to improve people's lives and the environment in an unobtrusive and ongoing manner. For the first time, computer science and traditional city-related courses such as transportation and civil engineering are combined to form a new field of study in urban computing. This article serves as an introduction to urban computing from a computer science perspective. Second, we categorise the uses of urban computing into seven broad categories: transportation planning, environmental conservation, social cohesion, economic vitality, and public safety and security, to name a few (safety). Our final description of common urban computing technologies focuses on sensing and data administration, knowledge fusion across heterogeneous datasets, and visualisation of urban information. Urban computing is examined, along with some recommendations for new research avenues.

In this paper Miltiadis D. Lytras 1,2,* ID and Anna Visvizi 1,3 ID proposed Research on smart cities is becoming increasingly popular, and this study argues for a cautious revision of its rationality and relevance as the discussion grows more heated. It is thus hoped that this article will shed light on the'smart city' argument by looking at people' understanding and capacity to use'smart' apps and solutions on the one hand, as well as the debate itself. Drawing on results from an international study, While smart city service consumers may be the most knowledgeable and prepared to use these services, this article indicates that even the most educated smart city service users voice major worries about the service's utility, safety, accessibility, and efficiency. For the benefit of all stakeholders, smart cities research must embrace more pragmatism. This research contributes to the discussion on smart cities in three ways. This study gives concrete evidence for the hypothesis of "normative bias" in smart city research. A discussion of the prerequisites for long-term transdisciplinary smart city research can be had as a secondary benefit of this paper. It also raises the possibility of exploring new avenues of inquiry.

III. Existing system:

- Using time series data, daily passenger flow may be characterised as a time series with daily occurrences. We propose a multi-type attention-based network that integrates numerous stations and external inputs in order to estimate subway passenger flow.
- Passenger flow representation and forecasting are the two key components of the proposed network. In order to

accurately show passenger movement at a given point in time, we need important characteristics. Different data structures can be simulated and the weights of various characteristics can be dynamically changed using attention techniques.

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- All time stamps in the forecasting process are selected using a temporal attention technique. These two components not only identify the most important information but also capture the long-term temporal dependencies of the passenger flow..
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- The attention vector for multi-station can be used to demonstrate the impact of numerous stations on a single target. This considerably aids in the early warning and dispatching of subway passenger flow.

Disadvantages:

1. Section 2 begins with a review of the relevant literature. Introduce the notations used in this work and the challenge we were trying to solve in the next sections.
2. In this section, we go over the details of the proposed network.
3. In order to show the efficacy of our suggested strategy, real subway passenger flow data is collected and used for forecasting.

PROPOSED SYSTEM:

Rail transit has grown rapidly in recent years. Subway travel has become the primary mode of transportation for many individuals due to its speed and convenience. It is so critical for passengers, transportation operators, and governmental authorities to have precise and trustworthy subway passenger flow forecasts Smart city research also includes the analysis of subway passenger movement. As a measure of how many people are using a certain station in a given amount of time, we use the term "passenger flow." Both the subway companies and the customers value smooth traffic flow in the station. Depending on the amount of people in the station, metro administrators and passengers can both adjust the number of subway gates and the subway's running intervals. Because of this, this article focuses on how people move around subway stations. A lot of research has been done on passenger flow forecasting, which is a kind of time series data prediction. There is just one source of time series data used in these investigations, which focus on uncovering time-related correlations

Advantages:

1. 1. It can be shown from the preceding research that the subway lines will have an impact on the interaction between the stations.
2. 2. The effect of common stations on a target station varies depending on the time of day and the location of the target station. A hierarchical structure can be formed by analysing all of the subway's traffic data because the lines and sites are interconnected.

System architecture:

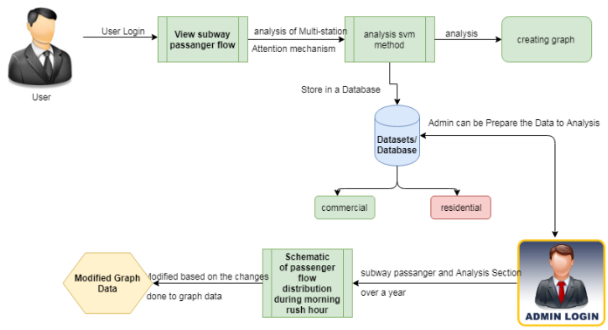


Fig: 3.1 System Model

User, Admin, Database, and Graph are the four types depicted in the graphic above.

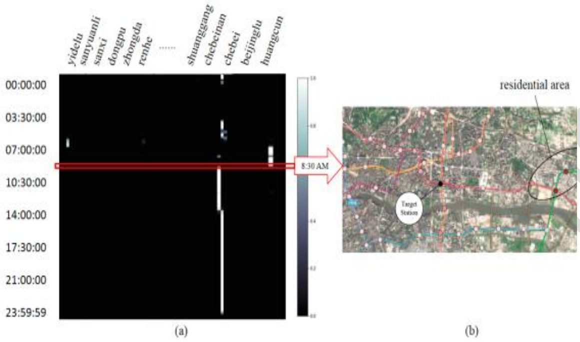
• User: Data storage space used by the end user. The data can be viewed in a database and the data can be viewed between stations.

As an admin user, you have access to various files and are responsible for maintaining user information. The activities of data analysis and data upload were also well-coordinated in this regard. Visualization adjustments for prediction input and output can be made.

Both master and transactional data are stored in the database.

An easy way to visualise and understand a graph's content is to use a related technique, and this may be done by converting the data into graphs for visualisation and understanding.

IV. Results:



V. conclusion:

Attention-based networks can be used to estimate subway passenger flow by incorporating numerous stops and external data. In order to achieve the required passenger flow in a certain location, the model employs three distinct attention techniques. With this weighted representation encoder decoder architecture is utilised to predict passenger flow. In order to accommodate extra data, we bucket numerical data and build an embedding layer that integrates category and numerical data.

Future scope:

The review material is not taken into account in our present work. As we move forward, we'll look exploring ways to incorporate review content into our early prediction. s The future of transportation depends on the development of new, more efficient energy sources, modes of transportation, and the requisite physical and technological infrastructure. There are three recurring themes in transportation innovation: smart technology, smart electrification, and smart autonomous systems.

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