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A Data Mining Based Model for Detection of Fraudulent Behaviour of Water Consumption using Python with Django

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Abstract: ***Water is one of the important renewable natural resource, no one can survive without it either humans or animals. India is rich in terms of different natural resources, water is one of them. Water comes from different sources such as precipitation, surface water and ground water. Which play an important role in India's supply of water. India receives 70% of surface water in the form of rain (monsoon) during three to four months. Although India has sizeable water resources, the country faces huge challenges in the water sector as the distribution of water varies widely by season and region. Water Resources are the prime input to the growth and prosperity of the nation. The objective of this paper is to highlights the demand and supply of water in India, and the estimated water in major basins in India. It has been found that the demand for water is increasing substantially due to increasing population, growing urbanization, and rapid industrialization combined with the need for raising agricultural production. The supply of water is inadequate compared to its growing demand in our country. The per capital availability of water is also continuously decreasing. Therefore Sustainable development and efficient management of water is an increasingly complex challenge to India. It has been estimated that More than 2.2 million people die each year from diseases related to contaminated drinking water and poor sanitation.***

I. INTRODUCTION

Water is an essential element for the uses of households, industry, and agriculture. Jordan, as several other countries in the world, suffers from water scarcity, which poses a threat that would affect all sectors that depend on the availability of water for the sustainability of activities for their development and prosperity [3].The mentioned Irregularities known as non-technical losses (NTLs). NTLs originating from electricity theft and other customer malfeasances are a problem in the electricity supply industry. [4] NTL is a problem in water supply industry too because of the similarity between water and electricity distribution systems in depending on meter technology and load profiling concept. NTLs include the following activities

A. Losses due to faulty meters and equipment.
B. Tampering with meters so that meters record low rates of consumption.
C. Stealing by bypassing the meter or otherwise making illegal connections.
D. Arranging false readings by bribing meter readers.
E. Arranging billing irregularities with the help of internal employees by means of such subterfuges as making out lower bills, adjusting the decimal point position on the bills, or just ignoring unpaid bills. Fraud is a serious problem face information system that implemented in various domains.

1) Fraudulent behavior in Drinking water consumption is a significant problem facing water supplying Nagpur municipal cooperation (NMC). According to survey NMC have data word wise but few of the words are complaining that they are not getting sufficient amount of water.
2) This behavior results in a massive loss of income and efficient measurements for detecting fraudulent activities has been an active research area in recent years. Intelligent data mining techniques can help water supplying NMC to detect these fraudulent activities to reduce such losses.
3) These to improve water and sanitization services are faced by NMC and the limited amount of renewable freshwater resource.

An Approach to Detection of Tampering in Water Meters Meter tampering is nothing but fraudulent manipulation which explains a service that is not billed by a utility company. It is a lack of consumption for the utility company and a main problem because they represent an important loss of income. The algorithms were generated and program after data mining process from the database of the company.

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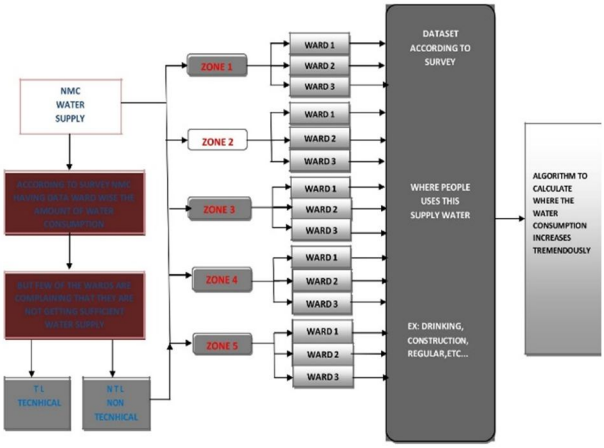

II. WORKING

A. The block diagram shows overall working of the model. In the first there is the block of NMC water supply, from which NMC is supplying water to consumers. NMC done the survey of consumers from which they have DATA of ward wise amount of water amount of water consumption. But few of the wards are complaining that they are not getting sufficient supply of water but the NMC supplied same amount of water to each ward. So there are many reasons behind insufficient supply of water. Mainly there are two types of water loss named as [1] Technical Loss [2] Non-Technical Loss

B. As Shown in the block diagram. NMC distributes water in each zone. Let us consider each zone includes three wards named as ward1, ward2, ward3 zones distributes water to their respective wards. Here the question is if NMC is supplying same amount of water to each zone then why there is shortage of water the reasons can be some consumers from the ward are using drinking water for their household purpose or some are wasting it by using it for cleaning purpose

C. To find these reasons model use the algorithm to calculate where the water consumption increases. This will gives us result in which area involves more water consumption, how much water is consumed, how much water is consumed, how much percentage of water got wasted, and the overall zone wise DATA.

III. SOFTWARE REQUIREMENTS

1) Integrated Development Environment (IDE) can be defined as software that gives its users an environment for performing programming, along with development as well as testing and debugging the application.

2) *Visual Studio Code:* It is popular open source IDE or editor for major programming language .It supports windows, Linux, Mac OS. By Default, support popular languages JavaScript, NodeJS, typescript and Nodejs

3) *Browser:* Chrome Technology

A. Database

PG Admin: It is the leading Open Source management tool for Postgresql , the world's most advanced Open Source database. Pg Admin 4 is designed to meet the needs of both novice and experienced Postgresql users alike, providing a powerful graphical interface that simplifies the creation, maintenance and use of database objects.

IV. TECHNOLOGY USED

A. Front End Technology

1) HTML CSS: CSS is a language of style rules that we use to apply styling to our HTML content, for example setting background colours and fonts, and laying out our content in multiple columns.

2) JavaScript: JavaScript is a scripting or programming language that allows you to implement complex features on web pages every time a web page does more than just sit there and display static information for you to look at displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, etc.

3) Bootstrap: Bootstrap is a potent front-end framework used to create modernwebsites and web apps. It's open-source and free to use, yet features numerous HTML and CSS templates for UI interface elements such as buttons and forms.

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B. Language

Python (Version 3.9.3): It is a general-purpose coding language which means that, unlike HTML, CSS, and JavaScript, it can be used for other types of programming and software development besides web development.

C. Back End Technology

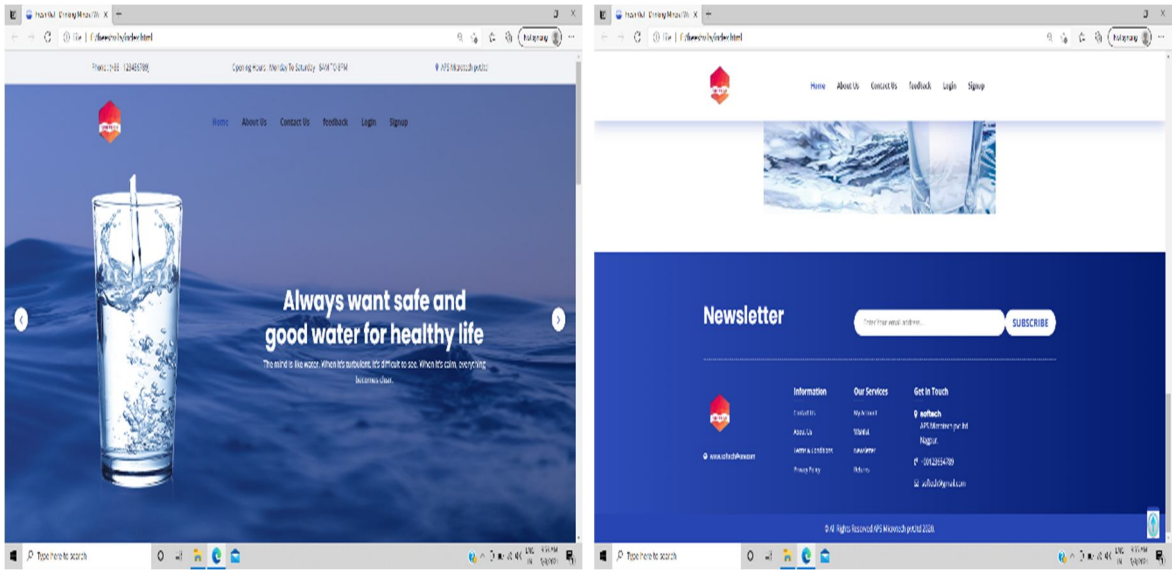
Django (Version 3.9.2): is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel.

V. PROBLEM DEFINITION

1) *Foundation Shifts:* Small shifts in your home's foundation (as it settles over time) can create big adjustment in your water lines, causing them to disconnect or rupture.
2) *High Water Pressure:* High Water pressure leads to damaging wear and tear on your pipes. Water zipping through your pipes at high speeds increases the risk of your pipes bursting. The sudden changes to the direction of water flow can be too much for your pipes to bear, eventually resulting in leaks.
3) *Tree Roots:* Tiny cracks in pipes can release water vapour into the surrounding soil. Where tree roots take notice and burrow their way to your pipes, causing big problems.
4) *Corrosion:* While not as big of a concern in some of Cincinnati's newer neighbourhoods, many older homes in the area use copper or galvanized steel piping, causing big problems.
5) *Temperature Changes:* Extreme changes in temperature (generally from cold weather) can cause pipes to crack and begin leaking.

VI. METHODOLOGY

A. Well-known data mining techniques to build a suitable model to detect suspicious fraudulent customers.
B. Depending on their historical water metered consumptions.
C. NMC incur significant losses due fraud operation in water consumptions.
D. This model introduces an intelligent tool that can be used to detect fraud customers and profit and losses.
E. Accurate result can give solution to the consumers who are facing water shortage problem.



Here we made a site in which includes complaint box, suggestion Box, login page etc.If any consumer is facing problem related to their water supply they can file a complaint here by using login page and then by clicking on file complaint. If anyone wants to give their suggestions they can also write it here.

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VII. FUTURE SCOPE

Day after day costumer irregularities increasing so more costumer irregularities collected to make bigger training data set for further testing and evaluation to increase the fraud detection hit rate and improve the proposed model accuracy with more customer data.

A. The selected techniques work as a black box, without induce descriptive rules to show the attributes how indicate fraudulent behaviour, so dealing with a rule based model is a strong idea to apply in the future work.

B. Implement the classification model as a whole system to work in MOG at DWTC and be applicable to work in any municipality or any organization deal with citizen's water consumptions.

C. This research study can be expanded by classifying load consumption patterns by respective districts, i.e. in Gaza strip like Nosyrat, Deirbalah…etc.However this approach requires more training data from each region, especially the load consumption patterns of the fraud customers.

VIII. ACKNOWLEDGMENT

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IX. CONCLUSION

In this research, we applied the data mining classification techniques for the purpose of detecting customers' with fraud behaviour in water consumption. We used SVM and KNN classifiers to build classification models for detecting suspicious fraud customers. The models were built using the customers' historical metered consumption data; the Cross Industry Standard Process for Data Mining (CRISP-DM). This phase took a considerable effort and time to pre-process and format the data to fit the SVM and KNN data mining classifiers.

X. RESULT

We have designed this model to detect the fraudulent behaviour in water consumption and with help of this model we have successfully executed it.

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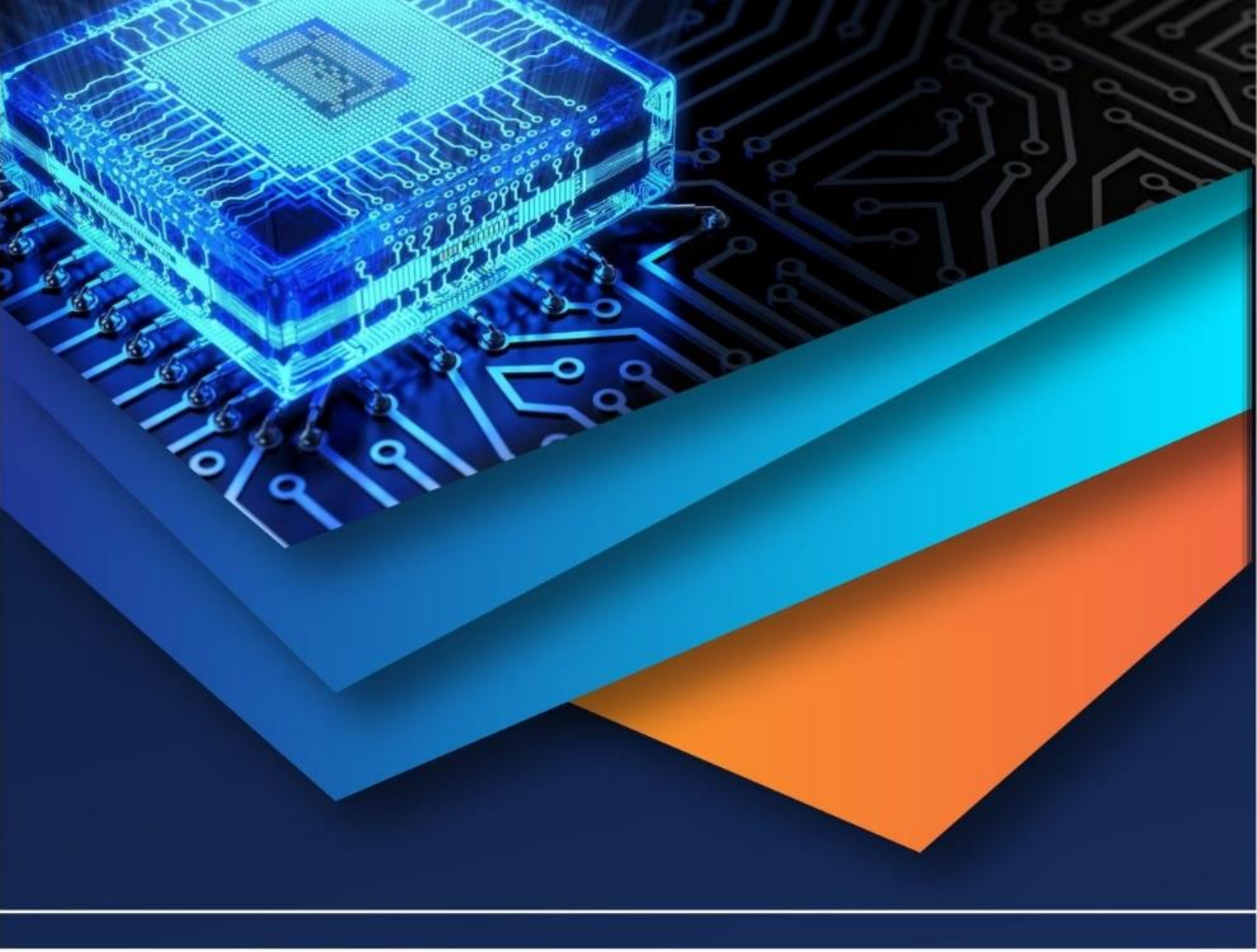

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