

Depletion of Plastic usage by Exerting Clustering

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Abstract— These Plastic is everywhere nowadays. The mass usage of plastic started in the 1950's and has steadily grown ever since. Plastic has negative effects on both human and animal life. But we are throwing plastic without taking the proper measures. Due to which we are facing many environmental issues such as global warming, soil erosion etc. So, there is a need to prevent the over usage of plastic. In order to prevent we need to spot the plastic prone areas. Many people came up with their IOT products in order to detect the plastic in oceans. Some of them are Seabin V5- The Seabin Project in 2015 was proposed by two Australian surfers for cleaning up the oceans, Waste Shark-Ran Marine Technology which floats on ocean surface and eats up the plastics and other floating debris was developed in 2018. But these IOT projects are costly. So, we came up with a project which is cost effective. In this project Depuration department employees give testimony about plastic usage by people in multifarious places. On the testimony given by depuration department employees data mining functionality is applied. So, in this project by analysis output of data mining functionality, places where plastic usage is more can be found. Hence depuration department or the government can take proper actions by scrutinizing the output of data mining to reduce usage of plastic and save environment.

Index Terms— Depuration department, Environment, Plastic, Datamining Functionalities.

I. INTRODUCTION

Plastic has become a constant element in our lives. It's everywhere: product packaging, cosmetic ingredients, textiles, mobile phones, etc. It's even in the chewing gum you might be chewing on right now! Its omnipresence is such that many would find the mere fact of giving it up a difficult task. Reducing the consumption of plastics therefore requires not only a change in habits, but also a change of mindset.

The mass usage of plastic started in the 1950's and has steadily grown ever since. The popularity of plastic is due not only to its low production costs but also its low weight, acid resistance and flexibility. These properties lead to new solutions, improvements and comforts including global warming etc. The tremendous consumption also results numerous problems. A large part of the plastic quickly ends up in the garbage. So, there is a need to decrease the usage of plastic. One of the ways to prevent plastic usage is waste prevention

Avoid single-use plastics such as drinking straws. Single-use plastics, such as plates and cutlery made from this material, make our lives easier, but seriously harm the planet. These types of products have viable alternatives and there is an urgent need to choose these.

Recycle chewing gum... it's also made of plastic! Most chewing gum currently on the market contains plastic. Try to buy less chewing gum and throw it in the correct recycling container. You can also opt for natural and organic chewing gums.

Replace PLASTIC Tupperware for glass or steel containers. If you eat at work, a Tupperware container is part of your day. We suggest you change your routine and opt for glass or stainless steel containers. Not only will the planet appreciate it, so will your health because some of these plastic containers can release harmful substances.

II. LITERATURE REVIEW

The literature on marine debris leaves no doubt that plastics make-up most of the marine water worldwide. Totally, as percentage, plastic material comprises the biggest group (48%) and it is followed by metal (25%), glass (12%), others (12%) and wooden (3%) in marine world [1].

It is evident that plastics bring many societal benefits and offer future technological and medical advances. However, concerns about usage and disposal are diverse and include accumulation of waste in landfills and in natural habitats[2].

The mass production of plastic products commenced in the 1950s, plastic debris has accumulated in terrestrial environments. This article mainly deals with the disadvantages plastic in terrestrial environment[3]. So there is need to find alternate solutions to replace plastic products in households and in food and packaging industries[4] and waste management became very difficult during COVID-19 and contributes short and long term impacts on environment[5].

Plastic is not only harmful to the environment but also to human and animals. It largely impacts the marine life[6]. So recycling is one of the important methods to reduce the plastic[8]. The chemicals used during the manufacture of plastics also impact the humans health[9]. The compounds are added during plastics manufacture, while others adsorb from the surrounding seawater. Concentrations of hydrophobic contaminants adsorbed on plastics showed distinct spatial variations reflecting global pollution patterns [10].

III. METHODOLOGY

First the user should get authenticated and then go through two phases namely register and login. In the registration phase, the user enters the user details and password. Those details and passwords will be stored in the database. In the login phase, they should enter email and password. Once the user gets login to the website, he/she is able to enter his/her data by clicking the upload button. Then admin gets login to the website and perform datamining functionalities to procure clusters. By analyzing the clusters, we can find the localities where the plastic usage is more.

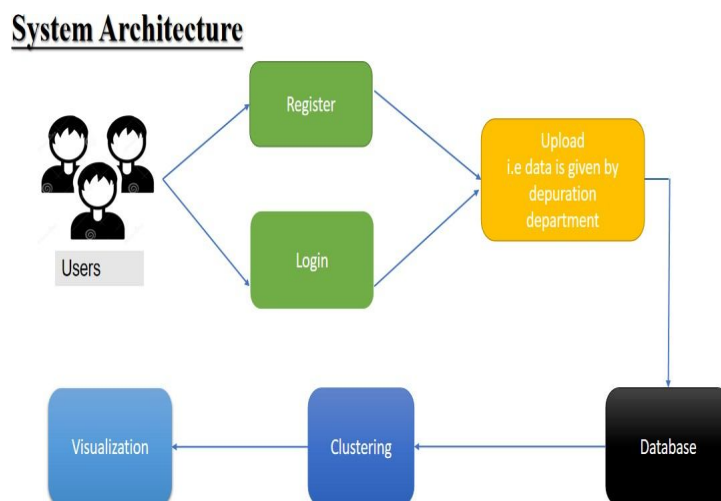
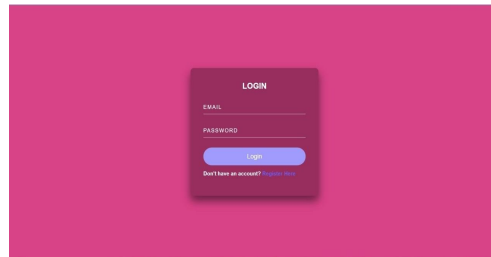


Figure 3.0:-System Architecture

Firstly, the deputation department employees should get authenticated by giving the data such as corporation, Office, Email. After that the user have following two operations: Register, Login

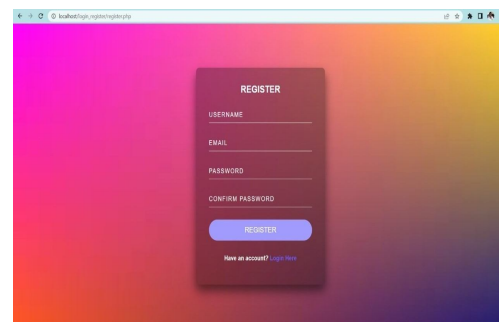
A. Register Module

If the employee is new to the website, he/she first gets registered by giving the details like User name, Email, Password. Then the home page of website is be displayed on the user's screen. The user needs to enter the same details when user wants to login.



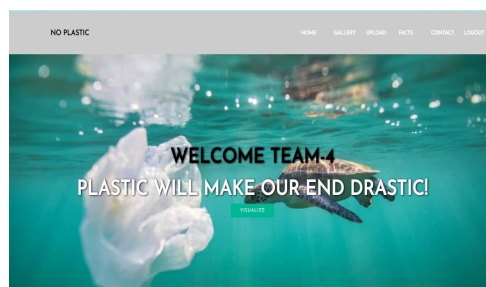
B. Login Module

The user can land on the home page of the website by logging on to the website by giving details which are given during registration ie, Email and password etc



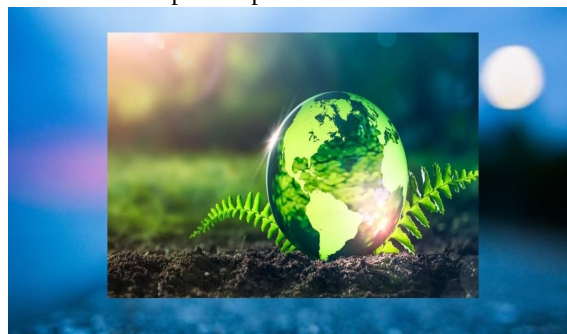
C. Home Module

On login/register into the website the user land on to the home page of the website.



D. Gallery Module

This page contains pictures related to impact of plastic on environment.



E. Upload Module

Secondly user can upload the data by clicking the upload button on the home page of the website. User gives the data such as district name, rate of not using plastic(ranges from 1-10),rate of cleanliness(ranges from 1-10),amount of plastic waste (tonnes).This information gets stored in database.

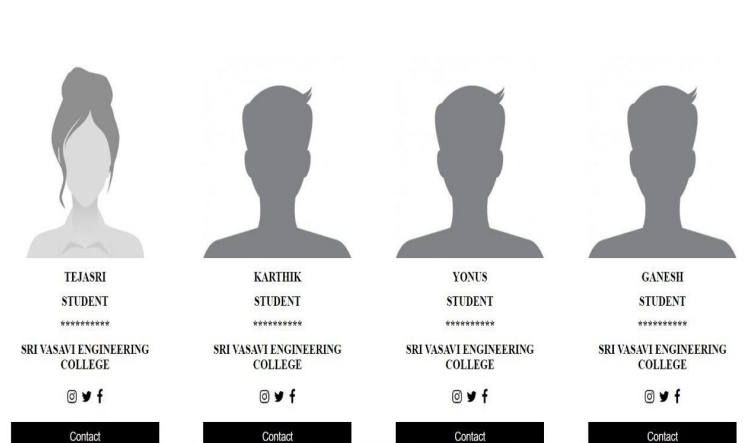
F. Facts Module



This page contains some important facts to reduce the use of plastic.

G. Contact Module

This module contains contacts of admin to communicate in case of any queries.



H. Clustering

Clustering is the process of grouping similar objects into different groups, or more precisely, the partitioning of a data set into subsets, so that the data in each subset according to some defined distance measure

a. K-means clustering

K-means is one method of cluster analysis that groups observations by minimizing Euclidean distances between them. Euclidean distances are analogous to measuring the hypotenuse of a triangle, where the differences between two observations on two variables (x and y) are plugged into the Pythagorean equation to solve for the shortest distance between the two points (length of the hypotenuse). Euclidean distances can be extended to n-dimensions with any number n, and the distances refer to numerical differences on any measured continuous variable, not just spatial or geometric distances. This definition of Euclidean distance, therefore, requires that all variables used to determine clustering using k-means must be continuous.

b. K-means algorithm

Step-1: We randomly pick K (centroids). We name them $c_1, c_2, \dots, c_k$, and we can say that

$$C = \{c_1, c_2, \dots, c_k\}$$

Where C is the set of all centroids

Step2: We assign each data point to its nearest center, which is accomplished by calculating the euclidean distance.

$$\arg \min_{c_i \in C} \text{dist}(c_i, x)^2$$

Where dist() is the Euclidean distance.

Here, we calculate each x value's distance from each c value, i.e. the distance between x_1-c_1 , x_1-c_2 , x_1-c_3 , and so on. Then we find which is the lowest value and assign x_1 to that particular centroid. Similarly, we find the minimum distance for x_2 , x_3 , etc

Step3: We identify the actual centroid by taking the average of all the points assigned to that cluster.

$$c_i = \frac{1}{|S_i|} \sum_{x_i \in S_i} x_i$$

Where S_i is the set of all points assigned to the i th cluster. It means the original point, which we thought was the centroid, will shift to the new position, which is the actual centroid for each of these groups.

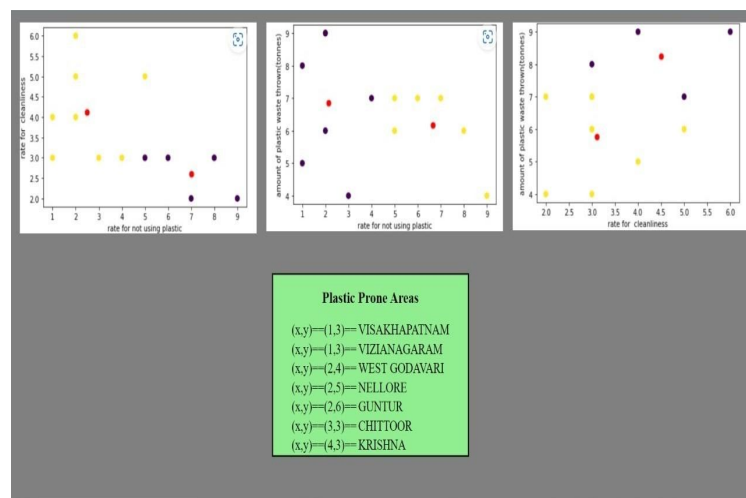
Step-4: Keep repeating step 2 and step 3 until convergence is achieved.

3.7.3 Elbow method for optimal k value:

For choosing the optimal number of clusters, the Elbow Method is one of the most popular and appropriate methods. The Elbow Method uses the idea of WCSS value, which is short for Within Cluster Sum of Squares. WCSS defines the total number of variations within a cluster.

$$\text{WCSS} = \sum_{\text{Pi in Cluster1}} \text{distance}(\text{Pi}, C_1)^2 + \sum_{\text{Pi in Cluster2}} \text{distance}(\text{Pi}, C_2)^2 + \sum_{\text{Pi in Cluster3}} \text{distance}(\text{Pi}, C_3)^2$$

I. Visualize Module



By analyzing the data using K-means algorithm we can procure clusters based on the parameters like rate of not using plastic, rate of cleanliness, amount of plastic thrown

IV. CONCLUSION

The main objective of our project is to collect testimony from depuration department through a website. On input data we apply clustering and procure clusters of localities pertinent to plastic usage and environment maintenance. From the output of clustering, we can scrutinize the localities where the plastic usage is more and can take proper precautions in future.

FUTURE WORK

As our target is to develop a project which is cost effective to spot the localities where the plastic usage is more by applying datamining functionalities, we can also apply some of the classification algorithms in order to recognize the plastic prone areas.

Not only classification we can apply soft computing techniques like fuzzy set and rough set clustering. We can also induce scrutinizing the work of depuration department employees in maintaining and cleaning environment by collecting testimony from people at different localities.

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