NIET Journal of Engineering & Technology (NIETJET)
Volume 9, Issue Summer 2021 ISSN: 2229-5828 (Print)

Solari – Finding Optimised Location Using Unsupervised Learning

Srijal[1], Akanksha Singh[1],Deepti Shikha Ojha[1],Surbhi Tripathi[1]
Ms. Shweta Mayor Sabharwal[1]
[1]Department of computer science& Engineering, Noida Institute of Engineering and Technology, Greater, Noida 201306, India.

Abstract: *The present study aims to provide an optimal solution for ensuring an organized distribution of limited resources like, fuel, food and other necessities on time during natural calamities example flood by the organizations having limited number of helicopters, drones. Our project, SOLARI - Finding Optimized location using Unsupervised Learning (ML) is software providing an effective alternative to the existing ad hoc management scheme used by the government during natural calamities like floods. The domain of this study is Machine Learning and are based on Unsupervised ML Algorithm:K-means clustering. K-Mean's algorithm proposed by J.B.MacQueen used in data mining and pattern recognition. The Software that is used in study are Python, Django[argon], Machine Learning supporting Libraries like (NumPy, pandas, sklearn, bcrypt, matplotlib etc.), HTML, CSS, Bootstrap, JavaScript, SQLite DB, Google maps API geopy, geocoder.The benefits of this study is that it helps the needy people stuck in affected areas will get necessary supplies. The algorithm gives an optimal solution for limited resources.*

Introduction

Clustering is an unsupervised machine learning approach that extracts conclusions from data without the use of labels [3]. We may conduct two forms of clustering using geographical data: hierarchical and partitioning [1], [7]. A hierarchy of groupings is created via hierarchical clustering. The model starts with 'n' distinct clusters and merges the nearest clusters until only one highest cluster remains [8]. Data points are organized into clusters depending on their attributes in partitioning clustering. The distance metric is used to allocate data points to subgroups. One of the most often used partitioning clustering methods is K-means clustering [7]. SOLARI stands for "Searching for an Optimal Location Using Unsupervised Learning"(ML). Solari is a word that meaning "to console." Unsupervised Learning was employed in this study to discover the best position (a Machine Learning Algorithm).SOLARI - Finding Optimized Location Using Unsupervised Learning (ML) is software that offers an effective alternative to the government's current ad hoc management plan for distributing food to relief shelters after natural disasters .Based on the number of helicopters and drones available, it generates an optimum location from the impacted region locations supplied by users. K-means clustering is used, which is an unsupervised machine learning approach, to discover the best site.

Methodology

The project accepts two sorts of user input (users can be any organizations who are working to provide basic necessities to the areas affected by natural calamities). First, it collects information about the impacted regions' locations; the user must enter all of the affected areas' locations that they wish to cover in order to offer basic essentials. The second input is the amount of drones and helicopters accessible to users for resource distribution. It need to discover the geocoded location (the collection of latitude and longitude coordinates of a physical address) for the impacted places since the user provides their physical address. Geocoding (the process of turning an address into geographical coordinates) is required to create the geocodes for all of the shelter dwellings. It's used in geographic information systems (GIS) to get the coordinates of a location or address using Google maps. Teams inside the aircraft use coordinates to determine where the drones should be released. Clustering is used to split the specified locations into k number of clusters, as indicated by the letter k. Cluster sizes are determined by the number of helicopters accessible to users. The number of helicopters will be denoted by the letter k. As a

Publisher: Noida Institute of Engineering & Technology,
19, Knowledge Park-II, Institutional Area, Greater Noida (UP), India.

result, the number of clusters will be k. The centroid of each cluster is determined, from which a helicopter will be dispatched and drones with supplies will be released.

The amount of relief shelters and other parameters will determine how available drones are distributed among these clusters. The number of drones assigned to helicopters is determined by the location to which they are travelling. If there are two helicopters and three drones, the helicopters that cover more densely inhabited regions will receive two drones, while the helicopters that cover less densely populated areas would receive one drone.

As a result, we'll have the geocodes for the centroids where each helicopter will drop down the drones, as well as the places where each drone will disperse supplies.

The system's use case diagram is shown in Figure 1. It demonstrates that both the end user and the administrator may log in, with the end user's duty being to sign up, supply location data, and offer resource data, while the administrator's responsibility is to maintain the system, report on it, and manage the users. The machine learning model's goal is to render an optimized location in this case.

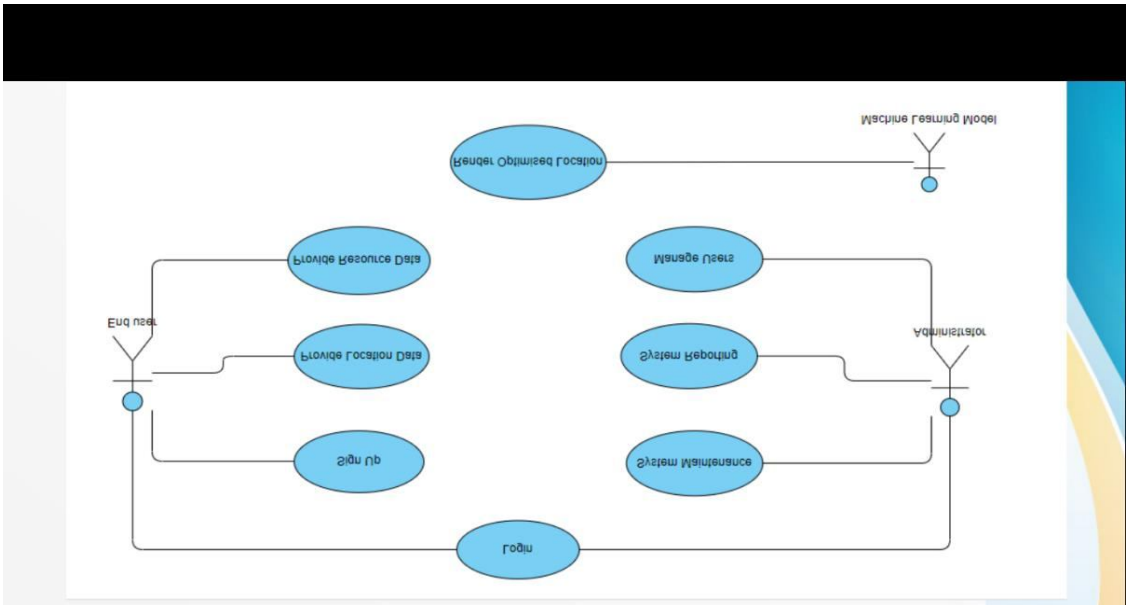

Fig1: Use case Diagram

Figure 2 depicts the system's flow chart schematic. The flow chart starts with a simple explanation of how a person logs in or signs up for a page. Then it determines if the user is a new or returning visitor; if the user is a new visitor, it will route them to the signup page and then to the login page; if the user is an existing visitor, it will take them directly to the login page. After logging in, the user must provide data, which the system will check to see if it is valid or not; if it is not, it will return to the home page; if it is, it will proceed to the input location page. After that, it will go on to the following section for input resources, which will be diverted to the machine learning model, which will give us the output optimized coordinates; lastly, the user must log out after obtaining the information.

Publisher: Noida Institute of Engineering & Technology,
19, Knowledge Park-II, Institutional Area, Greater Noida (UP), India.

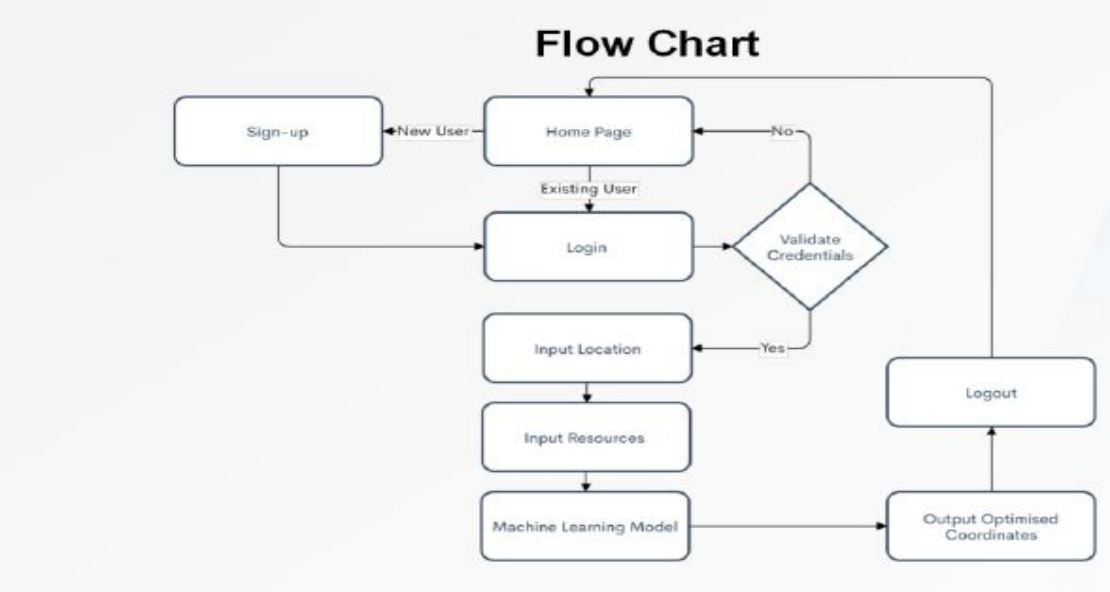

Fig 2: Flow Chart of the system

The following technologies were employed in the creation of the system. The following are some of them:
Python: Python is an open-source programming language that comes with a wealth of tools and comprehensive documentation. It also has a huge and active developer community that is eager to offer advice and support at all phases of the development process. Python's large number of machine learning-specific modules and frameworks make the development process easier and faster.
Django: Django is a high-level Python web framework for building safe and maintainable websites quickly. Django is a web framework built by experienced developers that takes care of a lot of the heavy lifting so we can focus on creating your project instead of reinventing the wheel. It's free and open source, with a vibrant and active community, excellent documentation, and a variety of free and paid support options.

Django, as a web framework, requires a simple mechanism to dynamically produce HTML. The most frequent method is to use templates. The static components of the intended HTML output are contained in a template, as well as some specific syntax indicating how dynamic information will be introduced. For a hands-on demonstration of how to create HTML pages using templates.

HTML: HTML is a markup language that your web browser – such as Chrome, Firefox, or Safari – interprets to display a web page for the user. "HyperText Markup Language" is the abbreviation for "HTML." Hypertext is a kind of text that allows users to navigate across pages via hyperlinks. Markup denotes the addition of code to a document in order to instruct anything (in this example, a browser) on how to understand the page.

Cascading Style sheets (CSS): CSS is used to style and lay out your information, whereas HTML is used to specify its structure and meaning. We can utilize CSS to change the font, color, size, and spacing of your information, divide it into many columns, and add animations and other ornamental elements.

JavaScript: JavaScript is a text-based programming language that allows you to construct interactive web pages on both the client and server sides. Whereas HTML and CSS provide structure and aesthetic to web pages, JavaScript adds interactive components that keep users engaged. The search box on Amazon, a news recap video posted in The New York Times, and refreshing your Twitter feed are all examples of JavaScript that you may encounter on a daily basis.

Publisher: Noida Institute of Engineering & Technology,
19, Knowledge Park-II, Institutional Area, Greater Noida (UP), India.

SQLite DB:

In general, SQLite is a serverless database that can be used in almost any programming language, including Python. The term "server-less" refers to the fact that SQLite does not require the installation of a separate server, allowing you to connect directly to the database.

Results and Discussions

The flowchart starts with a simple explanation of how we log in or register on a website. The system will then determine if the user is a new or existing user, redirecting new users to the signup page and subsequently to the login page, while current users will be taken directly to the login page. after login the user have to provide the data and accordingly the system will check if it's valid or not, if no then it will move backward to the home page and if yes then it will move to the input location page after providing that it will jump to the next part for input resources which will be deflected to the machine learning model which will give us the output optimised coordinates, after receiving the information the last step would be the logout step. The system is made up of several modules, which are as follows:

Module 1: accounts

It's the app that's part of our Django project. It contains the templates needed to transmit and receive data from a web page. It also comprises the statics folder, which contains CSS and template files. Django stores migrations, or changes to our database, in the migrations folder. Other files includes

- _init .py notifies Python that our accounts app is a package, and urls.py creates a URL configuration in the accounts directory. We register our models with the Django admin application in admin.py.
- applications.py is a configuration file that all Django apps have in common. The models for our programme are stored in models.py.
- tests.py includes the test procedures that will be executed when our app is being tested.
- The views for our app are contained in views.py. All of forms code should be placed in forms.py, according to the Django guidelines.

Module 2: simple-social

This directory contains our project's Python package. Its name is the Python package name that we'll need to import anything from within it.

- simplesocial/ init .py: A blank file that instructs Python to treat this directory as a Python package.
- simplesocial/settings.py: This Django project's settings and setup.
- simplesocial/urls.py: This Django project's URL declarations,
- views.py (simplesocial): A view function in Python receives a Web request and provides a Web response.
- wsgi.py (simple-social). Our project's entry point for WSGI-compatible web servers.

Module 3: static

The CSS, JavaScript, and pictures that we wish to serve with our site are all static files.Web applications typically need to deliver extra files in addition to the HTML created by the server, and these files are required to render the entire web page.

Module 4: templates

It includes the static elements of the intended HTML output as well as some specific syntax for inserting dynamic material. Here are the four HTML files:

Publisher: Noida Institute of Engineering & Technology,
19, Knowledge Park-II, Institutional Area, Greater Noida (UP), India.

- base.html page: This file holds the starting material for all subsequent HTML pages, such as the navigation bar.
- index.html page: This is the project's home page. This page loads as soon as the browser loads the launch URL.
- The text of the test.html page contains the issue statement as well as the answers (the introduction page).

The thanks.html page shows once you click the logout link.

Conclusions

People in need who are trapped in impacted areas will get supplies in a limited amount of time. The algorithm generates the best solution for limited resources and introduces a novel strategy that might be used in a national catastrophe management programme. In life-or-death situations, patients can be treated by doctors or transported to nearby hospitals in a timely manner using helicopters. As shown in the table below, the programme also performs validations on locations and resources.

References

[1] Viraj A. Gulhane, Maheshkuma R. H. Kolekar, "Diagnosis Of Diseases On Cotton LeavesUsing Principal Component Analysis Classifier", Annual IEEE India Conference (INDICON),2014.
[2] A.Miyatra, S. Solanki. 2014. “Disease and Nutrient Deficiency Detection in Cotton Plant,”International Journal of Engineering Development and Research, vol. 2, no 2, pp. 2801-2804. Surykant , Y.R.Sood, R.K.Jarial, N.Kushwaha, V.S.Bisht; 'Rotor Faults Diagnosis in Traction Drives Using Virtual Current Technique For Railway Application',Volume No.1,Issue No.1,2012,PP.038-041,ISSN :2229-5828
[3] V.J.Pithwa, B.R.Parekh; 'Microcontroller Based PMDC Motor Control Using Image Processing Algorithm Of Matlab',Volume No.1,Issue No.1,2012,PP.042-045,ISSN :2229-5828
[4] Nikhil Kushwaha ,Y.R.Sood, Suryakant and Vimal Singh Bisht; 'Nature Inspired Optimization Technique : Bacterial Foraging Algorithm',Volume No.1,Issue No.1,2012,PP.046-049,ISSN :2229-5828
[5] Verma, Shivendra Prakash; 'Design Optimization of 3hp,4-Pole, 3-Phase, 50Hz Induction Motor Employing Improved Genetic Algorithm',Volume No.1,Issue No.1,2012,PP.050-056,ISSN :2229-5828
[6] Shashi Prakash Dwivedi, Bhavaya Gupta and Devesh Chaudhary; 'The Effect of Process Parameters on Mechanical Stir Casting Process',Volume No.1,Issue No.2,2013,PP.001-007,ISSN :2229-5828
[7] Shyam Lal, Sudhir Kumar,Z.A.Khan, A.N.Siddiquee; 'Research and Development in Wire Electrical Discharge Machining(WEDM) :A State of An Review',Volume No.1,Issue No.2,2013,PP.008-013,ISSN :2229-5828
[8] Bhavana; 'ERP- A Brief Structure and Discussion of its Success and Failure',Volume No.1,Issue No.2,2013,PP.014-017,ISSN :2229-5828
[9] Mohanty, Pramodini; 'An Efficient Baugh-Wooley Architecture for Signed &Unsigned Fast Multipication',Volume No.1,Issue No.2,2013,PP.018-021,ISSN :2229-5828

Publisher: Noida Institute of Engineering & Technology,
19, Knowledge Park-II, Institutional Area, Greater Noida (UP), India.