Sainik: an Ai Based Android App Using ML for Volunteering

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Abstract — The current available modern technology has made possible for us to have many more volunteers to participate in the conservation of our environment and help in the sustainable development. This allows for providing opportunities to people to contribute to the society.

This has brought around an expanding number of versatile phone-based citizen science ventures that are outlined to get to these gadget highlights as well as to reach diverse client bunches, over distinctive venture lengths, and with diverse points and objectives. Here by integrating machine learning and predictive analysis, we can bring to life the basic idea of having people volunteer in these programs to help the environment. The Sainik application will help in accommodating all these ideas to fulfil the desire to help preserve our environment. It also provides people especially the youth to contribute to the safekeeping of our environment.

I. INTRODUCTION

Our surrounding plays a vital role in the sustenance of life on our planet Earth. Mother Earth is the giver of life and provides us all with the necessities like food, water, land, and air to survive. In this manner, it is necessary for every person to save and ensure our environments safekeeping. It's simple to urge bystander disorder approximately the environment and envision somebody else will "beware of it." But the truth of the matter is, in case the citizens of Earth do not start taking care of the planet nowadays, it could be as well late to require care of it within the future. Unfortunately, it is not always possible to be able to put time aside for this deed. But what if many different opportunities were presented at different period of times![10]

There are many services and events for community volunteering which helps provide help to the needful as well as provide opportunities to everyone involved. The current populace doesn't know what activities they can contribute to, either due to lack of time or lack of information regarding the matter[11]. Due to this, most of these able people take either any activity to volunteer even if they can't give their best or simply don't participate in such events. They don't have the information on whether the event they chose is compatible to their strengths or if they can be of any help in such events.

Simultaneously, it is also imperative that the organizers and supervisors evaluate the volunteers and get qualified ones for the job. This project allows us to build an intelligent AI driven mobile application that allows all volunteers to organize take care of their daily activities and also helps the organizers choose most suitable volunteers for the job. This can be done by filtering volunteers by their location, occupation and job performance which can be found in their profiles and segregated by the AI machine using predictive analysis for the process.[10]

To make this application we need to complete simple system which is to obtain data, have it reserved and make optimized and efficient decisions using the data.

For obtaining of data, I made an android application that users can use to register and login with their credentials which can be used to study the volunteers' interests and skills. The simple navigation of the app allows the user to create or participate in events they find interesting. The data gathered by the android application is stored in an organized database. This database is used for the authentication and security purpose of users.[9]

The app can use this data stored in database at any time to query any data regarding the registered people and show it on the screen. Machine learning framework is implemented into the mobile app which makes predictions from the data given by the volunteers. For testing purpose, we have given some dummy data into the database to showcase the training of AI model algorithm used which is the predictive analysis in this case. In end, the appropriate algorithms are run on the application server which is accessible at any time to users. By using some dummy data, I can train the different machine learning algorithms I wish to test and get the most optimized solution. This simple system works to accurately provide the most efficient solution to the complex problems.[11]

II. *LITERATURE SURVEY*

Concept And Implementation of Tourism Information System in Wasur National Park based on Android[1]

This paper focuses on the topological aspect of the project. Here they have made a list of popular tourist places, public areas and special areas, monuments or historical areas. This paper helps in finding these popular areas which we have integrated in our project as many popular areas are used to garner attention for volunteers to increase participation.

An ML-based Citizen-Driven Traffic Violation Reporting Android App [2]

In this paper the goal is to create a user-friendly application which is used by the public to follow the rules and be law-abiding citizens. This concept is used in our project to increase the productivity of youth and help the environment with volunteering.

Village Health Volunteers (Volunteers) with Information Technology Amidst the COVID-19 Epidemic[3]

In this research the goal was to provide everyone with a tool during the COVID19. Many people were falling sick and having access to IT allowed everyone to act quick and save

people. By integrating this idea in our project, I have made the goal to have this application be available to people so they can do the same for our environment. By utilizing this format, we can create events to help certain areas by creating events to save our surroundings.

Effect of Environmental Volunteer Integrated with Service Learning (EV_SL) to Improve Student's Environment Care Attitudes and Soft Skills[4]

Understudies can utilize the data to supply coordinate benefit to society. This can offer assistance understudies study around the political, social, logical, and environmental problems. In expansion, benefit learning makes a difference understudies create ventures whereas making a difference illuminate community and natural issues. Natural Volunteers coordinates with Benefit Learning can build unused information and unravel issues taking after the subjects considered in benefit exercises. Students might study about to creating evaluations connected to these benefit exercises. Understudies can back and serve nearby communities by settling real-world issues.

Performance analysis on Android SQLite database[5]

The focus of the research here is to study SQLite Android, relational database management system, experiment its conduct in many different scenarios: regarding CRUD operations on unencrypted data, the encrypted data and the access to database. For this purpose, this application was developed which I will be integrating with my project. This projects database is done in room database which is localized database and uses SQLite.

Review of random forest classification techniques to resolve data imbalance[6]

There are many different data within the dataset which may cause imbalanace in it. Processing of this dataset is necessary for training a model. But to do so, we require a way to filter these data and form an algorithm which may be able to analyze it and thus predict the required outcome. For this we integrated the random forest bagging algorithm to our project.
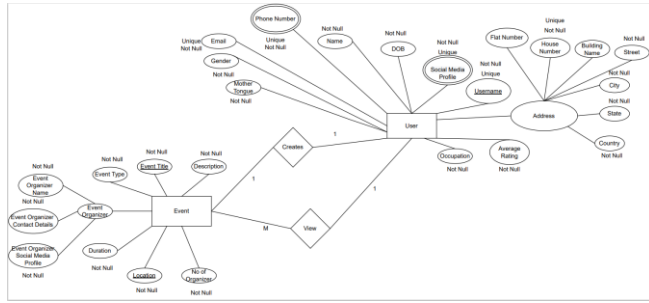
III. *METHODOLOGY*

Fig 1   : ER Diagram

The purpose of this project was to create an android application integrated with Machine learning (predictive analysis) which allows users to organize and host programs to showcase list of upcoming programs to help save environment by garnering support and volunteers for the same. This study is conducted by utilizing the data provided by the users and stored in our database. [12]

The goal here is to collect qualitative data and quantitative data to understand the compatibility of volunteers with the events created by organizers through machine learning done by the data collected via the mobile application[13]. This is done to build an intelligent AI driven mobile application that lets all users to implement this in their future plans, and also helps the organizers choose most suitable volunteers for the job.

For implementation of this idea, we need three steps: Gathering data(android model), storing data(room database) and making assumptions and predictions using this data(ML model/algorithm).

For gathering of data, we implemented a mobile application that users can use to register and login with their credentials which can be used to study the volunteers' interests and skills. The simple navigation of the app allows the user to create or participate in events they find interesting. The data gathered by the mobile application is stored in a database. This database also allows for the verification of people for secure login, thus enabling us to fulfill our goals.
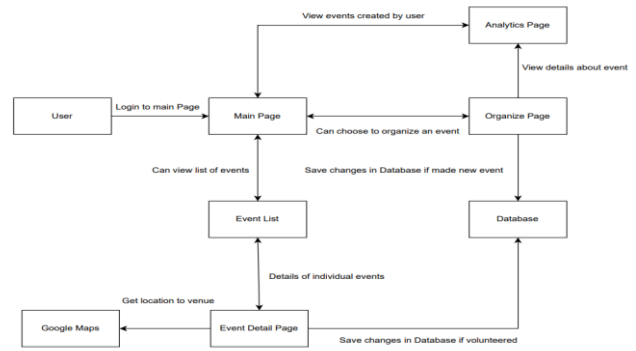

Fig 2   : Block Diagram

IV.   *MACHINE LEARNING PREDICTIVE MODELS*

To instruct the algorithm, I used some dummy data to get the training of the model started. Whenever a prediction is required, we will consider the users registration details and the location the event is set up on to make a prediction on how their performance will impact the event. Using the Scikit-learn machine learning library in Python, different algorithms, which include linear regression, k-nearest neighbor classifier, random forest bagging and polynomial regression to see which gives the best accuracy for this project.

Linear Regression: Linear regression is a simple relation which is linear in nature between the dependent and independent is called linear regression. We start with linear regression. We try to take number of expected volunteers based on the location the event is planned. Due to different population, we can determine the linear nature between the more populated area providing more volunteers. Simple Linear Regression is the single variable input of LR. With multiple variables the LR becomes multiple linear regression. This algorithm demonstrates an inclined (positive or negative slop) straight line depicting the relationship inside factors.
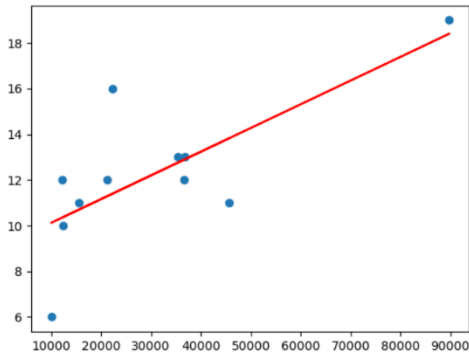
Fig 3 : Linear Regression Plot

KNneighbour: KNN algorithm works on the principle that alike things are always existing in a close propinquity. In layman's term, it means similar things are close to each other. KNN captures the idea of similarity with some simple math's operation like finding a point closest to all the given areas. In this algorithm, I used the KNN algorithm to find the similarities between the registered users and see how they compare to the given event. This can allow us to find suitable volunteering opportunities for every individual.

```
In [50]: KNN=KNeighborsClassifier(n_neighbors=3,
             weights='uniform',
             algorithm='kd_tree',
             leaf_size=30,
             p=2,
             metric='minkowski',
             n_jobs=-1)
```

Fig 4 : KNN algorithm

Polynomial Regression: Polynomial regression, similar to the linear regression has the relation between two variables (x and y) and tries to find a way to connect all the points the data gives. It may be a linear model with a few adjustments in arrange to extend the accuracy. The dataset utilized in Polynomial regression for preparing is of non-linear in nature. It makes utilization of linear regression to show how to fit the complicated and non-linear capacities and datasets. Polynomial regression is a sort of Linear Regression where both the X(dependent) and Y(independent) variables have a curvi-linear relationship and the below equation is adjusted into these datapoints.

```
y= a₀+a₁x₁+ a₂x₁²+ a₂x₁³+...... aₙx₁ⁿ
```

$$y = a_0 + a_1x_1 + a_2x_1^2 + a_2x_1^3 + \ldots \ldots a_nx_1^n$$

```
y_pred=linreg.predict(X_poly)
```

```
plt.scatter(x,y, color='blue')
plt.plot(x,y_pred, color='red')
```

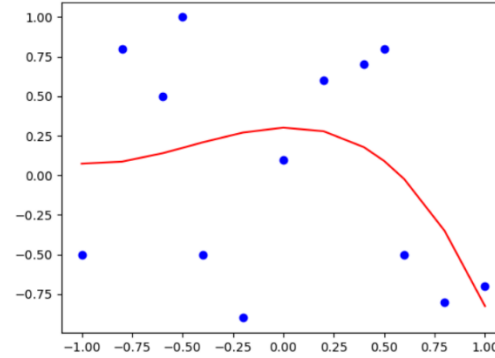[<matplotlib.lines.Line2D at 0x6a68a38>]

Fig 5 : Polynomial Regression Plot

The coefficient for polynomial regression and intercept was [0.   0.03994766   -0.67770181   -0.48982244]   and 0.30159529806884966 respectively.

Random Forest Bagging Algorithm: Random Forest Bagging is a supervised form of machine learning algorithm which is very popular. Here multiple decision tress is utilized to form the most appropriate solution which results in high accuracy. We can use many different parameters we gain from users' profile like their occupation, population density of the area and their age for more optimized solution. It is related to the concept of ensemble learning, which is a process of combining multiple classifiers for the solution of complex problems and to enhance the performance and efficiency of the model.[15]

To discover the leading calculation, there were multiple tests ran to guarantee precision of the calculations. As can be seen within the chart underneath, polynomial regression performs essentially way better than all other calculations tried. After comparison between polynomial and the RFB algorithm, we concluded that the latter gives the best accuracy for our project.

As seen in the older experiments, the ML calculations are prepared utilizing client's past information. Both the past users' information and the user's current information will be used in arrange to form the expectation[16]. The Sklearn ML library in Python allows us to use linear and polynomial regression, KNN (n_neighbors = 3, weights='uniform') and random forest bagging classifier.
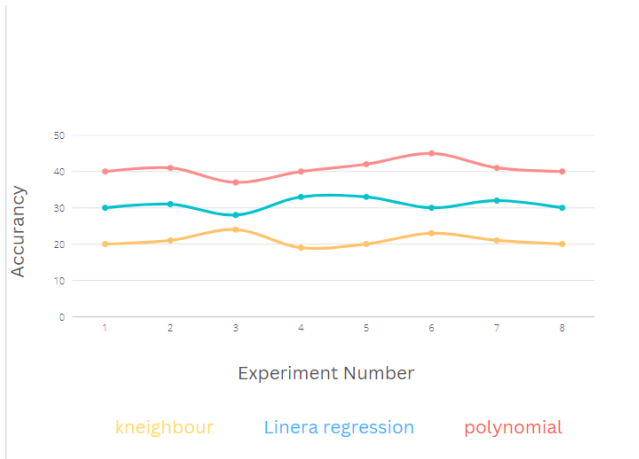
Fig 6   : Comparison of ML Algorithms

After the algorithm is chosen, we can begin to integrate the python file we used in jyuper notebook with android studio. To do so, we require some applications like pycharm, postman, and heroku[14] to convert the python files we made into the JSON format which android studio accepts. Once we create the API cand are able to successfully call them we can use the data from the android to work the ML model.[7][8]

V.   RESULTS AND DISCUSSIONS

This android application can be successfully be used to create and participate in an event. By using the ML model, we can easily predict the number of volunteers expected in the event. This footfall allows us to make the decision on whether an event location or type is worth setting up. It also provides the users a medium through which they can help contribute to the society. The accuracy at which we are able to get the number of expected people for an event is shown below:

```
In [379]: from sklearn.model_selection import train_test_split
          X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.2,random_state=6)

In [380]: from sklearn.ensemble import RandomForestClassifier
          from sklearn.metrics import accuracy_score
          rf=RandomForestClassifier()
          rf.fit(X_train,y_train)
          y_pred=rf.predict(X_test)
          accuracy_score(y_test,y_pred)

Out[380]: 0.8846153846153846
```

Fig 7: RFB accuracy

The current models which allow users to register and volunteer to events are a simple medium through which people can give their willingness to an activity. By integrating machine learning in our project as well as the android studio, we have successfully completed a device through which people can have more accurate reads on the number of events to set up and how they would fare in the given situation. This helps everyone to save time and effort while always working towards a more fruitful goal which will result in the necessary upliftment of our environment [17].

VI.   CONCLUSUION AND FUTURE SCOPE

Numerous organizations look for volunteer administrations and important assets of vitality, ability, and imagination to fulfill those volunteer occupations. This gives opportunity to everybody to supply their claim help within the betterment of the environment. Being able to take an interest within the right benefit openings can help in creating responsibility and higher self-worth for the general populace and will assist in shaping their opinions on the volunteer administrations to serve desires of the ones who need it. Students who have an association in volunteer benefit more often than not more dependable and have higher pride and versatility when they ended up grown-ups. Subsequently, it is significant and valuable to construct an AI, android app, which is simple to navigate through for volunteer stage that gives student volunteers the information they got to choose proper benefit openings which oblige with the interface, gifts, and personal activities. This lets users participate in areas which they truly find inspiring and fun.

A drawback to the data collected could be the fact that a lot of data used was dummy data which may not factor the real data collected by users later. For future plans, addition of notifications, priority of events and additional details for the events will be added. Similarly, there is plan to examine further connections between actual volunteer registrations, predictable volunteer performance, and providing them with volunteer opportunities they are actually more suitable for and hence give them better chance to help the society.

VII.   REFERENCES

[1]https://www.ijert.org/concept-and-implementation-of-tourism-information-system-in-wasur-national-park-based-on-android

[2] https://ieeexplore.ieee.org/document/9716674

[3] https://ieeexplore.ieee.org/document/9425712

[4] https://eric.ed.gov/?id=EJ1329754

[5] https://ieeexplore.ieee.org/document/8717652

[6]https://ieeexplore.ieee.org/document/8122151?arnumber=8122151

[7] Wu, Wenhao. "React Native vs Flutter, Cross-platforms mobile application frameworks." (2018).

[8] Peng, Dunlu, Lidong Cao, and Wenjie Xu. "Using JSON for data exchanging in web service applications." Journal of Computational Information Systems 7.16 (2011): 5883-5890.

[9] OL. Google Android Developers, Android Develop Guide,
http://developer.android.com/guide/topics/fundamentals.html

[10] Stukas, A. A., Worth, K. A., Clary, E. G., & Snyder, M. (2009). The Matching of Motivations to Affordances in the Volunteer Environment: An Index for Assessing the Impact of Multiple Matches on Volunteer Outcomes. Nonprofit and Voluntary Sector Quarterly, 38(1), 5–28. https://doi.org/10.1177/0899764008314810

[11] Finkelstein, Marcia A., Louis A. Penner, and Michael T. Brannick. "Motive, role identity, and prosocial personality as predictors of volunteer activity." Social Behavior and Personality: an international journal 33.4 (2005): 403-418.

[12] Davis, M. H., Hall, J. A., & Meyer, M. (2003). The First Year: Influences on the Satisfaction, Involvement, and Persistence of New Community Volunteers. Personality and Social Psychology Bulletin, 29(2), 248–260. https://doi.org/10.1177/0146167202239050 [13] Segal, Mark R. "Machine learning benchmarks and random forest regression." (2004).

[13] http://blogs.computerworld.com/raphael

[14] J. Li Lin, Changwei Zou, Research on Cloud Computing Based on Android Platform, vol.11. Software Guide, 2010, pp.137-139

[15] M. Junmin Ye, Software Engineering, Tsinghua University Press, 2006,6

[16] Michie, Donald, David J. Spiegelhalter, and C. C. Taylor. "Machine learning." Neural and Statistical
Classification 13.1994 (1994): 1-298.

[17] https://link.springer.com/chapter/10.1007/978-3-319-76445-0_2