A Synopsis on

ANNADATA: A Web Based Farmer's Portal

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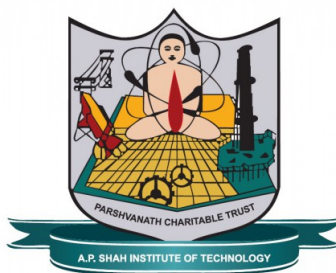
in

Information Technology

by

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CERTIFICATE

This is to certify that the project Synopsis entitled ***ANNADATA: A Web Based Farmer's Portal*** Submitted by ***Cdt. Swarad Hajarnis (18104073), Mr. Kaustubh Sawant (18104066), Mr. Shubham Khairnar(18104026)*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Information Technology***to the University of Mumbai,is a bonafide work carried out during academic year 2021-2022

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Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

The world is rapidly moving towards digitization. In these tough times where everyone is not so comfortable with the digital world, there are many classes in the society that faces difficulties in updating themselves and to keep up with their professional requirements at the same time. There are many classes that are neglected during the ongoing pandemic situation, whose issues aren't addressed, whereas they actually play an important role in society as well as in maintaining ecological balance. Agriculture is an important sector in India. It is indispensable for the sustenance and growth of the Indian economy. On an average, about the 70 per cent of the households and 10 per cent of the urban population is dependent on agriculture as their source of livelihood. Agriculture is the primary source of food and plays an important role in employment and economy in India. Thereby to address some of these issues, this project is developed in order to help and uplift the Farmer's community as they play vital role in many aspects. Some of the issues would be addressed that are on high priority currently. The whole system is developed with a motive to help the unaddressed community that selflessly delivers to us a keen interest towards working for a social cause.

Introduction

Due to the increase in the use of machines and fast evaluation of the world towards the digitization process, there are many classes of the societies that aren't very familiar with this new trend. There is a strong need to acknowledge this. There are many classes in the society that have been facing a lot of issues during the ongoing Covid-19 pandemic situation. One of those is the Farmer Community that faces a lot of issues in their day-to-day lives. There are many issues that goes unaddressed and are being neglected since ages, whereas this community has always been selflessly working in order to provide the best products to us all-day everyday. Farmers are the sole reason we have fresh and good nutrition rich food products. But there are many issues which the farmers have been facing since long period of time. Many of these issues even go unaddressed or are overlooked by the concerned authorities. Thereby with a positive approach the submitters have proposed to design a web-portal for the farmers wherein many of their problems would be identified and they would be provided a solution for the same. India has been the global agricultural powerhouse since ages. As good as 17-18 per cent of India's GDP was generated through agricultural domain in 2018, whereas almost 16 per cent was generated in 2019. India is one of the largest exporters in the world for many agricultural products. India is the second largest exporter of rice and wheat the basic foods and largest exporter of milk like products where cattle is involved. All-in-all, India can be considered as an Agricultural State. So it becomes necessary for us to address and help the mainstream frontline people associated with this domain, THE FARMERS! As the world is moving towards e-platforms, we are fortunate enough to study in the Information Technology sector, and use our skillset, knowledge and willpower to work towards a social cause for our Final Year Project. Herein, we would be designing a web-portal that would prove to be useful for the Farmers. Some of their issues have been identified and the web-portal would contain a solution for it. This portal would be designed after a detailed study and taking into consideration a lot of data from relevant sources about the concerned aspects. The system would consist of different modules which would help the farmers in many aspects. The highlighted part of this system is that the whole system would be multi-lingual, and the farmers can access the data, information and overall operations in the system in their native language. This will enable the farmers to gain confidence over the system and would be really of use to them. It will be easy to them to operate things and get access of all the modules and take 100 per cent advantage of our portal as they would be comfortable using it as it would be in their native language. The security aspect is also taken into consideration and thereby firstly the farmer has to register themselves on our database using their mobile number. We would be verifying the mobile number through an OTP (One Time Password) and after successfully verifying the number, the portal would register their mobile number and generate a password for them. After successful login, the user will have to create their profile by adding their name, region, type of agricultural practice they have been following etc., this would create an overall profile of the end-user and also help us in gathering data across different parts of the country. Once the user has register themselves on our database they can have an access to our portal and take benefits from all the modules that we would we adding . The modules are:

1] Weather Prediction
2] Crop Prediction

3] Government Schemes

4] Farm Bills

5] Chatbot

6] Market Prices

Through these modules the user would be able to get access of a lot of relevant data real-time information. This would be helpful to them in deciding their workflow, being a beneficiary of government schemes, getting real-time weather prediction, and also the chatbot! The project is developed by using different technologies, algorithms and after a detailed study of the same. Different algorithms have enabled us to give precise predictions and provide more accurate results. We all are also aware of the situation that was arised due to the mis-interpretation of the new farm bills that were imposed recently. Many who were directly affected due to this farm bills had no proper legitimate information about the bills and were mis-guided all through their way. Thereby, recognizing the need to guide the people who are directly related to these new farm bills was important. So, this project would be providing all the legal information that is concerning their profile in simpler and their native language. Basically, not all but much of their queries would be addressed here in our project and would also develop a sense of responsibility and dedication towards working for a social cause in us.

Objectives

There are many limited products in this domain so as to create a competent and user friendly product that would be really helpful to our targeted audience, which would suggest the best for them in all fields and aspects that are mentioned in our modules. In all, a product that could be beneficial for them with respect to all terms.

1. To address a social cause and use our skillset to help the unaddressed community
2. To develop a chatbot to solve the queries of the farmers
3. To enable Indic Language on the conversation system to provide a multi-lingual support
4. To connect the farmers with new advances in all fields and aspects that concern their profile
5. To notify the farmers about the red flags generated in weather forecasting
6. To make them aware about the different Govt. Schemes for which they are eligible and to notify them everytime a new scheme is launched
7. To help farmers know about the sci-geographic conditions and which agricultural forms to go with
8. To make them aware about the new farm bills and help them understand the legalities that concern their profile
9. To inform them about the market prices and the government prices for the crops they grow so that no middle-man can cheat on them
10. To address various issues in depth and provide them easy solutions in their native language using multi-lingual support

Literature Review

We have divided the literature review as per our findings into some module specific researches and literatures by known publications. 2.1 Crop yield prediction using RFA [1]

Random forest algorithm is used for both regression as well as classification. In this model the publishers had used 10-fold cross-validation technique which helped them in indicating, giving high accuracy and correlation between the climate and the crop yield. The accuracy of their model was found to be 87 per cent. In their project, many other factors like quality of soil, pest, chemicals which are used, etc were not used as they stated because it depends on the type of field. As the climate changes according to the season their web application helped the users in taking the best decision according the geographic conditions about which crop needs to be cultivated in their region. This study was completely based on the climate and seasonal analysis and other factors weren't taken into consideration. The publishers highlighted the point that their study and their product will help the policy planners too. It will help the policy planners in import-export, pricing, marketing, etc to take decisions even before the crop is harvested. Their system was designed using python and flask framework was used to render the results into their web-page. They took input from the users like their name, region, district etc. In their model they had trained 20 decision trees to build a random forest algorithm. The result page of their smart farm application also displayed a graph of crops that the farmers can plant in their district vs yield the respective crop will produce. They interpreted that this might help the users to crop could be planted to get a better yield. They gathered the data about the various districts in Maharashtra from the Government website www.data.gov.in and for the climate they gathered the data from another government site www.imd.gov.in Overall this model was great to study and to understand where exactly we can work to overcome some flaws and produce a better product.

2.2 Smart Chatbot for Agriculture [2]

In this model the publishers had used KNN algorithm to create a chatbot. K nearest neighbours or KNN is an algorithm used to create chatbot. They proposed that their system learns on their own and updates the answer. Their system produced high accuracy as predict. Their system was trained for a particular dataset and based on their analysis and continuous testing they observed that it improved gradually and provided answers with an accuracy of 90 per cent. They sighted that KNN(K nearest neighbour) was best suited since it predicted future too, as per their findings. There system gave corresponding answers to the questions outside the database too. KNN is a simple algorithm that would store all the available cases and then would classify the new cases based on the similarity measure. They had also mentioned about a Django architecture in their model. Django followed a Model-View-Controller (MVC) architecture, which was split up into 3 parts. They created a simple KNN algorithm by first loading the dataset. Then they initialised the value of K. Then for getting the predicted class, they iterated it from 1 to total number of training data points and calculated the distance between test data and each row of training data. There they used Euclidean distance as their distance metric in the system since it is the most popular method. The other metrics they could have used are Chebyshev, Cosine etc. Then they sorted the calculated distances in ascending order based on the distance values in the Euclidean Distance SI. Then they got top K rows from the sorted array. After which they got the most frequent class of these rows and then returned the predicted class. This was how they trained their KNN algorithm in a simple yet efficient way to predict and provide the answers which according to their study was 90 per cent accurate.

2.3 Crop Prediction using data mining [3]

In this model the publishers collected all the data sets from the publicly available records of the Indian Government for the duration of 64 years (1950-2013). It had consisted of monthly rainfall, monthly mean temperature, area under irrigation, area, production and yield for Kharif and Rabi seasons respectively. Then the publishers processed the data. The data processing was done to collect all the datasets in Microsoft Office Excel. For every crop it had consisted of columns like: Year, area, production, yield, area under irrigation, monthly rainfall, and monthly mean temperature. Now, when they divided the Production by area, they got the values very close to yield. Again, for mining, regression analysis is a predictive modelling technique which estimated the linear relationship between dependent variable and one or more independent variables. Regression analysis was used as a predictive modelling technique for the crop prediction. The regression algorithms used in their research were Multiple Linear Regression, Random Forest regression and Multivariate adaptive Regression Splines (Earth). The experimental Results showed that the performance of Multivariate Adaptive Regression Splines (Earth) was better in comparison with Multiple Linear Regression and Random Forest Regression on the crops like rice and wheat datasets. Whereas the performance of Multiple Linear Regression was found to better than Multivariate Adaptive Regression Splines (Earth) and Random Forest Regression for the maize datasets. Their overall study and modelling with experiments and their results show that Multiple Linear Regression, Random Forest Regression and Multivariate Adaptive Regression Splines (Earth) regression analysis can be used to predict production of rice, wheat, maize, with precision. Accurate forecasts of these parameters would result in accurate production forecast in the future.

2.4 Jollity Chatbot- A contextual AI assistant [4]

The main aim of the jollity chatbot was to confer with people and help them by suggesting articles, videos, and images. Most of the chatbots are retrieval-based models but the jollity chatbot was generative based. The jollity chatbot understood the flow of the interaction and could ease the pain of the user by giving appropriate or exact results to the user as stated by the publishers. Generally, chatbots might not be NLU processing but in their chatbot NLU took care of spelling mistakes and gave exact results to the user as per their findings. Their chatbot gave instant replies to the uses when the users wanted to talk to someone during their tough times. Also their objective was to engage the users with some funny videos and calming/soothing songs. Their aim was to create a virtual-friend for the users and to create an interactive interface for their users. They concluded their module by stating that chatbots are not only used for bookings, educational purposes, hospitality, etc., but their chatbot was unique in its own way as it will be a virtual friend for every person whenever they need someone, especially during their tough times when one is feeling very low by suggesting them funny videos, soothing songs, good articles, and images to make them feel better. Their jollity chatbot mitigated the problems of depression, anxiety, by lending an invisible friend as per them on whom the user can rely on and they can also chat with the bot for the whole day. That was really a cost-effective project we studied, as it could somewhat help the users from spending sums of amounts at high-end psychological sessions if it wasn't that advisable, as the jollity chatbot cheered its users in its own way. Their jollity chatbot was implemented in RASA and deployed on Telegram. Their system is evaluated with various parameters such as intent accuracy, story accuracy, and confusion matrix. Their experimental results showed that the system could recognize the intents and fetch the appropriate responses with an accuracy of 90 per cent as per their findings. They defined the future scope of their Jollity Chatbot is to fetch real-life examples by adding the platforms like Quora so that the users can understand the feeling of another person how they are dealing it when they are depressed and it also makes them realize that they are not the only ones who are going through it but there are many people across the globe who have been facing similar issues were their future scope mentions. They highlighted that they would also like to add speech to text conversations in their future implementations.

2.5 Indian Government Schemes on Architecture [5]

This project focused on the financial needs of the farmer and emphasised on the government schemes available for the farmers. They did a lot of research and studied various available stuff and designed their project after intricate research. The submitters of this project discussed about various major government schemes that are available and easily accessible to major population of farmer's community to provide a helping hand. They discussed about how agriculture is important in India and India being an agricultural state, we need to focus on the requirements and issues of this profession's immediate stakeholders. They jotted down some keywords related to this project idea to make their content available to the farmers when they search anything related to it. It made their content to be easily accessible. They referred various writings and books of well-known authors to enhance the output of this project.

Problem Definition

India can be addressed as an agricultural state as much of the country's export products are from the agricultural domain. Thereby, it becomes necessary to address the issues faced by the people associated with this domain. It becomes necessary to provide them with the products that can be useful for them and they can find information related to many sectors in their domain at one place. As we all know that the people associated with this domain, viz. Farmers, are not fortunate enough to be as literate as us, they find it difficult to understand foreign languages. Therefore the current products in the market do not prove to be really useful to them. These products might be commercially competent and provide precise and accurate information but the main drawback here is that the products that are designed are not comfortable for its end-users. These products do not use the language that their end-users are comfortable in. Also many products in the market do not resolve many issues under one banner so it becomes even more difficult for the targeted audience. As they will have to go for multiple products for multiple issues. Thereby, recognising all these issues, identifying major problems of our targeted audience we define the problem statement as mainly the language barrier between the existing products and their users, the scope limitations of these products, access of these products and their easy availability to the users. Another challenge is that, our target users stay in rural areas and their approach towards science, inventions, new techniques, new advancements etc are really conservative and to win their trust is a task. They are known to follow their age-old techniques, which are definitely superficial than many, and India is known for its diversity and old Home-Techniques, but if these are merged with the new advances then overall a best product can be delivered by them. So here our project aims to cross that thin line and help our users in bringing out what's best for them.

Proposed System Architecture/Working

Herein, we would be designing a portal that addresses the issues faced by our end users. The project is committed towards building a user-friendly portal. The user has to first register himself/herself on our database if we do not posses any records, i.e if they are new users. They can simply register using their mobile number. After providing the mobile number, verification would be done for security reasons. An OTP(One Time Password) would be sent on their cell-phones and after successfully verifying the mobile number they would be registered on our database. The system would generate a password for them which they can use for their further logins. After the successful login, the user has to create their profile, i.e name, age, sex, region, district, crop type they have been practicing etc., after providing all this information their profile would be created and recorded in our database. Now, the users can take benefits of all the modules that the system consists of. These modules will enable the target audience in getting relevant information about many fields that concern their profile.

Modules:

a) Weather Prediction: Herein, we would be providing the real-time weather prediction to the farmers. As weather plays an important factor in the growth of any crop, the weather conditions needs to be analysed so as to help the farmer know his future steps according to the weather conditions. Every crop that is being cultivated needs a specific weather conditions for its healthy growth and to maximize its nutritional value. So this module will enable the farmers in predicting the weather. Sometimes, the weather suddenly changes into extreme conditions and thereby it can destroy the crop. So in such cases, when there's a sudden change in the weather conditions, the system would notify the farmers on their registered mobile number about the conditions of the weather for them to take necessary preventive steps. There are certain standards maintained by the government regarding the weather conditions, so if there's any extreme condition, then that generates a red flag in the prediction system. In such cases, where there's a red flag generated, meaning, there's such extreme weather conditions, in such cases our system would auto-generate and send SMS to our users in that region about the change in the weather. This is the special feature that is added in the project which is the face of the weather prediction system.

b) Crop Prediction: In this module, the system would take user-input about the district/region the user wants to cultivate the crop, and based on many other factors and sci-geographic conditions in that region, the system would generate a list of the crops that could be best practiced in that region. This list will be consisting of a list of crops, their details, number of people who have cultivated that crop in the same region. Random Forest Algorithm(RFA) would be used to predict the list of crops. This will boost the confidence of the users to grow the crops and achieve productivity

c) Government Schemes: There are many schemes that government has launched in order to help the farmers. All these schemes directly or indirectly helps the farmers on monetary grounds. If we see the current stats, there are many farmers who have taken harsh steps due to the loss and being in debts. Adding to it, a little to these beneficiaries know that there are many schemes that would help them in all aspect. So, this module in our system would address this issue and we would be providing a list of all the government schemes and their related information like, the documents needed, eligibility criteria, etc so that the schemes that

are being launched by the government can be really helpful for its beneficiaries. Also similar to the weather prediction system, in this module too, we would be notifying our registered users through SMS everytime the government launches a new scheme.

d) Farm Bills: As mentioned above, our target audience are from the backward areas and have less knowledge about technical specifics and also the literacy rate in those areas is very low as compared to any urban city. So these people, who are directly concerned with the newly imposed farm bills have very less amount of knowledge about what exactly the bills are, plus they have been easily influenced and we could see its results some months back in Delhi Riots. It is an overall loss for any country and not just a community. So as to avoid such things we would be providing all the legal information and its technicalities in simpler and their native language, so as to avoid any such controversial events in future. This module will make them independent of any external factor to help them in understanding technicalities related to the legal forms.

e) Chatbot: Our virtual chatbot will enable the farmers to post their queries and get instant solutions for the same. This will help them as it will be available 24*7 for them and they can get their queries solved at any hour of the day. This chatbot would be really helpful to them as this chatbot would be a multi-lingual support offered to them. The farmers can post the queries in their native language and the solution will also be provided to them in the same language. This can help in reducing the language barrier and be helpful to the end-users. This module will be designed by using RASA as mentioned above in the technology stack.

f) Market Price: Herein, this module will address the post cultivation part in the agricultural domain. There are pre-defined prices of each crop by the government that would be provided to them and also the market price of that crop so that they can maximise their profits as they truly deserve. Overall, this system would be helpful to the farmers as it would address major issues and we tend to extend the scope of the project and its modules in the future scope. This system would prove to be a user-friendly system as it would have a multi-lingual support and that can increase the comfort level of the target audience and win their trust over the product. Once the user successfully logins into our portal, we are obliged to provide them all kind of support and the project ensures the same.

Design and Implementation

As we can see in the above findings, the existing system posses' some drawbacks that would be addressed in our project. The existing system consists of crop predictions, chatbots, chatbots using AI, weather predictions. In our project we would be including all these modules with a higher accuracy rate and would be predicting more accurate results using different algorithms and technologies. Also the project's highlighted part would be that all the findings, researches, predictions, information etc., would be provided to the farmers in their native language with a motive to make it more user-friendly. They would easily connect to our portal as they would find it familiar as it would be addressing to them in their language and this would play as the key factor. The submitters are also committed towards working over other modules too, which are mentioned above. This will make the portal more unique as the end-users would find many things under one banner. We would like to address many legal issues and information too to the end-users through our portal which would help them in understanding the legalities in simpler language. Also there are many other modules that would be addressing different aspects in various sectors of the agricultural domain. Also there is no system currently that registers the farmers on their database and notifies them on their mobile numbers about the immediate importants. The current products in the market are very limited and address to very limited specifics, also the language barrier plays a role in turning the users skeptical about the product and be reserve about the approach towards the product, as we have been seeing the language barrier since ages. When something is been conveyed in the language that the users are very familiar with, to say, their native language will help our product win their trust and that trust of the consumers would motivate us to work even better and produce the best out of our skillset! According to the study, Agriculture contributes 10+ percent of the total India's GDP and a lot of families depends in this as their source of livelihood. With the advancement in the IT Sector, it becomes necessary to provide them with better products and products that would consist of quantity and quality both! Having said this, we would like to update and modify the current systems and add new features and modules in our system that would address more issues and problems that are faced by the target audience As we can see and consider the above figures and after studying in detail the current systems and products in the market, we can easily note that there are many drawbacks and, mainly many products address just one issue at a time in their services. Thereby, it convinces the submitters to produce a competent and efficient system that would be addressing major issues at one place.

Summary

By applying the knowledge and skillset, we are determined towards building a completely userfriendly web portal which would be useful to the targeted audience, viz. THE FARMERS! This system ensures the multi-lingual support and has other modules as above mentioned that would address different specific issues. In near future, the product would be designed with a motive to help the unaddressed community and help them resolve their issues. The overall performance would be tried and tested and would be made available once all the trials-n-errors have been successfully worked upon so as the Users can enjoy, learn, and grow in all aspects using our product

References

[1] Kiran Moraye, Aruna Pavate, Suyog Nikam and Smit Thakkar, "Crop Yield Production Using Random Forest Algorithm for Major Cities in Maharashtra", International Journal of Innovative Research in Computer Science Technology (IJIRCST), March 2021

[2] Prof. Yashaswini. D. K, Hemalatha. R, Niveditha. G," Smart Chatbot for Agriculture", International Journal of Engineering Science and Computing, May 2019

[3] Suvidha Jambekar, ShikhaNema, Zia Saquib, "Prediction of Crop Production in India Using Data Mining Techniques", IEEE 2018

[4] Kanakamedala Deepika, Veeranki Tilekya, Jatroth Mamatha, Subetha T," Jollity Chatbot-A contextual AI Assistant',IEEE,November 2020.