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Kisan Soch – A Mobile App for Farmers

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Abstract: Farming is the backbone of India. Agriculture in India is major source of income for a majority of the population and can never be underrated. Government Schemes are intended to help all farmers across the country. We aim to develop an android based mobile application which provides information regarding the various Government Schemes. The already existing applications provides outdated information and have lot of security risks. Moreover, these apps provide information only in one language (either only English, or Hindi). In this paper, we made a universal multilingual mobile application which any farmer can use conveniently irrespective of their native language it will provide multiple language support. Our system is implemented using Neural Machine Translation (NMT) which uses an Encoder-Decoder Architecture. The Encoder takes the sequence of sentences and feeds it to the Neural Network, then the Decoder generates the decoded output (translated sentence)

***Index Terms* - Neural Machine Translation (NMT), React Native, Multilingual Mobile Application**

I. INTRODUCTION

Farming is the backbone of India. Agriculture in India is major source of income for a majority of the population and can never be underrated. Despite the fact that GDP contribution has reduced to less than 18 percent and other sectors contribution increased at a faster pace, agricultural production has grown which made Indians independent and taken us from being a starving for food after independence to a total exporter of agriculture and confederated products. India has a total of 22 different languages, where each language comes with its own set of regional languages as well. In turn, farmers find it difficult to find information related to schemes in their desired language. We used react native framework[6] to build the application which supports both android and iOS using Node JS as the backend. The mobile application provides multilingual feature for the user, so the user can select one out of 3 supported languages (English, Hindi and Kannada) throughout the app. React Native is a popular JavaScript-based mobile app framework which allows you to make a application which can run on cross platform devices. Using same codebase we can create the app using the react native. Google Firebase[7] is a Google software that helps developers to develop cross platform apps. We used Firebase to store the user information and the government scheme information. We used a Neural Machine Translation (NMT) model with attention mechanism to perform language translation from source language (English) to target language (selected by the user) and display the translated government schemes.

II. SYSTEM ARCHITECTURE

The application is based on Client Server Architecture. The user interacts with app through the UI of the application shown in the figure. It is 3 - tier architecture. The 3 tiers are:

- Presentation Layer
- Business Layer
- Data Layer

The First tier is the UI and communication layer of the application, where the customer interacts with the application. Its main target is to show information to and gather details from the user. The second tier, also known middle layer, is the center of the application. In this tier, details gathered in the presentation layer is processed - sometimes against other details in the 3rd tier using a specific set of business protocols. The third tier or back-end, is where the details is processed by the application is stored and managed. The database used in this application is firebase.

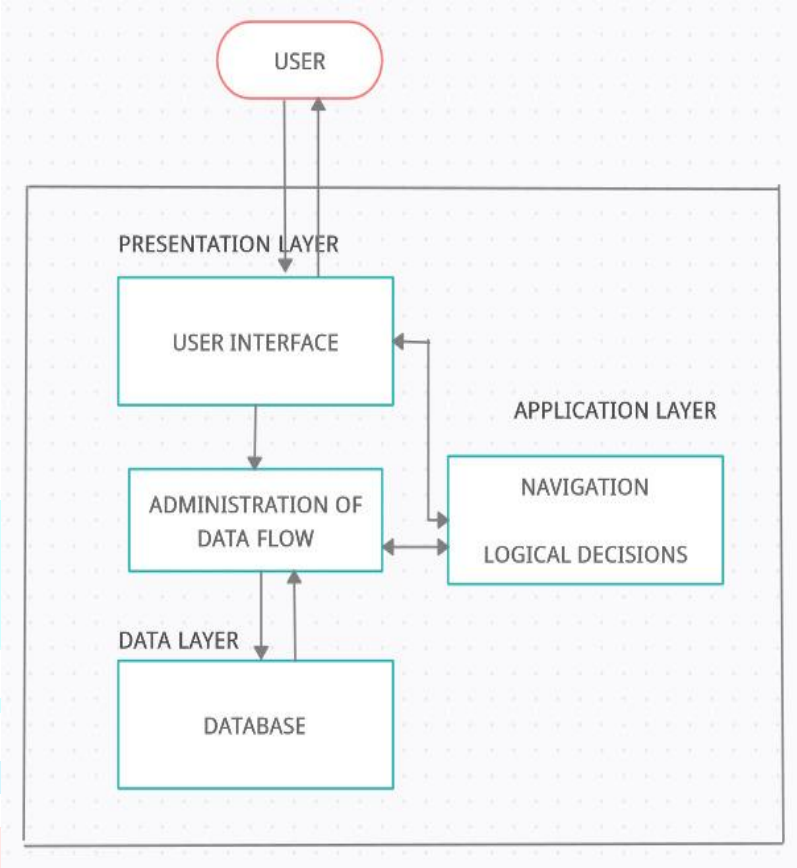

Fig 1 – System Architecture of Kisan Soch

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III. LITERATURE SURVEY

We carried out many research and survey on NMT using the transformer model which uses attention mechanism. To increase the translation quality and reduce the over translation it is necessary that we perform some modification on the NMT model. NMT model alone cannot give you accurate translation as the input size increases (more in general term as length of sentences increases) the translation quality reduces. We carried out research on several journal papers to understand how we can improve the translation quality. The Transformer model calculates each token representation independently[1].It is uses both position encoding relative encoding to determine the order of the tokens. Since the encoding used are separately, it cannot consider token order for source and target sentences. To overcome this it uses preordering encoding[1].Training more time on instances on the transformer model will yield better BLEU scores compared to scores achieved by the other models like NMT using LSTM[2].The next journal paper, we took in it proposes a using of syntax to enhance the Transformer based NMT in terms of input embedding and positional encoding[3]. The first method is took from [4] paper and second method uses transfer of tree features into positional encoding, and remains unchanged[3].Thus, totally we took 44 journals to understand the Neural machine translation and its translation quality in each research and we identified that Neural machine translation based on transformer model which adopts the attention mechanism showed a good result in terms of the accuracy in the output it achieved.

IV. METHODOLOGY USED

The methodology of the system is segmented into following parts

A. *Programming the application*

- The application is being coded using React Native programming language and Node JS for the server side language.
- The application is made and tested on the Expo GO platform
- The application has an authentication feature using Email ID and password with Google Firebase
- The application provides multilingual feature using the I18n library of React Native

B. *Data Collection*

The collection of Datasets is one of the most important task for a language translator in order to train the ML model properly for the required language. The bigger the dataset, the more accurate will be the ML model after training. Here, the dataset is consisting of thousands of lines of everyday sentences used in Hindi and Kannada language. Before sending the dataset to the ML model, we have to preprocess the data and remove any unwanted or special characters which the dataset may or may not contain. The more clean the dataset, the more effective will be the training of the model.

C. *Data Pre-Processing*

The data has to be cleaned before being transferred to the ML model to perform the training. Data pre-processing is a process of preparing the raw data and making it suitable for a ML Model. So, to do the cleaning of data, various text mining operations are performed. If any data is missing in the dataset, then it may create a huge problem for our ML model, so such missing data is replaced by appropriate data.

D. *Transformer - A Machine Learning Model*

A transformer is a deep learning model which uses attention mechanism, differentially weighing the significance of each part of the input data. It is generally used in Natural Language Processing (NLP) and Computer Vision (CV). Transformers are made to target sequential input data, for example natural language for tasks such as translation and text summarization. Processing the data necessarily is not in order for the transformer model. That's why attention mechanism provides condition for any location in the input sentence. Therefore this reduces the training time. Mostly for NLP problems model chosen is Transformer models. It allows training on larger datasets now which earlier it was not.

E. *Deployment to Cloud*

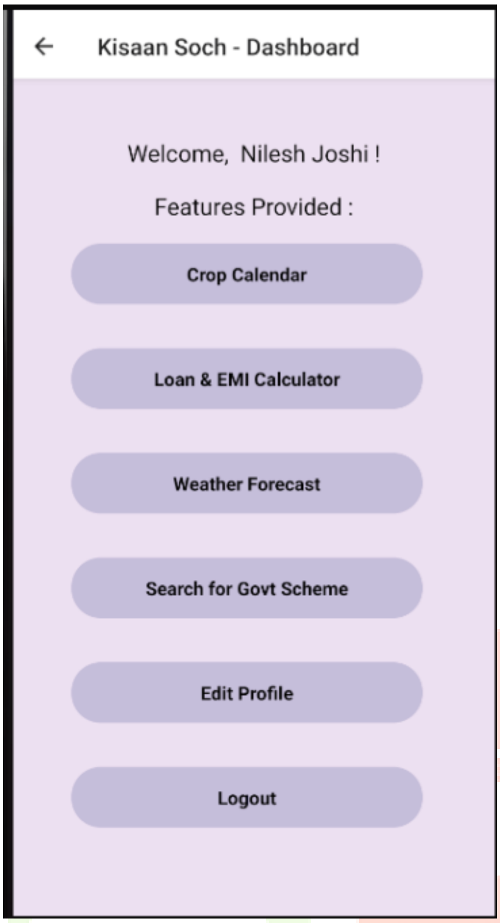
Heroku supports many programming languages. Applications that run on Heroku routes HTTP requests to correct application container. Git server handles application repository pushes from permitted users. services are hosted on Amazon EC2 platform. In our application, we deployed a Machine Learning model in Heroku platform which helped us in integrating the model with the front-end UI. We used this service because the developer can access the resource from anywhere and provides tools and techniques for adding additional features.

F. *Multilingualism*

The mobile application which we aim to create is mainly for the farmers of India, and since India has so many languages spoken around the states so it was pertinent for our mobile application to also support Multilingualism. The Multilingual feature was added by the use of I18n library of react native which allows you to store the text in a JSON format (key-value pair) which you can use throughout your app while providing the Intent (target language code).

V. RESULTS

The Snapshots of our application is shown below in different languages which our app processed. Fig 2 shows the Home page of our application. Here different sections are shown each section provides specific features.



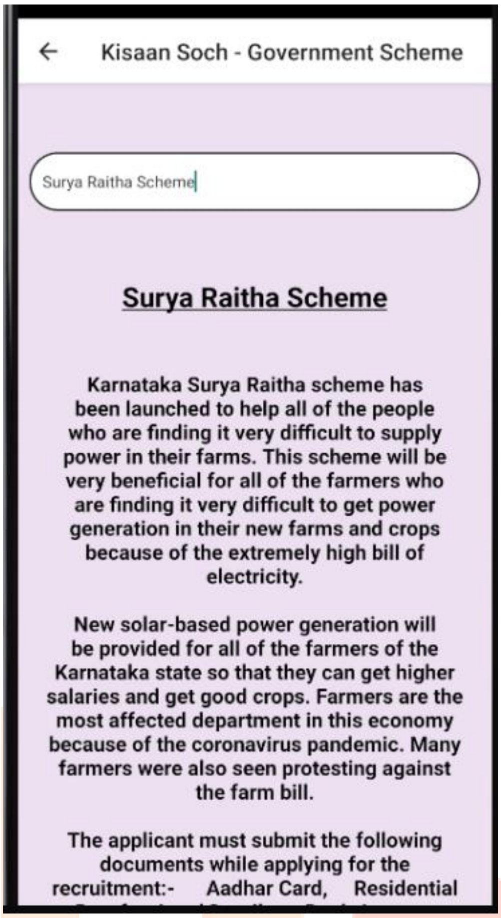
Kisaan Soch - Dashboard

Welcome, Nilesh Joshi !

Features Provided :

Fig 2 – Home Page

IN Fig 2: Crop calendar shows the which all crops are suitable to be planted according to seasons. Loan EMI calculator calculates the Loan EMI for the user. Weather Forecast shows the weather details of the place entered by user. Govt schemes search button will fetch different schemes according to user specific language. Fig 3, Fig 4 and Fig 5 are different government schemes displayed in English, Hindi and Kannada.



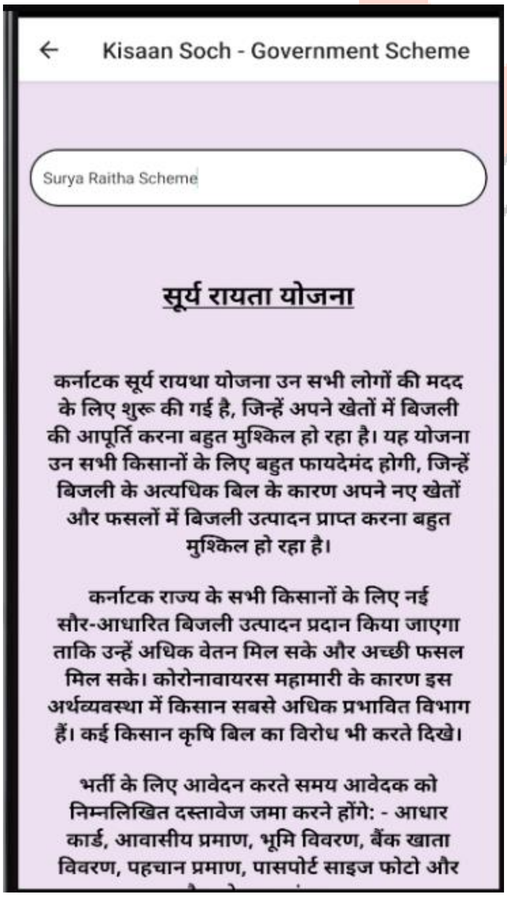
Surya Raitha Scheme

Karnataka Surya Raitha scheme has been launched to help all of the people who are finding it very difficult to supply power in their farms. This scheme will be very beneficial for all of the farmers who are finding it very difficult to get power generation in their new farms and crops because of the extremely high bill of electricity.

New solar-based power generation will be provided for all of the farmers of the Karnataka state so that they can get higher salaries and get good crops. Farmers are the most affected department in this economy because of the coronavirus pandemic. Many farmers were also seen protesting against the farm bill.

The applicant must submit the following documents while applying for the recruitment:- Aadhar Card, Residential

Fig 3 – Govt Scheme in English



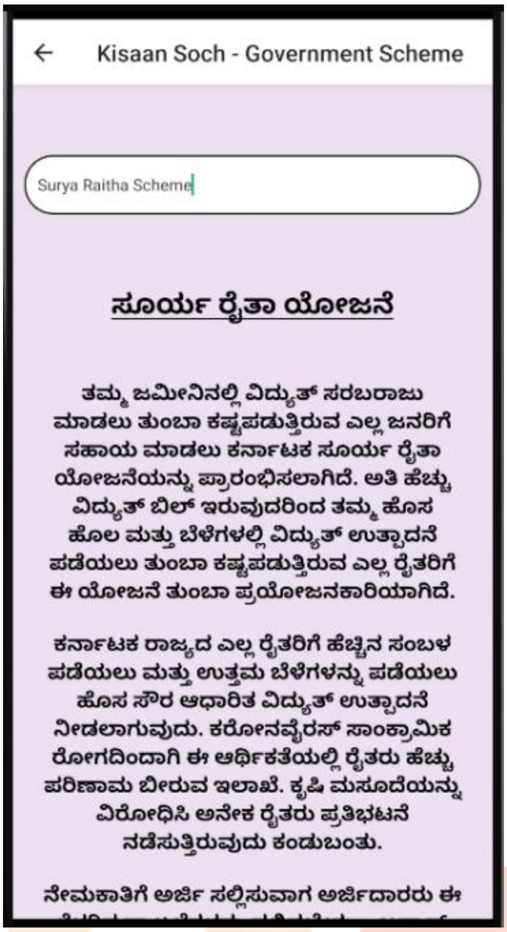
सूर्य रायता योजना

कर्नाटक सूर्य रायथा योजना उन सभी लोगों की मदद के लिए शुरू की गई है, जिन्हें अपने खेतों में बिजली की आपूर्ति करना बहुत मुश्किल हो रहा है। यह योजना उन सभी किसानों के लिए बहुत फायदेमंद होगी, जिन्हें बिजली के अत्यधिक बिल के कारण अपने नए खेतों और फसलों में बिजली उत्पादन प्राप्त करना बहुत मुश्किल हो रहा है।

कर्नाटक राज्य के सभी किसानों के लिए नई सौर-आधारित बिजली उत्पादन प्रदान किया जाएगा ताकि उन्हें अधिक वेतन मिल सके और अच्छी फसल मिल सके। कोरोनावायरस महामारी के कारण इस अर्थव्यवस्था में किसान सबसे अधिक प्रभावित विभाग हैं। कई किसान कृषि बिल का विरोध भी करते दिखे।

भर्ती के लिए आवेदन करते समय आवेदक को निम्नलिखित दस्तावेज जमा करने होंगे: - आधार कार्ड, आवासीय प्रमाण, भूमि विवरण, बैंक खाता विवरण, पहचान प्रमाण, पासपोर्ट साइज फोटो और

Fig 4 – Govt Scheme in Hindi



Surya Raitha Scheme

ಸೂರ್ಯ ರೈತಾ ಯೋಜನೆ

ತಮ್ಮ ಜಮೀನಿನಲ್ಲಿ ವಿದ್ಯುತ್ ಸರಬರಾಜು ಮಾಡಲು ತುಂಬಾ ಕಷ್ಟಪಡುತ್ತಿರುವ ಎಲ್ಲ ಜನರಿಗೆ ಸಹಾಯ ಮಾಡಲು ಕರ್ನಾಟಕ ಸೂರ್ಯ ರೈತಾ ಯೋಜನೆಯನ್ನು ಪ್ರಾರಂಭಿಸಲಾಗಿದೆ. ಅತಿ ಹೆಚ್ಚು ವಿದ್ಯುತ್ ಬಿಲ್ ಇರುವುದರಿಂದ ತಮ್ಮ ಹೊಸ ಹೊಲ ಮತ್ತು ಬೆಳೆಗಳಲ್ಲಿ ವಿದ್ಯುತ್ ಉತ್ಪಾದನೆ ಪಡೆಯಲು ತುಂಬಾ ಕಷ್ಟಪಡುತ್ತಿರುವ ಎಲ್ಲ ರೈತರಿಗೆ ಈ ಯೋಜನೆ ತುಂಬಾ ಪ್ರಯೋಜನಕಾರಿಯಾಗಿದೆ.

ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಎಲ್ಲ ರೈತರಿಗೆ ಹೆಚ್ಚಿನ ಸಂಬಳ ಪಡೆಯಲು ಮತ್ತು ಉತ್ತಮ ಬೆಳೆಗಳನ್ನು ಪಡೆಯಲು ಹೊಸ ಸೌರ ಆಧಾರಿತ ವಿದ್ಯುತ್ ಉತ್ಪಾದನೆ ನೀಡಲಾಗುವುದು. ಕರೋನವೈರಸ್ ಸಾಂಕ್ರಾಮಿಕ ರೋಗದಿಂದಾಗಿ ಈ ಆರ್ಥಿಕತೆಯಲ್ಲಿ ರೈತರು ಹೆಚ್ಚು ಪರಿಣಾಮ ಬೀರುವ ಇಲಾಖೆ. ಕೃಷಿ ಮಸೂದೆಯನ್ನು ವಿರೋಧಿಸಿ ಅನೇಕ ರೈತರು ಪ್ರತಿಭಟನೆ ನಡೆಸುತ್ತಿರುವುದು ಕಂಡುಬಂತು.

ನೇಮಕಾತಿಗೆ ಅರ್ಜಿ ಸಲ್ಲಿಸುವಾಗ ಅರ್ಜಿದಾರರು ಈ

Fig 5 – Govt Scheme in Kannada

VI. CONCLUSION

The main goal of this project was to build a native mobile application which can ran on any platform and provides a convenient way for farmers to access such information along with some other features as well. We also provide a Multilingual mobile application which farmers can use on-the go to access the government schemes in their desired language using Neural Machine Translation.

VII. FUTURE WORK

- Providing different regional language option for the application.
- UI enhancement
- Adding GPS to automatically predict weather
- Adding schemes from different states

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