Smart India Hackathon 2023

TEAM AND PROBLEM STATEMENT

MISSION: APP-BASED SOLUTION TO IDENTIFY AND SOLVE DISEASE IN PLANTS/CROPS

VISION: INTEGRATING APP DEVELOPMENT AND AI TO SUCCESSFULLY DEVELOP AN APP THAT FARMERS COULD USE TO UPLOAD THE PHOTO OF THEIR DISEASED CROP THAT CAN BE PROCESSED BY OUR MODEL TO IDENTIFY THE RIGHT PLANT PATHOGENIST FOR THEIR PROBLEM AND RECEIVE PRESCRIPTIONS VALIDATED BY THEM.

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TEAM INFORMATION

TEAM MEMBERS

AYUSH VERMA 2021UCD2134

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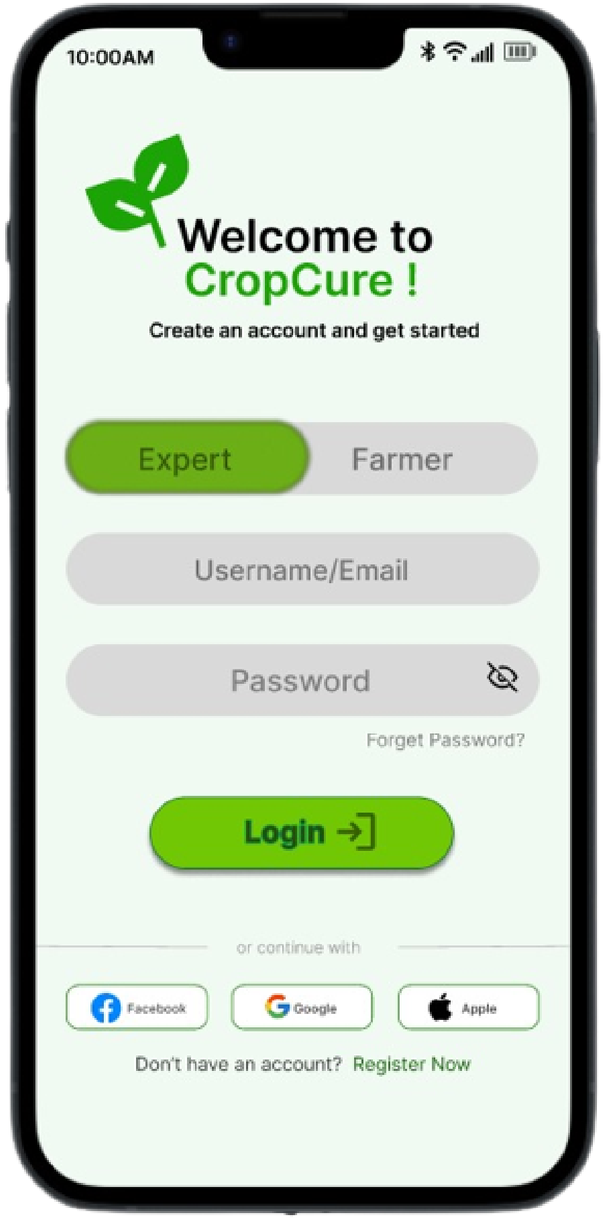
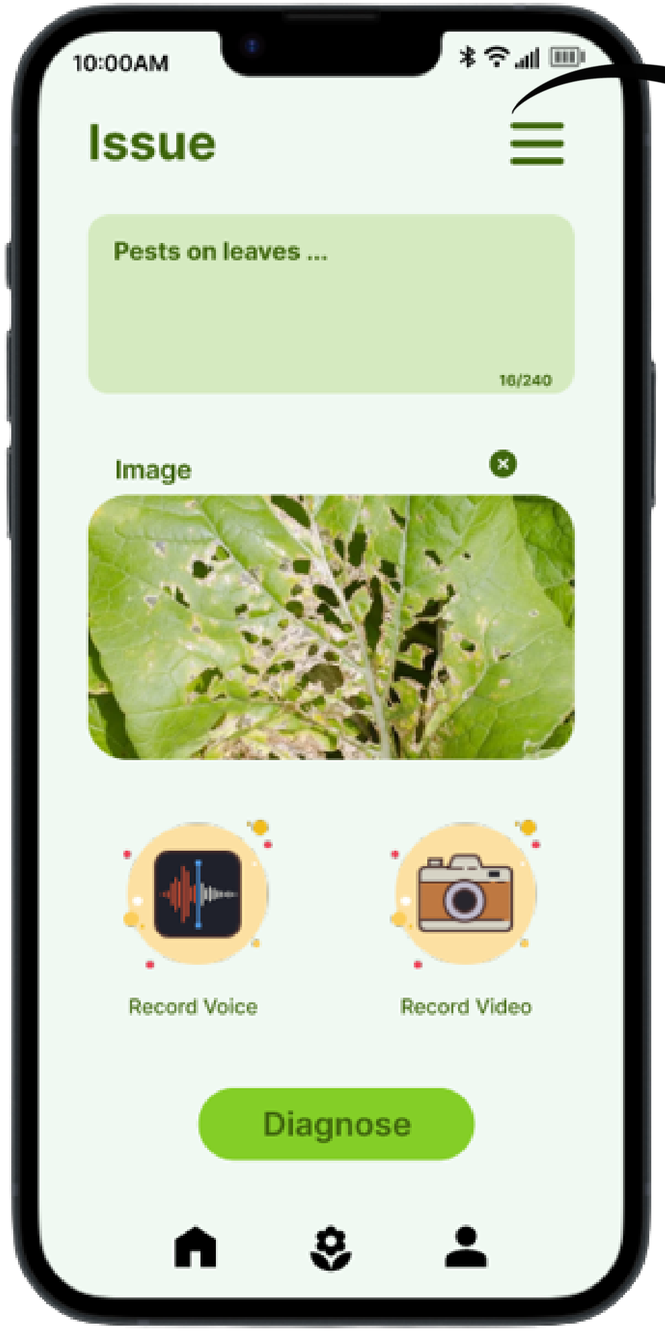
PAIN POINTS

MY CROP
HAS BEEN AFFECTED....
WHICH DISEASE??
WHICH TREATMENT ?
WHAT PRECAUTIONS ?
NOW WHAT?
WHO CAN GUIDE ME?
HOW TO SAVE IT !!!???



PROPOSITION

Farmer can add image of crop, record his video or voice in his own regional language to describe the symptoms/ ill-effects and convey issues faced by the crop, write his concerns and upload on the app



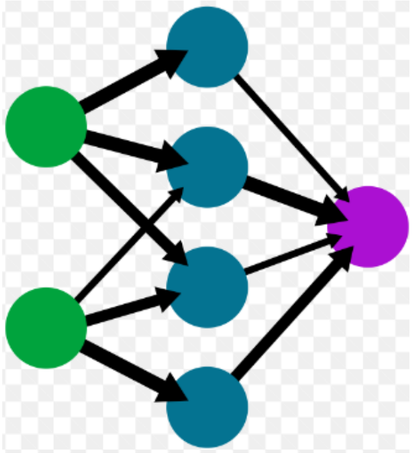
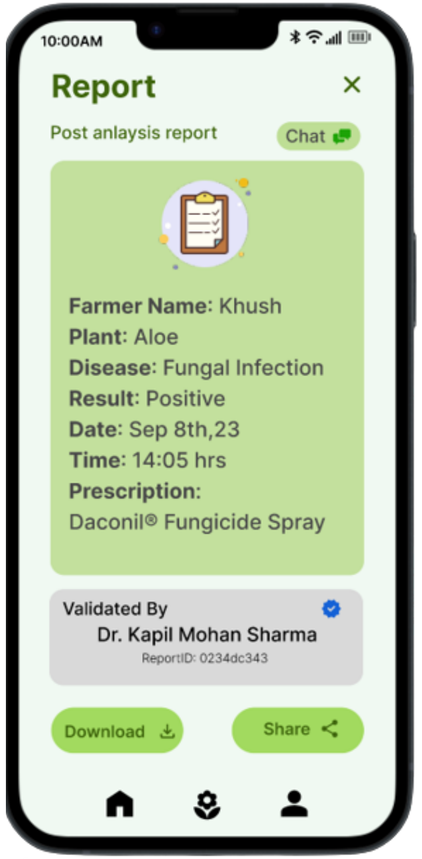


Image and Speech/Text if provided are cross-modalled and input to our model to detect the type of plant disease the crop is affected by.

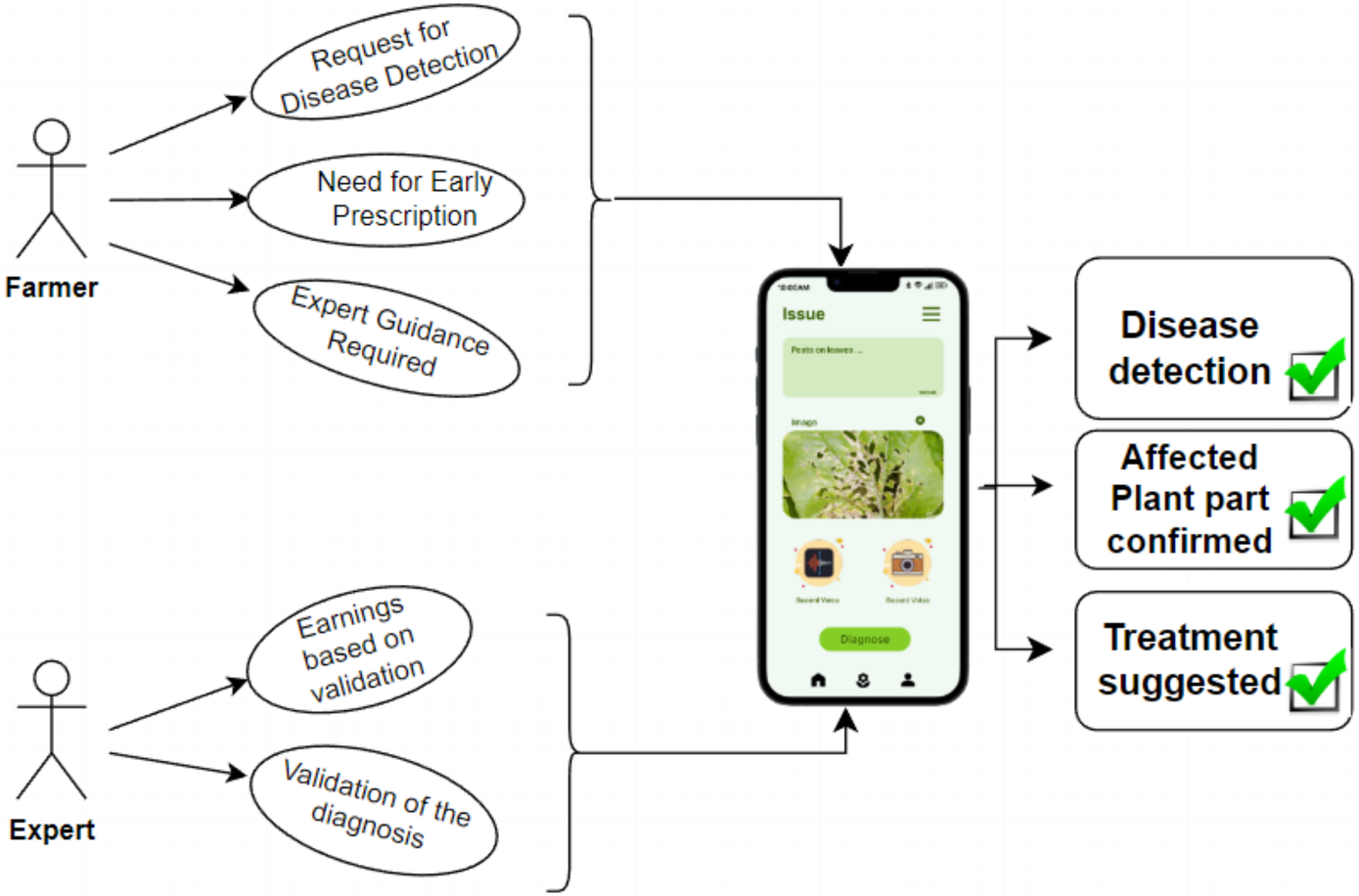


Based on the disease identified, a plant pathogenist specialising in that type of plant disease could either validate the AI-generated prescription or if requested could cater to the needs of farmer and provide the solution as needed.

VALUE TO USER

IMPLIED ADVANTAGE

Obtainment of labelled data for various diseases alongwith their prescriptions validated by experts across the plant kingdom, enhancing the model's learning capabilities as it becomes more widely utilized by farmers.

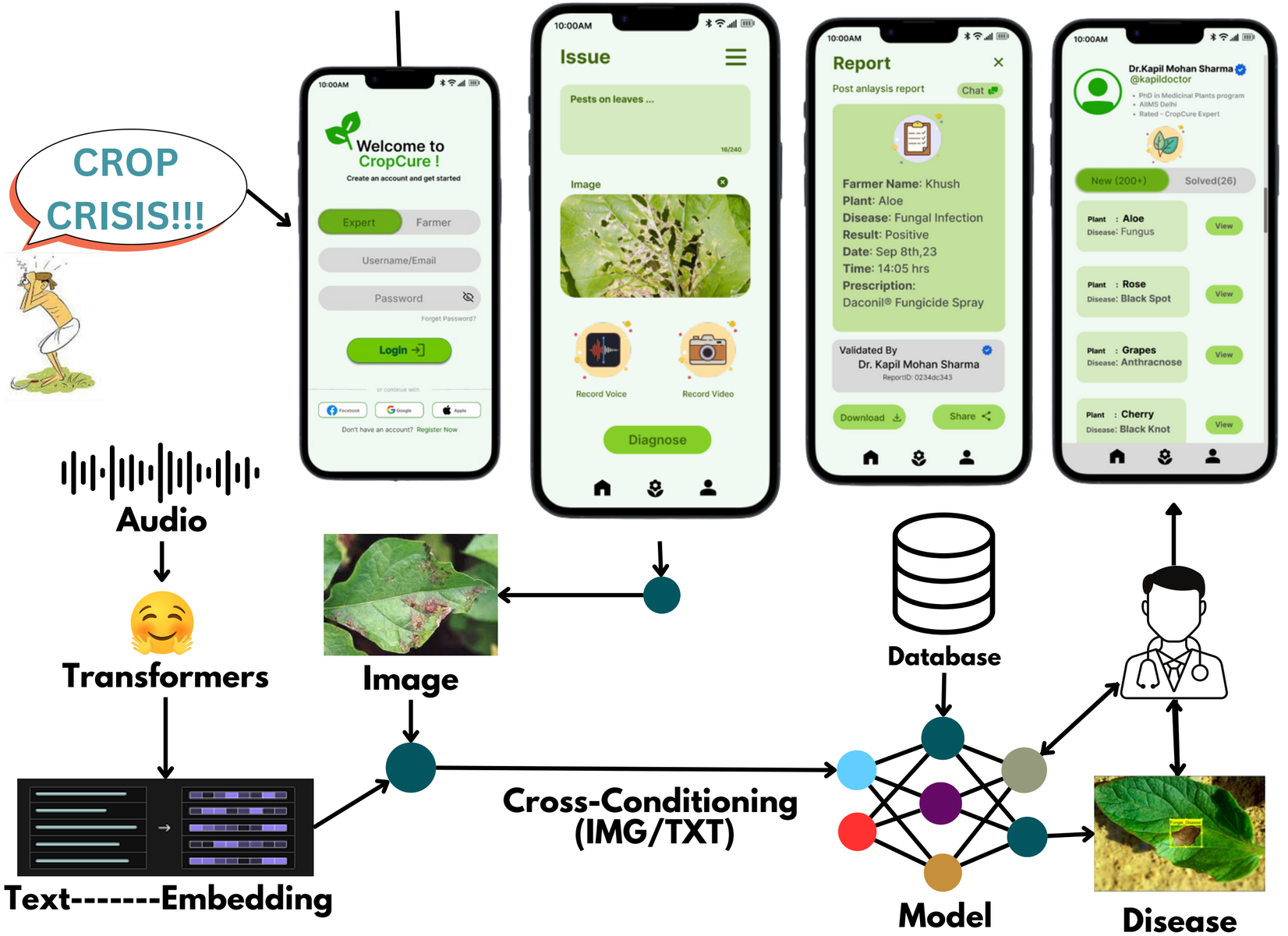


SHOWSTOPPER

- Our app can translate every regional language ensuring accessibility for farmers pan-india.
- Our app is scalable and could cater to multilple use cases like animal and human disease prescriptions, providing all specialists an easily accessible common platform to do social good.
- Follow-up treatment and re-evaluation of crop health

IDEA/APPROACH

- **Image of the affected crop** along with a **video of the farmer** is taken as input, its **audio is extracted** while detecting the regional language used.
- Our **speech recognition model** finetuned on common regional languages translates input speech and provides **dynamic translation support**, then its converted to variable length keywords based on Language-agnostic BERT Sentence Encoder(**LaBSE**).
- **Cross modalling of text tokens** alongwith the **input image disease** is inputted to the classification model
- Attention-based context relevant searching of query is performed over the database and classification with **CNN/DBN model** to identify the most correlated disease with **97% accuracy**.
- After diagnosis of the disease, the farmer is given a **prescription** with suggestions **validated by the apt experts**



Technologies Used

TorchAudio · python · PyTorch · Flutter · Firebase · Transformers

BUSINESS MODEL

Opportunities- As a service, Product

- Potential business prospective is bright, considering its accessibility to users worldwide if proper access and data could be provided.
- Not just farmer-crop issues but animal disease, human disease treatments, and prescriptions validated by experts
- CRM or in our case, farmercrop relationship would be taken care of with frequent follow-ups and improved treatments while the problem persists.
- Early detection and prescription to ensure no more crop wastage.
- Provision of paid services to personal plantation/ garden owners

Sources of Revenue

- Government of India
- Department of Agriculture and Farmers Welfare
- Ministry of Agriculture
- Asia and Pacific Plant Protection Commission (APPPC)
- Paid services to consumers can generate revenue

Intended Customer Base

- Poor Farmers
- Personal plantation/garden/home plant owners.

ADJACENT MARKETS

A similar app might exist, but our USP would be our model

FINANCIAL MODEL AND PROJECTIONS

Investment to develop- Material and manpower

A workable prototype could be developed at minimal cost, only needing to pay the expert
Manpower: 2 for model deployment
2 for app development

Assumptions

The plant village dataset, AI4Bharat dataset(IndicNLP) is used. We assume the validity and correctness of these datasets.

Return On Investment

Assured plant protection saving huge crop losses.
Saving 5-7 billion USD yearly due to Crop Loss

ARCHITECTURE

App and model design already proposed previously.

SCALABILITY

Scalable to users all-around the world
Scalable for other doctor-patient platfroms.

COMPETITION & COMPETITIVE ADVANTAGES

DEFENSIBILITY

A robust model that can identify disease with approximately 97% accuracy.
And referred to the specialised plant pathogenist with less number of waiting cases who can validate asap.

NICHE

Specialise in Crop disease detection with farmer concern personalised reports.
Less Waiting Time to provide prescription

Strength of Technology

- Our ML model is a CNN/DBN network
- Also supports cross conditioning with farmer's plight for personalization.
- Recommends to best possible expert
- Waiting time is as min as possible

USP

- SOTA plant lesion segmentation techniques infused to predict disease
- Waiting time is optimized.

ASSUMPTIONS AND RISKS

THREATS, CONCERNS,RISKS

- Our app cannot give proper results to farmers, due to wrong or in-understandable symptom description by the farmer
- Our app prescription was too wrong that the farmer crop even got worse.
- Farmers aren't able to operate the app properly.
- Doctors won't give timely replies due to already loads of work.

PRECAUTIONS

- Doctors must be given significant incentives by GOI for more validations that would encourage prompt validations by the doctor.
- Model would be already tested before deployment on the application to avoid bad results.

RESPONSES

- In wrong or inconsistent results being delivered by our model, model would be trained on more data, and would be improved.
- Deeper model, better techniques on model like the denoising model would be applied to learn the latent/ hidden distribution of plant diseases with the iamges provided.
- Self-Supervised methods of learning would be employed to make it learn better.