A.A.R.C.S.

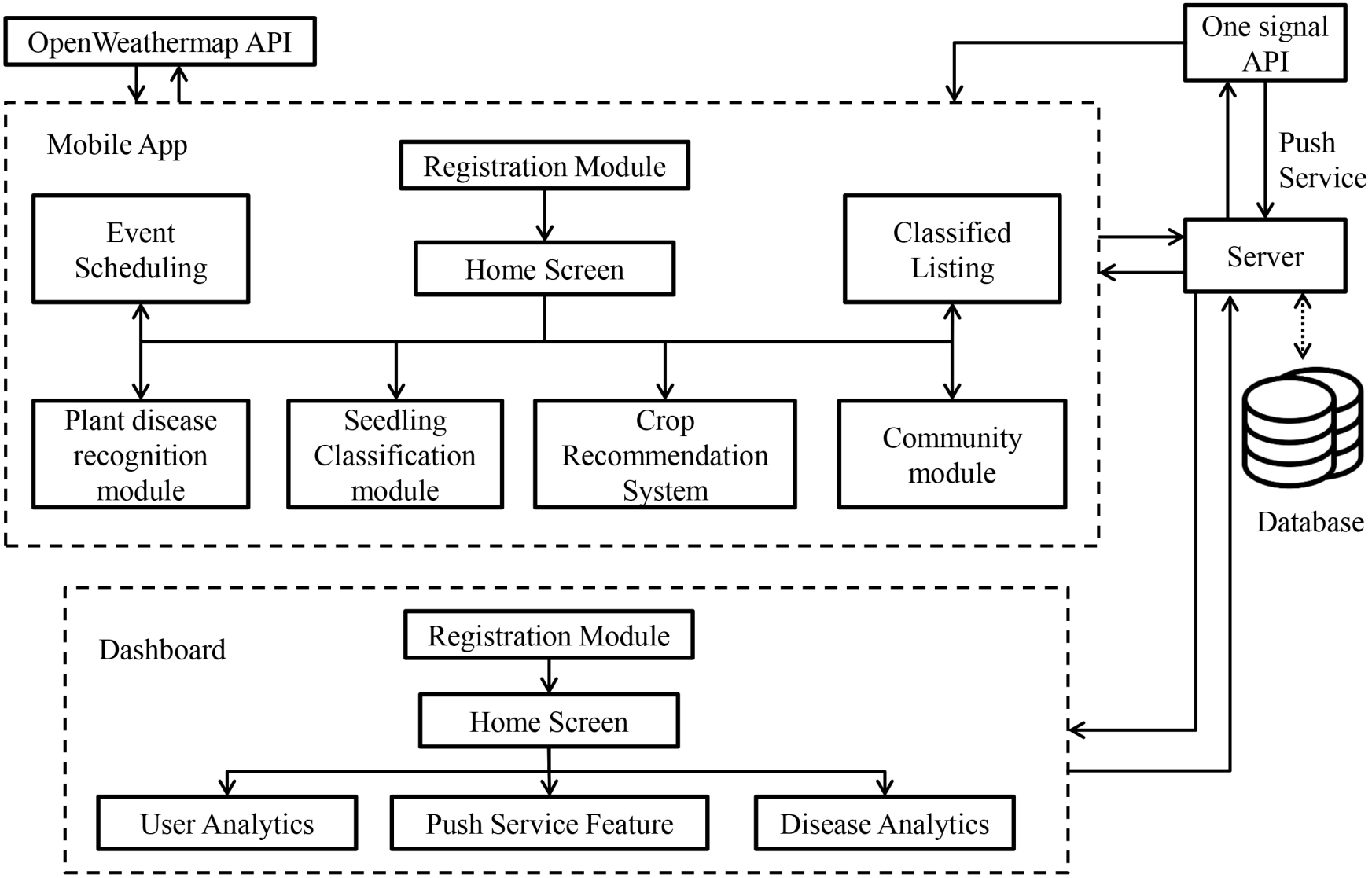
Advanced Agricultural Recommendation and Classification System

CONTENTS

1. INTRODUCTION

- India is the second largest producer of agricultural products in the world.
- The contribution of Agriculture is more than 15% of India's GDP.
- Today about 40% of the yield in India is lost due to plant diseases and other reasons.
- This opens a new opportunity in the agricultural field to develop the solutions using ML and DL.
- Seedling classification and crop recommendation also plays a huge role in the agricultural field.

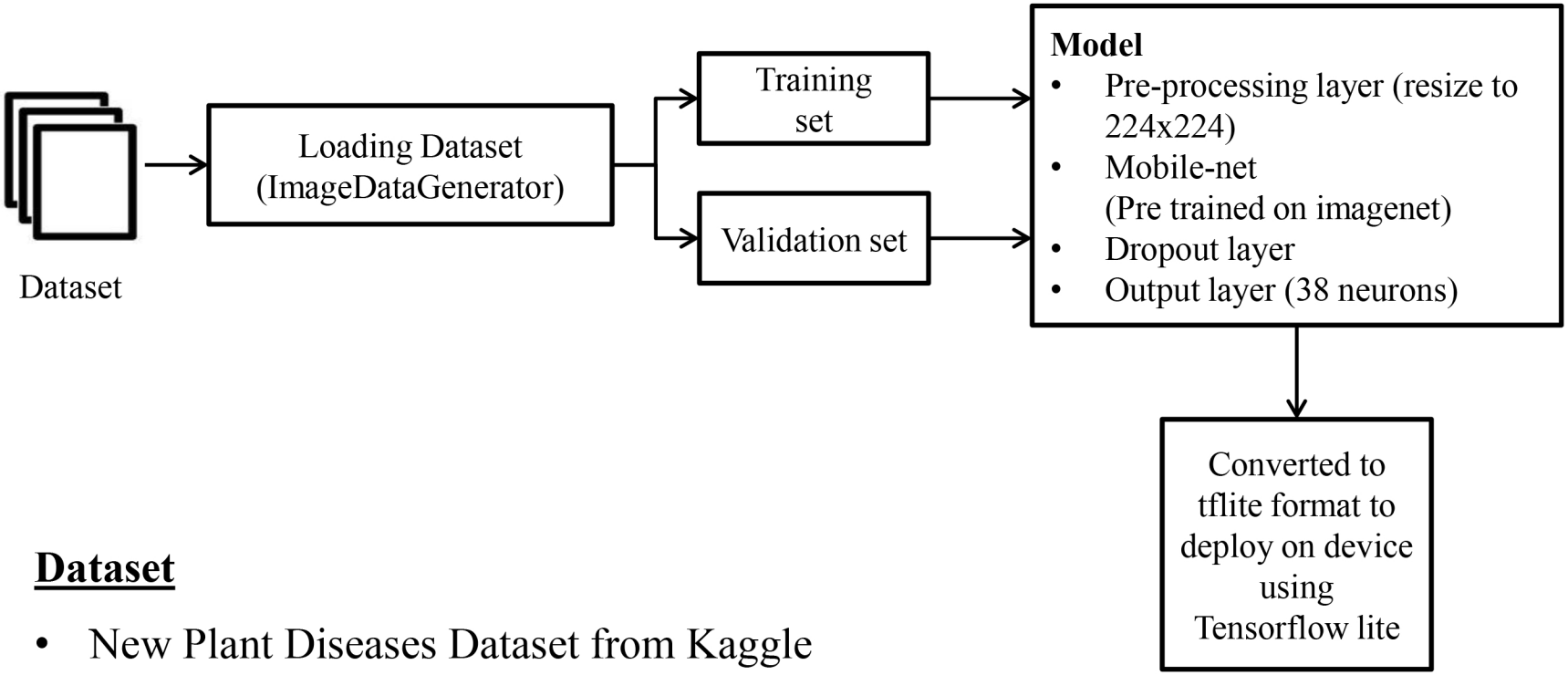
2. BLOCK DIAGRAM



3. IMPLEMENTATION

- Plant Disease Recognition Module
- Seedling Classification Module
- Crop Recommendation Module
- Disease Analytics Module
- User Analytics Module
- Community Module
- Notification Module
- User Registration Module
- Admin Login Module
- Event Schedule Module

3.1 Plant Disease Recognition Module



Dataset

- New Plant Diseases Dataset from Kaggle
  - 70295 images in train sub folder belonging to 38 classes
  - 17572 images in validation sub folder
  - 33 images in test sub folder

- Recognizes the plant disease by giving an image of plant leaf as input.
- MobileNet based image classification model (transfer learning).
- Dataset from kaggle.

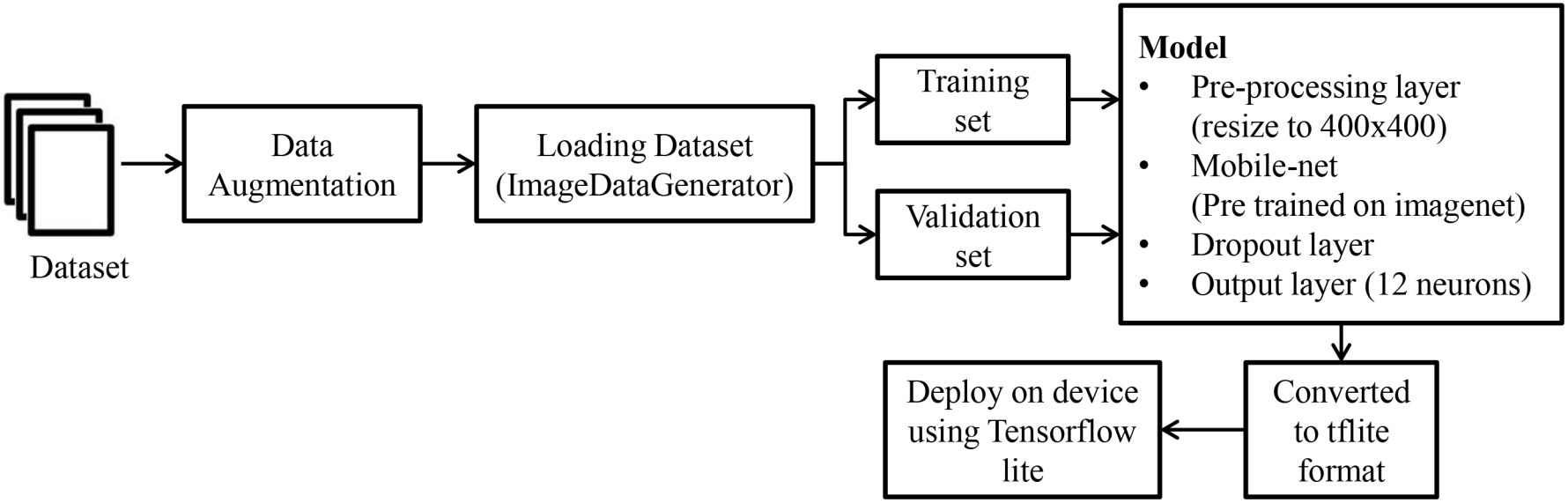
3.1.1 Technology Used

- TFLite
- Tensorflow/Keras (for model training)
- On-Edge Computing

3.1.2 Completion Status

- Completed

3.2 Seedling Classification Module



Dataset

- V2 Plant Seedlings Dataset from Kaggle
  - 4750 images in train sub folder belonging to 12 classes
  - 794 images in test sub folder
- Dataset is imbalanced.
- Data augmentation technique will be used to balance dataset

- Recognizes the plant seedling from the image.
- MobileNet based image classification model (transfer learning).
- Performs image resizing as preprocessing.
- Dataset from Kaggle.
- Threshold value to filter out images that does not belong to the class labels have been set to 80.

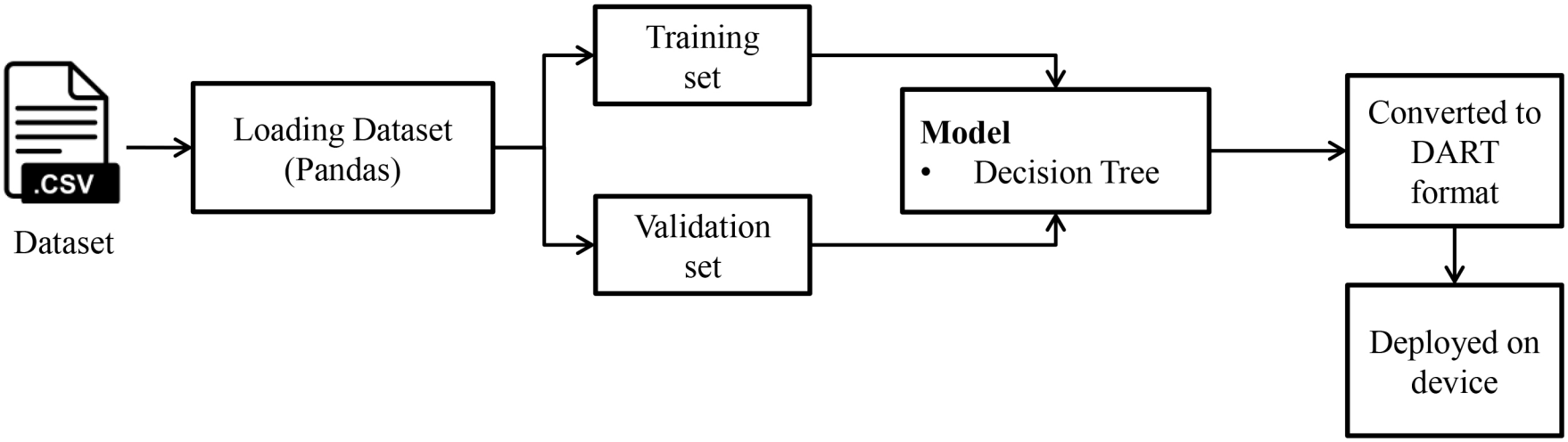
3.2.1 Technology Used

- TFLite
- Tensorflow/Keras (for training)
- On-Edge Computing

3.2.2 Completion Status

- Completed

3.3 Crop Recommendation Module



Dataset

- Crop Recommendation Dataset from Kaggle
  - 7 features and 1 label columns
  - 7 features include N, P, K, temperature, humidity, pH and rainfall.
- Bound limits for parameters have been configured using this dataset.

- Recommends the right crop for the corresponding soil parameters accepted from users.
- Decision tree based model.
- Dataset from kaggle.

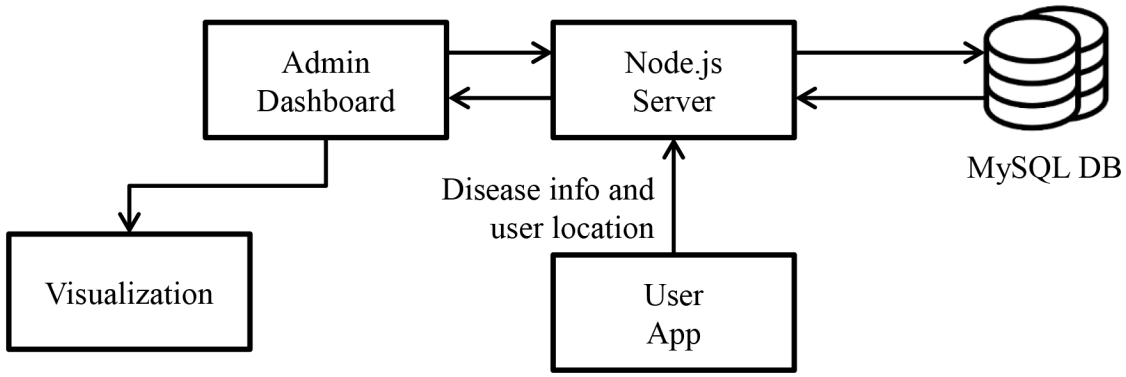
3.3.1 Technology Used

- Scikit-Learn (for model training)
- Sklearn Porter (conversion of Decision tree to program code)
- On-Edge Computing

3.3.2 Completion Status

- Completed

3.4 Disease Analytics Module



- District wise analysis for diseases.
- The data from the plant disease recognition module along with user location are stored in server for later usage.
- Data then organized to analyse the trend.

3.4.1 Technology Used

- Data Analytics
- Data Visualization

3.4.1 Technology Used (contd.)

- HTML
- Bootstrap
- Javascript
- Ajax
- Chart.js

3.4.2 Completion Status

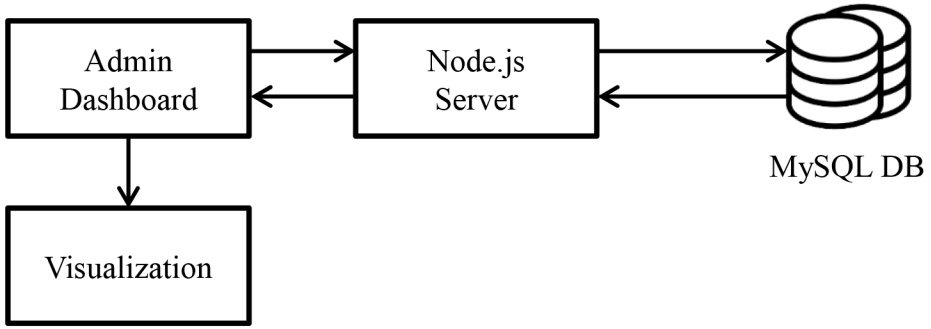
- Completed

3.5 User Analytics Module

- To identify trends in new user registrations.

3.5.1 Technology Used

- Data Analytics
- Data Visualization
- HTML
- Bootstrap
- Javascript
- Ajax
- Chart.js

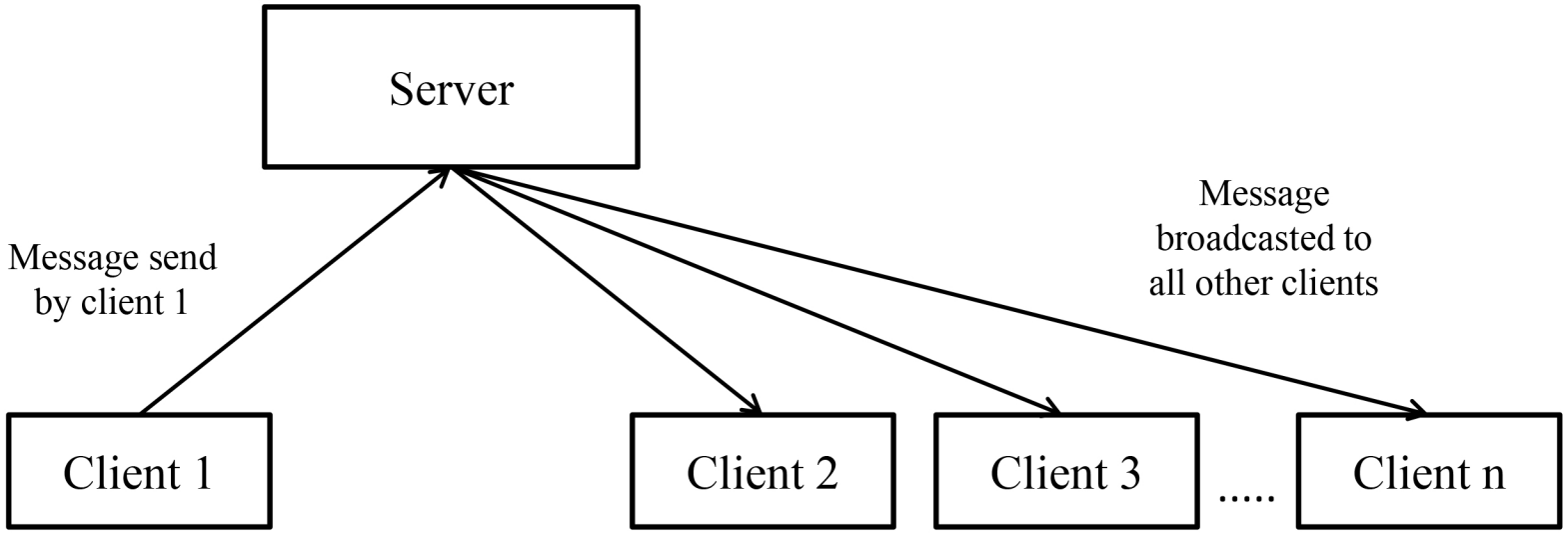


3.5.2 Completion Status

- Completed

3.6 Community Module

- Chat Sub module



- Community chat.
- Share expert opinions using real time chat.
- Seek help by posting images/doubts in the community

3.6.1 Technology Used

- Restful APIs
- Flutter (for frontend)
- Socket.IO
- MySQL Database

3.6.2 Completion Status

- Completed

3.7 Notification Module

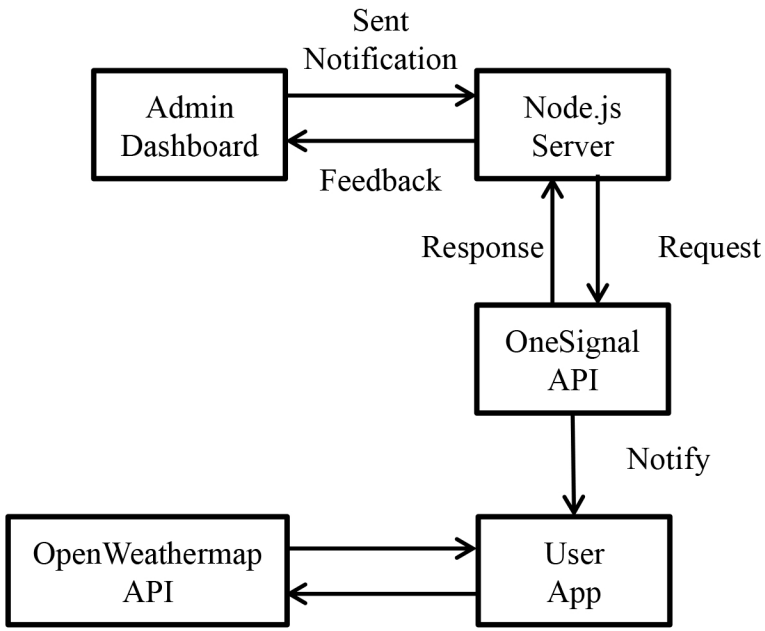
- Realtime push service.
- Provide any important alert to clients through admin dashboard.
- Also has analytics feature.

3.7.1 Technology Used

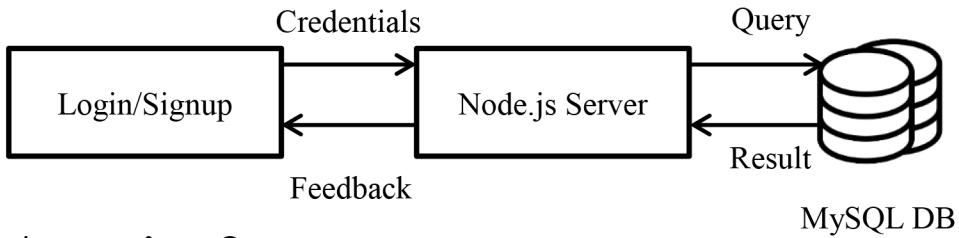
- Restful APIs
- OneSignal SDK

3.7.2 Completion Status

- Completed



3.8 User Registration Module



- Signup/Login for user
- Provided at Flutter based User Application.

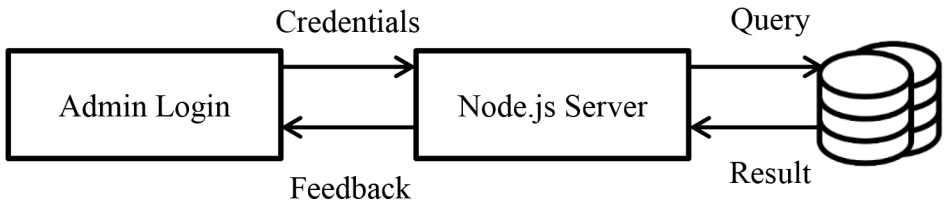
3.8.1 Technology Used

- Flutter (for frontend)
- Restful APIs
- MySQL database

3.8.2 Completion Status

- Completed

3.9 Admin Login Module



- Login for admin
- To authenticate access to admin dashboard.

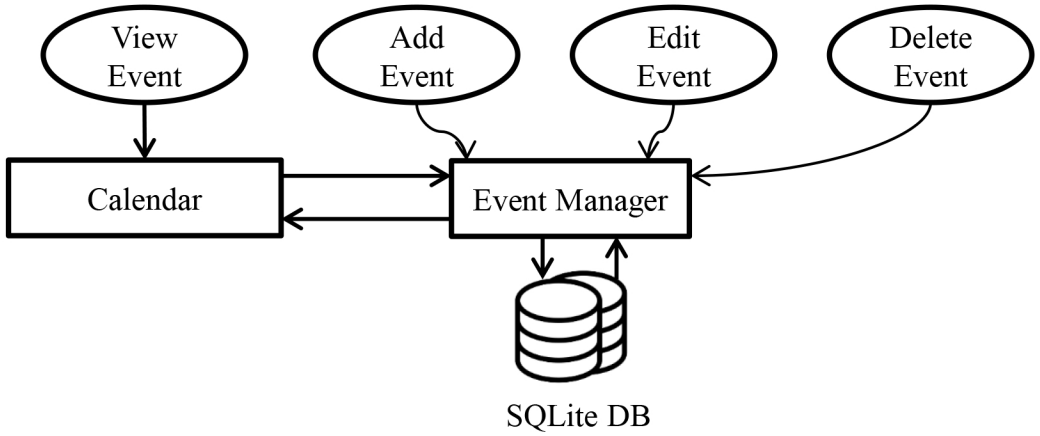
3.9.1 Technology Used

- HTML
- Bootstrap
- Javascript
- Ajax
- Restful APIs

3.9.2 Completion Status

- Completed

3.10 Event Schedule Module



- Schedule important events in the calendar in the user app.

3.10.1 Technology Used

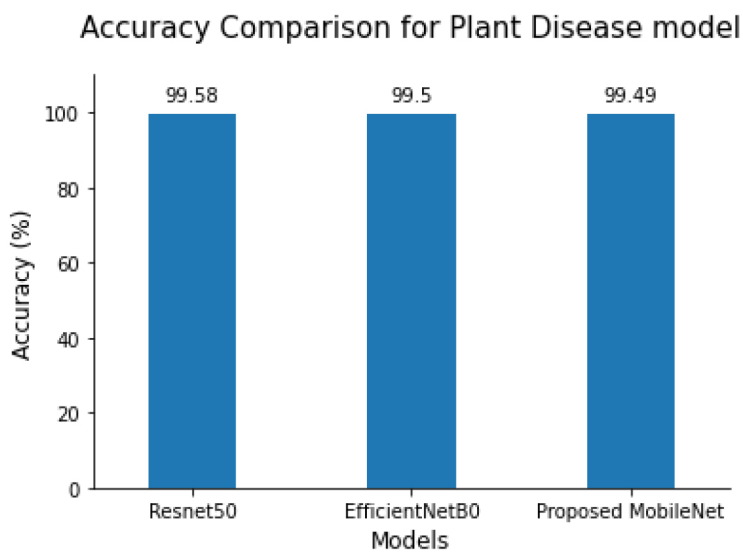
- Flutter Calendar
- SQLite database

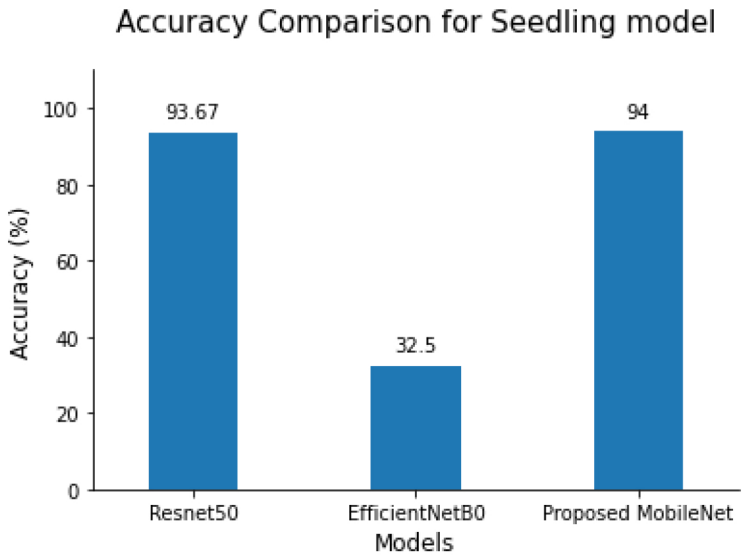
3.10.2 Completion Status

- Completed

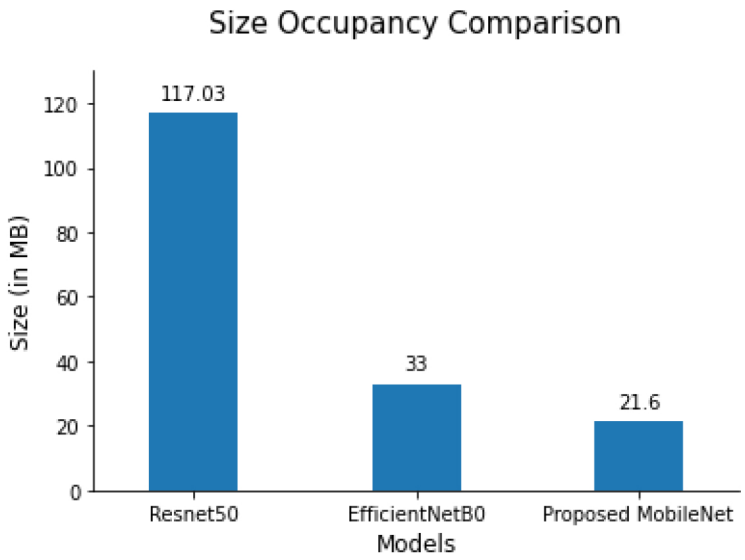
4. RESULTS & DISCUSSION

- Experimental results of proposed models

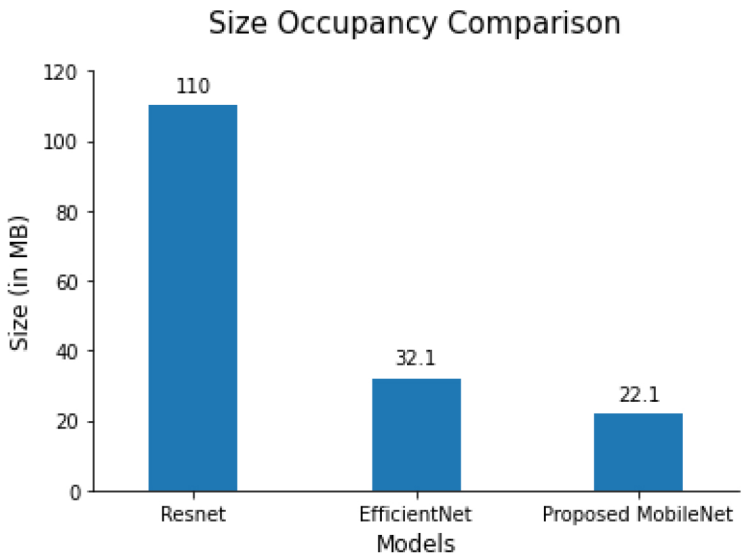




Plant Disease Models



Seedling Classification Models



- Helps in reducing network congestions by reducing the network usage.

5. ADVANTAGES & DISADVANTAGES

Advantages

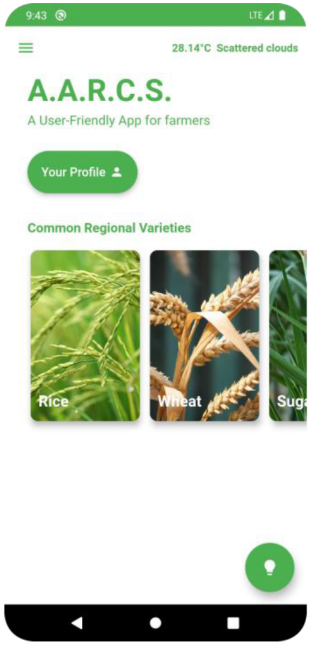
- Requires no internet connection for classification tasks
- Better user experience
- Helps promoting agriculture
- Helps reducing network congestions
- Reduced model size

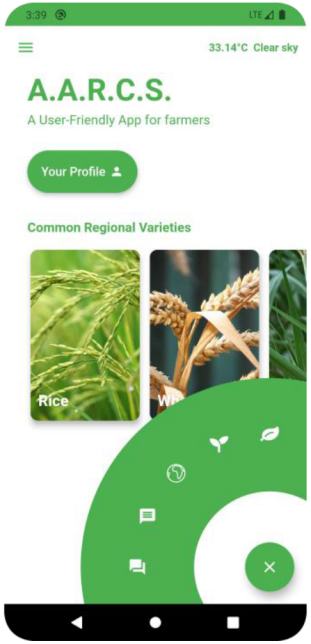
Disadvantages

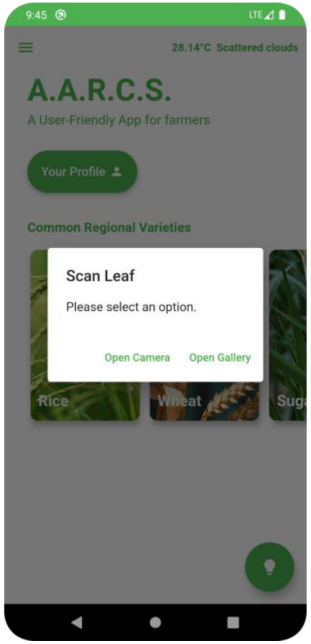
- Accuracy lose for deep learning models during conversion to TFLite format.

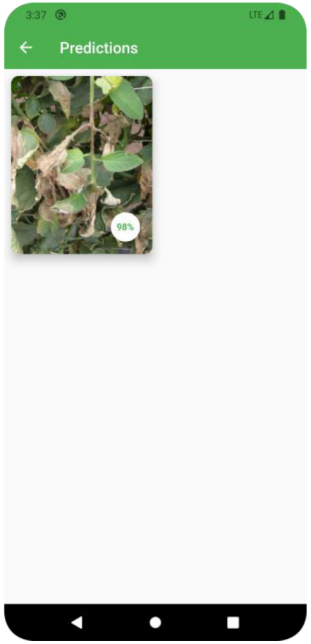
6. SCREENSHOTS

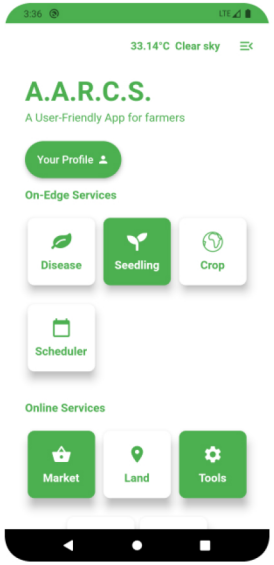
Flutter Application

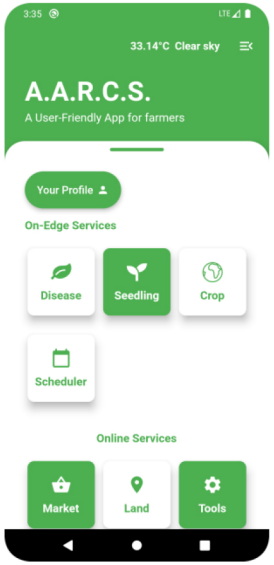









33.14°C Clear sky
A.A.R.C.S.
A User-Friendly App for farmers
Your Profile
On-Edge Services
Disease
Seedling
Crop
Scheduler
Online Services
Market
Land
Tools


33.14°C Clear sky
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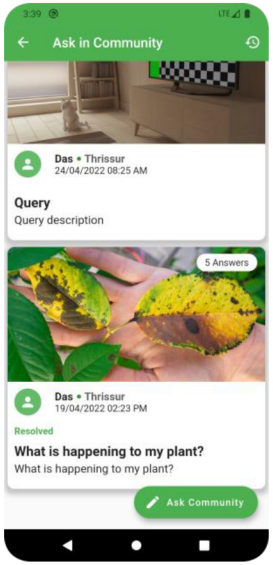
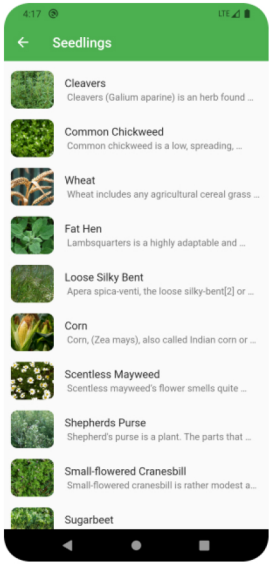
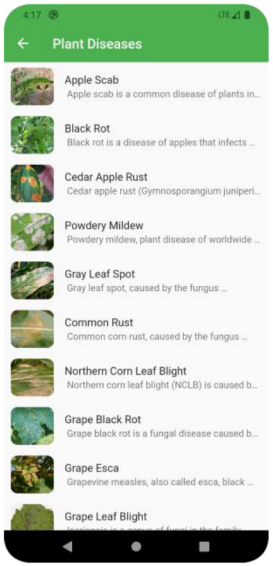
Online Services
Market
Land
Tools

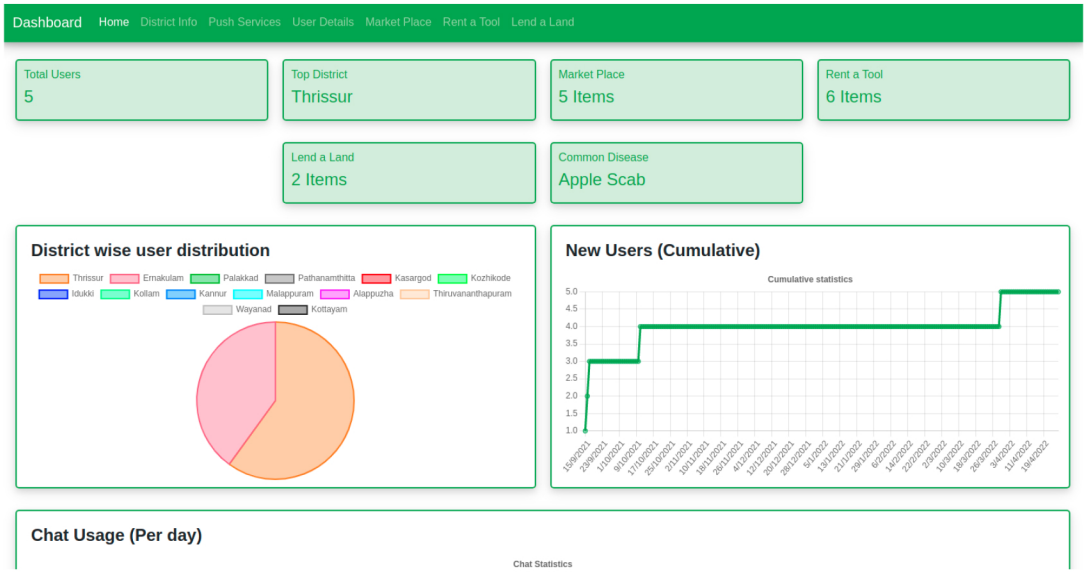

Recommendation Result
Result obtained using on-edge decision tree model
Model v.1.0
Recommended Crop:
Mango
Given Parameters
N 40 Kg/ha
P 45 Kg/ha
K 45 Kg/ha
pH 7.5 pH Value
32°C Temperature
60% Humidity
250 mm Average Rainfall

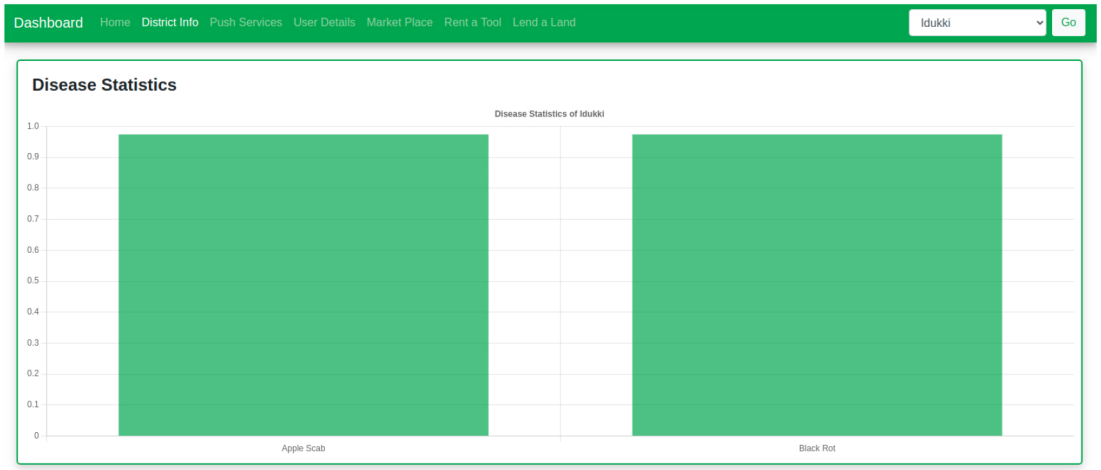

Ask in Community
Das • Thrissur
24/04/2022 08:25 AM
Query
Query description
5 Answers
Das • Thrissur
19/04/2022 02:23 PM
Resolved
What is happening to my plant?
What is happening to my plant?
Ask Community


Seedlings
Cleavers
Cleavers (Galium aparine) is an herb found ...
Common Chickweed
Common chickweed is a low, spreading, ...
Wheat
Wheat includes any agricultural cereal grass ...
Fat Hen
Lambsquarters is a highly adaptable and ...
Loose Silky Bent
Apera spica-venti, the loose silky-bent[2] or ...
Corn
Corn, (Zea mays), also called Indian corn or ...
Scentless Mayweed
Scentless mayweed's flower smells quite ...
Shepherds Purse
Shepherd's purse is a plant. The parts that ...
Small-flowered Cranesbill
Small-flowered cranesbill is rather modest a...
Sugarbeet


Plant Diseases
Apple Scab
Apple scab is a common disease of plants in...
Black Rot
Black rot is a disease of apples that infects ...
Cedar Apple Rust
Cedar apple rust (Gymnosporangium juniperi...
Powdery Mildew
Powdery mildew, plant disease of worldwide ...
Gray Leaf Spot
Gray leaf spot, caused by the fungus ...
Common Rust
Common corn rust, caused by the fungus ...
Northern Corn Leaf Blight
Northern corn leaf blight (NCLB) is caused b...
Grape Black Rot
Grape black rot is a fungal disease caused b...
Grape Esca
Grapevine measles, also called esca, black ...
Grape Leaf Blight

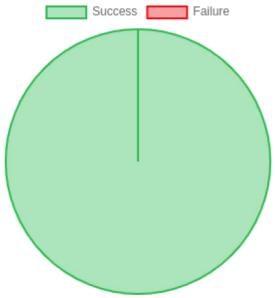
Dashboard


Dashboard
Home
District Info
Push Services
User Details
Market Place
Rent a Tool
Lend a Land
Total Users
5
Top District
Thrissur
Market Place
5 Items
Rent a Tool
6 Items
Lend a Land
2 Items
Common Disease
Apple Scab
District wise user distribution
Thrissur
Ernakulam
Palakkad
Pathanamthitta
Kasargod
Kozhikode
Idukki
Kollam
Kannur
Malappuram
Alappuzha
Thiruvananthapuram
Wayanad
Kottayam
New Users (Cumulative)
Cumulative statistics
Chat Usage (Per day)
Chat Statistics

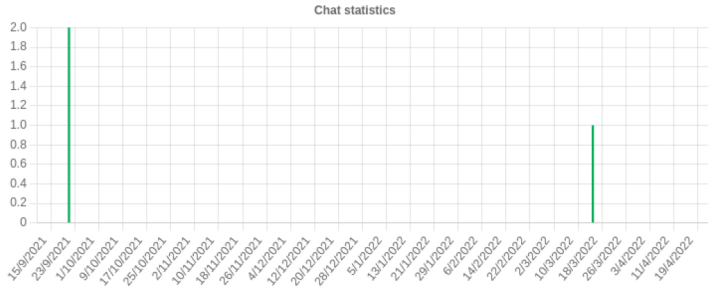

Dashboard
Home
District Info
Push Services
User Details
Market Place
Rent a Tool
Lend a Land
Idukki
Go
Disease Statistics
Disease Statistics of Idukki
Apple Scab
Black Rot

Dashboard Home District Info Push Services User Details Market Place Rent a Tool Lend a Land Push Notification

Push Notification



Push Statistics



Show 25 entries

Search:

#	Title	Content	Label	Date	Time
1	Alert	Weather Alert	Weather	25/09/2021	08:17 PM
2	Alert	Content	Push	25/09/2021	08:35 PM
3	Alert	Alert	Alert	19/03/2022	08:51 AM

Showing 1 to 3 of 3 entries

Previous 1 Next

192.168.18.2:3000/district

7. CONCLUSION & FUTURE SCOPE

- A.A.R.C.S. is a flutter based mobile app along with an admin dashboard with analytics feature.
- This application will help in boosting the agricultural productivity.
- Currently about all of the listed modules have been completed.
- Since technology we use is under development, there will be future advancements in:
  - Size of the models
  - Accuracy
- In future flutter may support modifying the assets which allows pushing updates to on-edge models.

THANK YOU