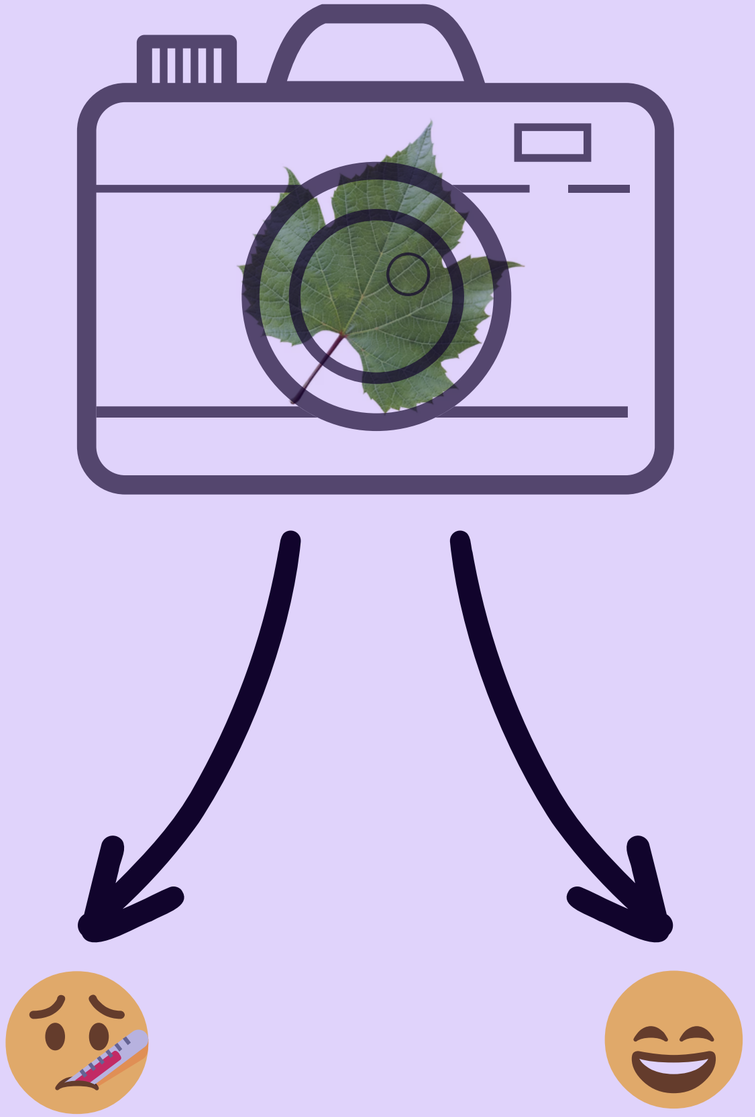
VinePlantHealth App

App’s purposes

VinePlantHealth App allow farmers, vineyards owner and companies to detect and keep tracks diseases of their vine plants.

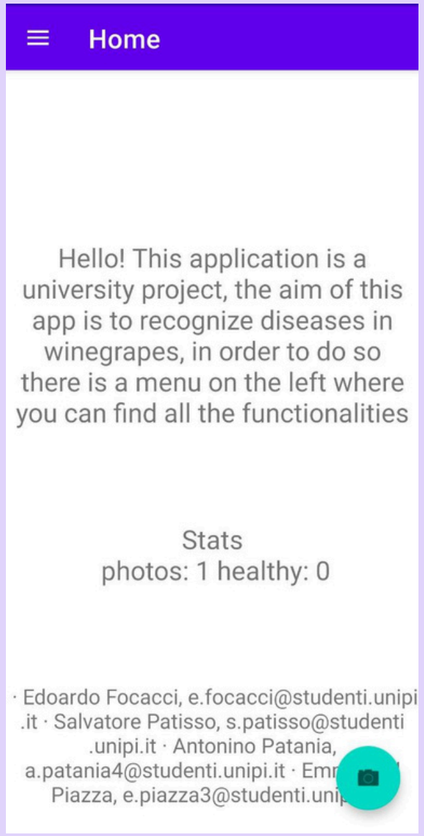
App consists of 3 views:

- HOME: contains statistics and contacts
- GALLERY: contains saved photos with related information
- MAP: to track photos geographically



Home

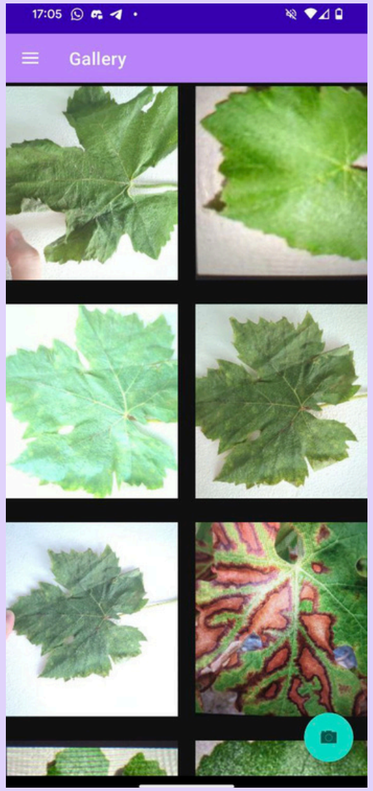
The application home shows contacts info and stats on the classified plants to give an overall short view on the vineyards



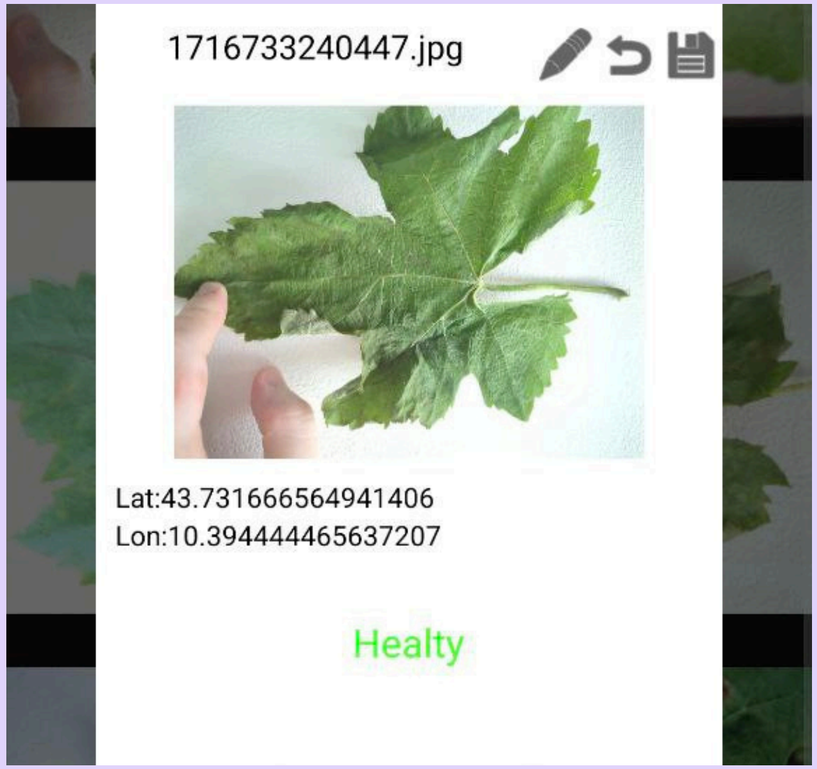
A floating button is always shown. This button allows to start the camera and take a photo.
The call back function registered on this button save the image in the directory and starts the inference activity

Gallery

The gallery shows a grid preview of the photo and then, by clicking on them, show an Image Dialog with images info and label. Media permission are required so their are request if not granted yet.
To create the grid we used a GridView that adapt and organize the image views correctly



There are button that allow the user to rename and delete the photo

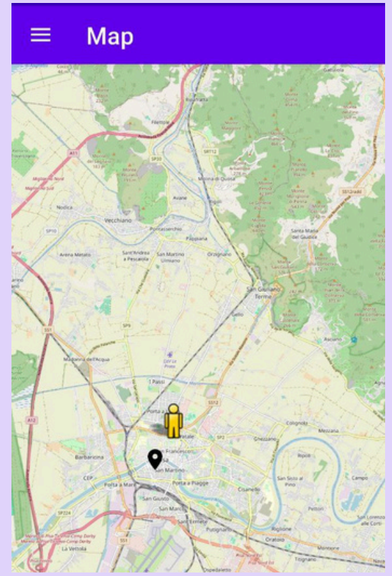


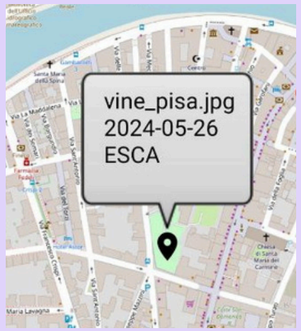
Map

The map is implemented using OpenStreetMap and osmdroid library.

Using the map location requires location permission that are requested to user if not granted.

After checking if they are granted the fragment load all the markers on the map in the same position where photos where taken by accessing to this information.

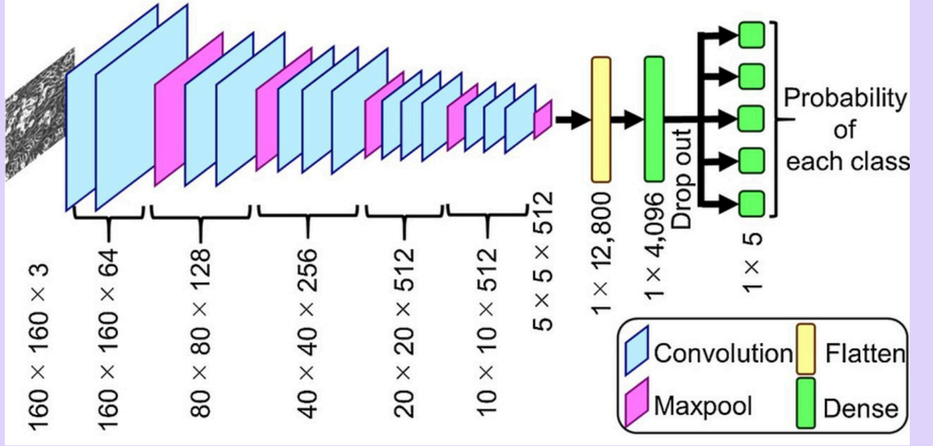




Classification: CNN-based model and inference activity

Classification model

The model is a CNN-based architecture trained on a grapevine dataset and made from-scratch. It was developed in python using keras and tensorflow and obtained an accuracy of 97.5% on the test dataset. Later it was exported to TFlite in order to utiilize the model directly on the mobile app without the necessity of a internet connection.

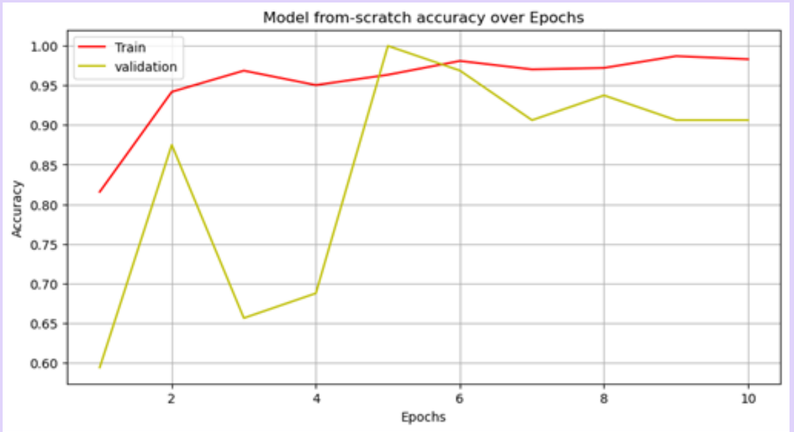


Inference Activity

This activity is started using an intent after taking a picture with the camera.
The image uri of the last picture is passed to the activity and then the inference phase is started in order to produce a label. The user can choose to save results or going back and try with another picture. To save the metada we used ExifInterface to access to “ImageDescription” attribute

Conclusion

The high accuracy of the convolutional neural network (CNN) in identifying common grapevine diseases supports timely and targeted interventions, enhancing crop health and yield quality. We can also observe how using a balanced dataset cold have caused some overfitting issues, denoted by the overpresence of the diseases contrary to the real-world counterpart.



- Dataset Expansion: Gathering a wider range of images to better represent real-world variability. If the app targets specific market segments, the dataset can be adjusted to be balanced to counteract overfitting.
- User Experience: Enhancing the app's interface and adding features like disease information and treatment suggestions.
- Disease Solutions: Including potential solutions for detected diseases, providing users with actionable recommendations.

THANKS