



CASSAVA LEAF DISEASE DETECTION



MODULE 2 PROJECT



*Helping Cassava Farmers in
Sub-Saharan Africa*

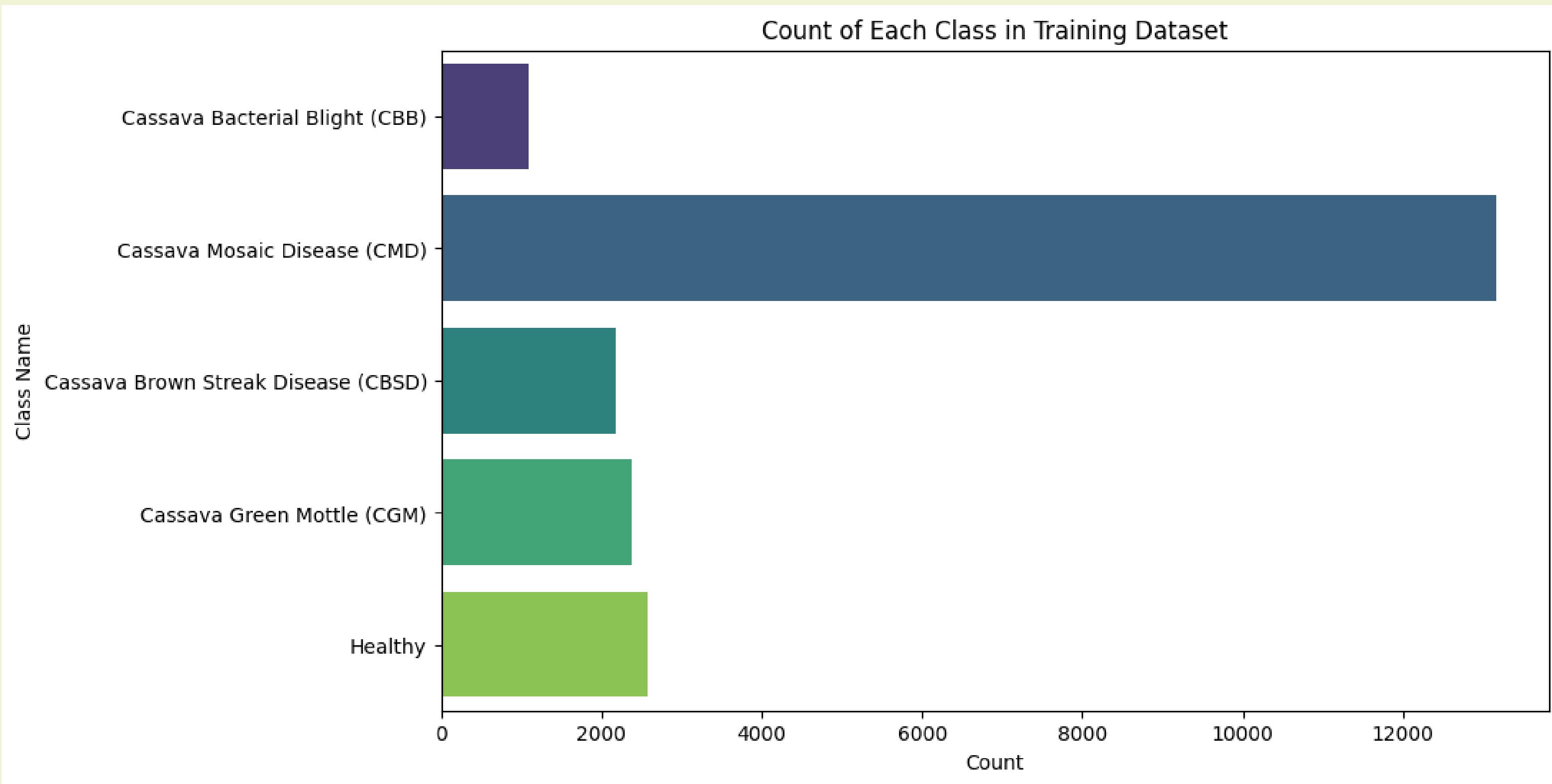


Presented by Team 5 farmers

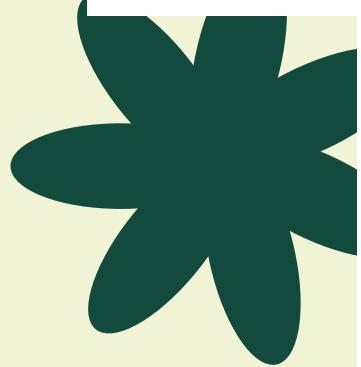
Exploring the Dataset



How many samples by class is there in the dataset ? Is it relatively equilibrated ? If no, could that be a problem ?



What are the different diseases and how do they affect the plant ? What are some characteristics of the different diseases ? How can we recognize them ?



Cassava Mosaic Disease (CMD)



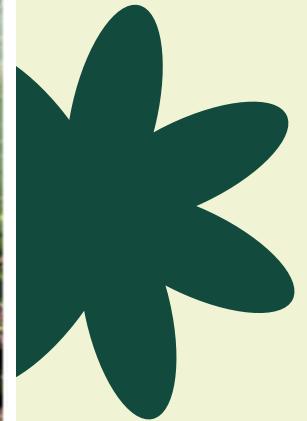
Healthy



The Different Classes

Training set size: 19257
Validation set size: 2140

Visualize some of the images of the different diseases in the dataset. Can you make any interesting observations ?



What are some characteristics of the different diseases ? How can we recognize them ?



● CASSAVA BACTERIAL BLIGHT (CBB) ●

Water-soaked lesions on leaves, stems, and petioles. Can lead to wilting, defoliation, and plant death.

Zaire in the early 1970s, the losses due to CBB were estimated at 75% of its tuber yield and almost all of its protein-rich leaf yield every year for several years, causing severe malnutrition and even starvation.

● CASSAVA MOSAIC DISEASE (CMD) ●

Mosaic patterns, yellowing, stunting, distorted growth. Severe infections can lead to complete crop loss.

Affects overall growth of the plant and production of tubers depending on the level of infection. Plants severely affected with CMD show poor growth with no tubers and a moderately affected plant produces few tubers with intermediate growth when compared to a healthy plant

● CASSAVA BROWN STREAK DISEASE (CBSD) ●

Necrotic lesions on storage roots, yellowing, leaf symptoms.

Infected cassava plants are characterized by feathery chlorosis along the leaf veins or circular patches of chlorosis between the veins, brown necrotic streaks on the stem that results in stem dieback in severe cases, necrosis and occasional radial constrictions of the tuberous roots.

● CASSAVA GREEN MOTTLE (CGM) ●

The mite pierces and sucks juices from the leaves, most commonly from the underside; this causes yellowing, mottling, death and leaf fall. Stems show a 'candle stick' effect with the loss of terminal shoots.



Choosing a Machine Learning Pipeline



To answer the questions...



Model type

: CNN : image classification (extraction of features from the image to observe some patterns in the dataset)

Loss function

: Cross-Entropy Loss

Optimizer

: Adam (combines the benefits of both RMSprop and Momentum by using running averages of both the gradients and their squared values)

Data Augmentation

: Random rotations and random brightness/contrast adjustments

Activation Function:

Softmax (used for multi-class classification problems)

Training Our Model

What hyperparameters could you change ? What effect do you think it's going to have on the model ?

- **Data augmentation** (rotation, brightness adjustment, contrast adjustment...)
- **Number of Epochs** (adding more epochs to the training process = reach a more optimal solution). **Risk of overfitting**

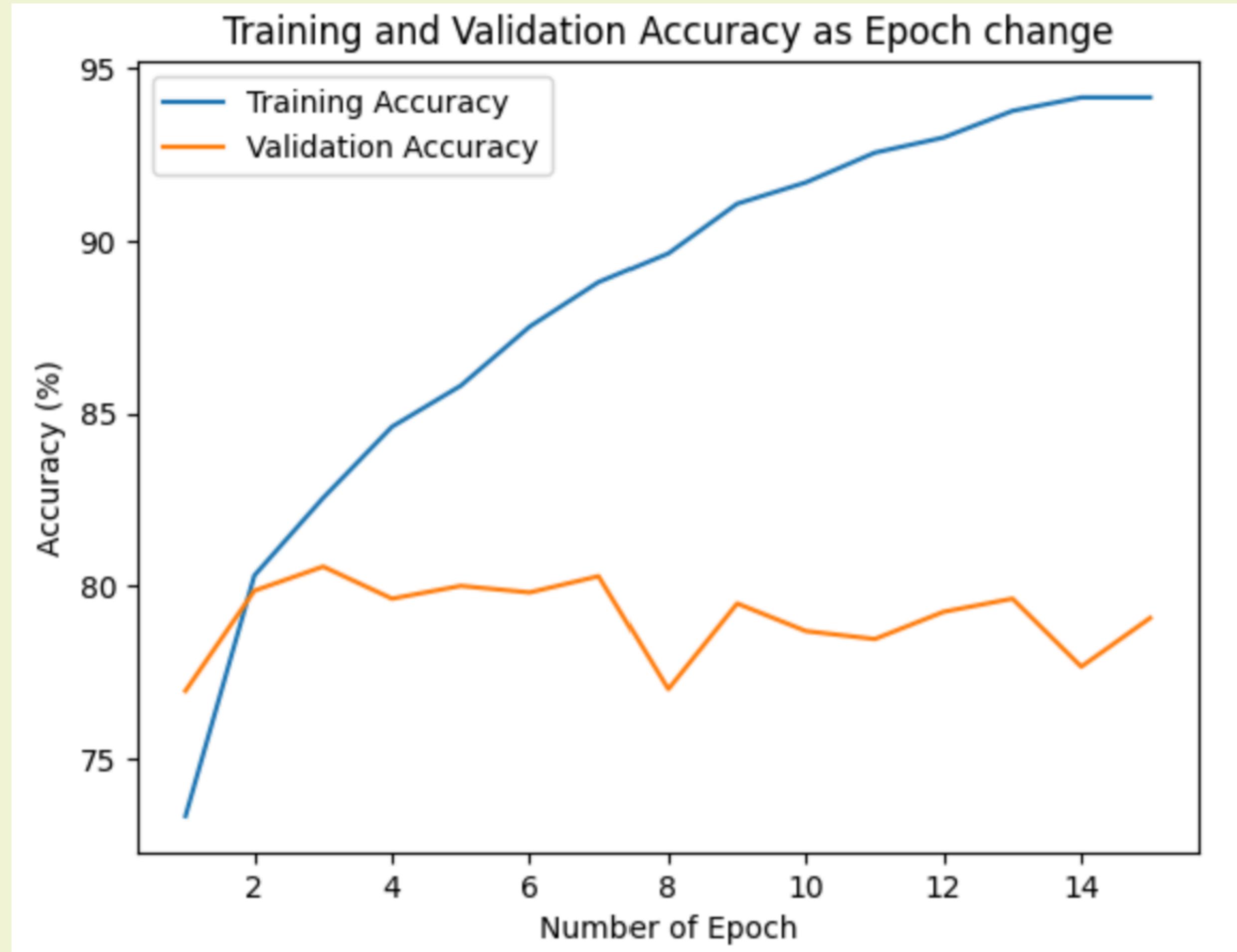
Example of data augmentation (20 degrees)

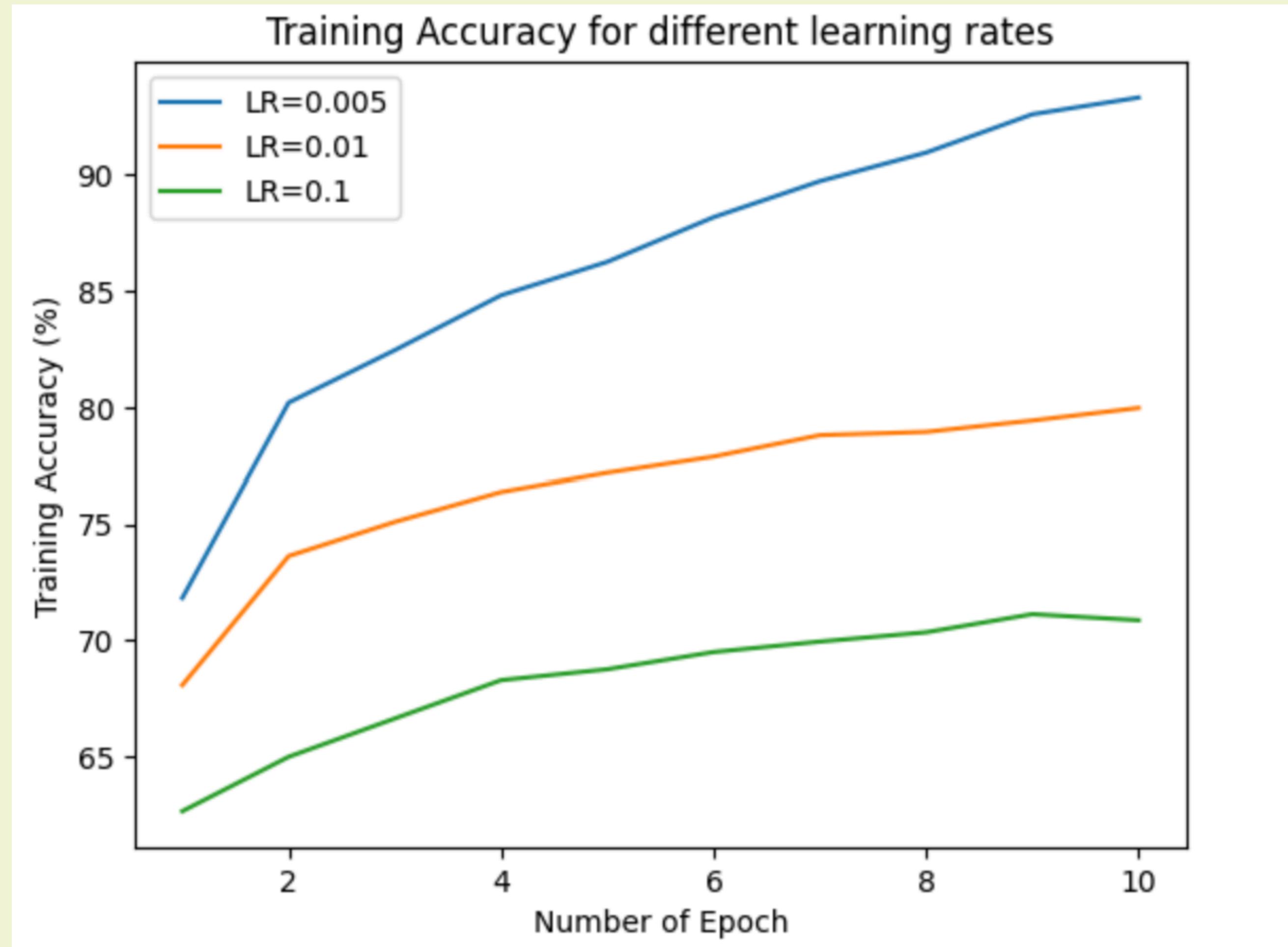


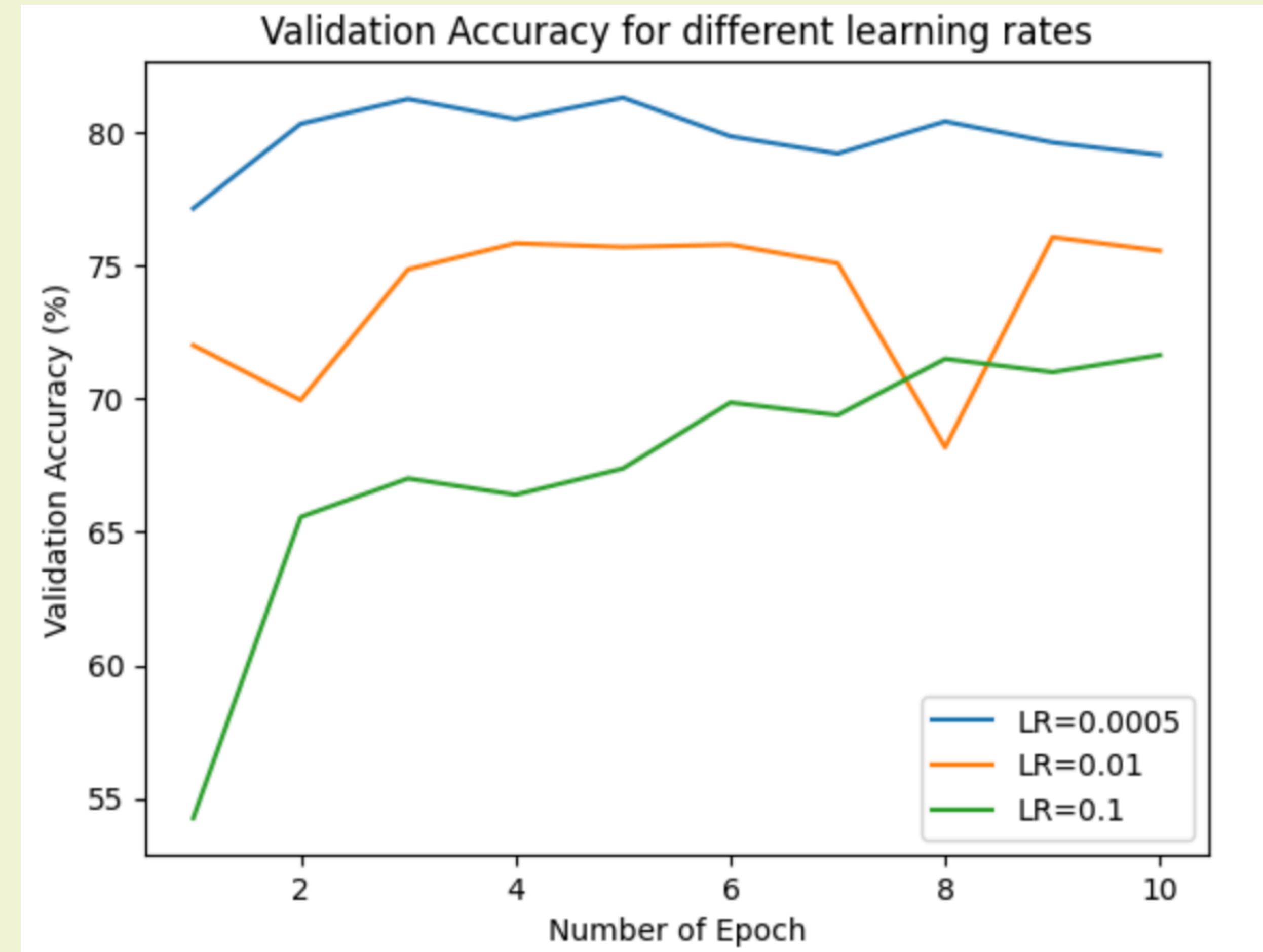
Evaluating Hyperparameter

Changes





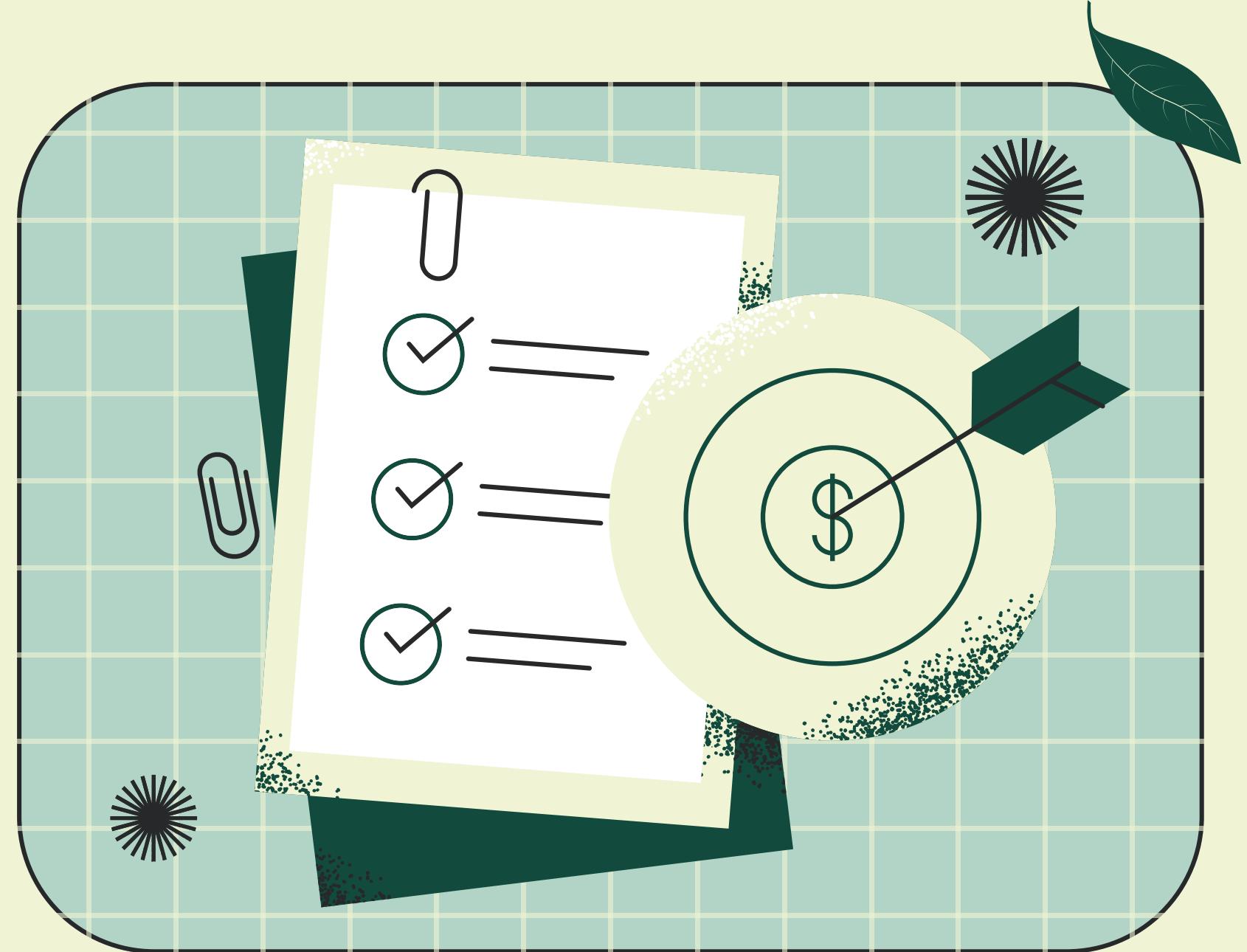




FUTURE GOALS

- Scaling the data and the parameters (using a more expressive mode)
- Applying multilayer classification
- Performing additional hyperparameter tuning to optimize the model's performance
- For real-world application:
 - Add a feedback loop with farmers to continuously improve the model based on actual usage.
 - Improving the accuracy by providing recommendations for farmers. ex: taking pictures at specific time of day, angle, or distance to the camera

Future Outlook



Thank You From Team 5 Farmers



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Nastaran



Elsana



Thuy



Léa

