



Butterfly Image Classification

Presented by Pia Lagler & Mariia Gurova

Importance

AI for Wildlife Protection

- Detects locations of populations (important for endangered species)
- Analyses wildlife patterns
- Gives climate change information
- Predicts migration patterns
- And many more



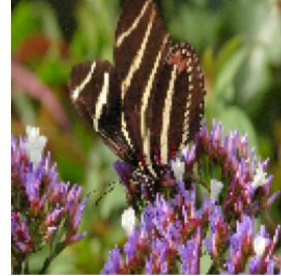
Overview

- Objective: to build a classifier for species recognition
- 832 images in 10 classes

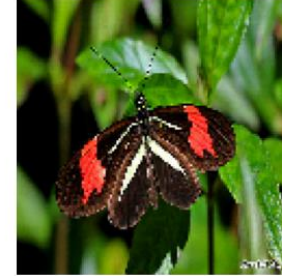
Class 1



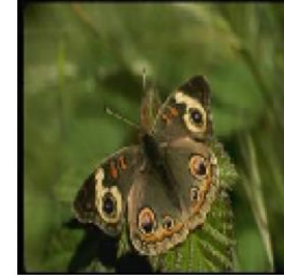
Class 2



Class 3



Class 4



Class 5



Class 6



Class 7



Class 8



Class 9

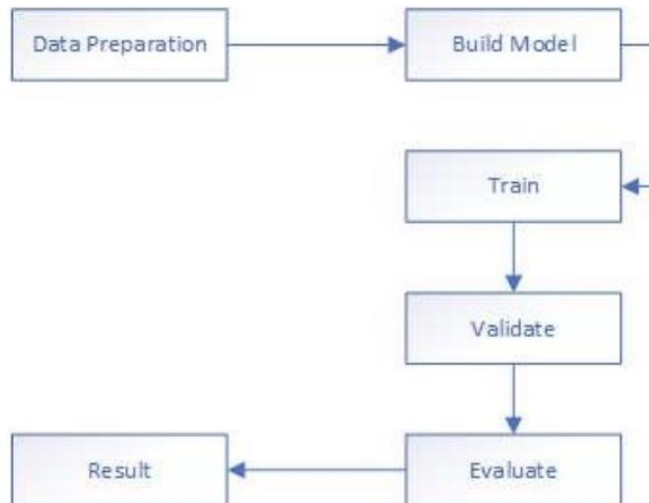


Class 10



Literature research

- Similar dataset
- Inspiration for a model
- Used for our results validation (.94)

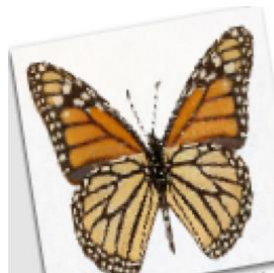


Data Preprocessing

- Normalization
- Rotation (15 degrees)
- Height/width shift (0.1)
- Shear / Zoom range (0.1)
- Horizontal Flip

One Augmented Image from Each Class

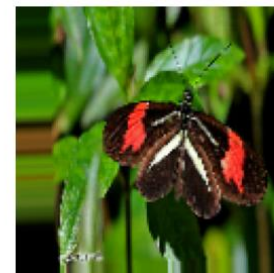
Class 1



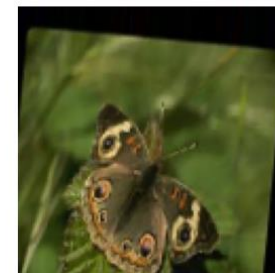
Class 2



Class 3



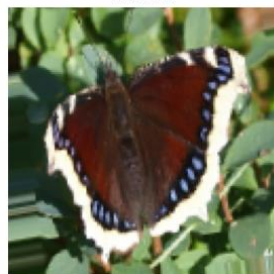
Class 4



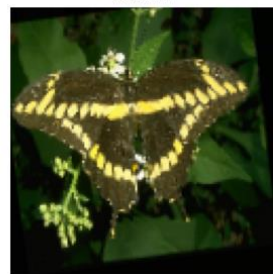
Class 5



Class 6



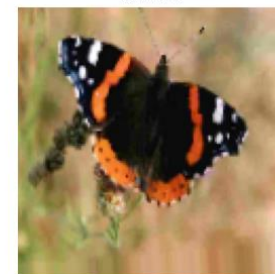
Class 7



Class 8



Class 9

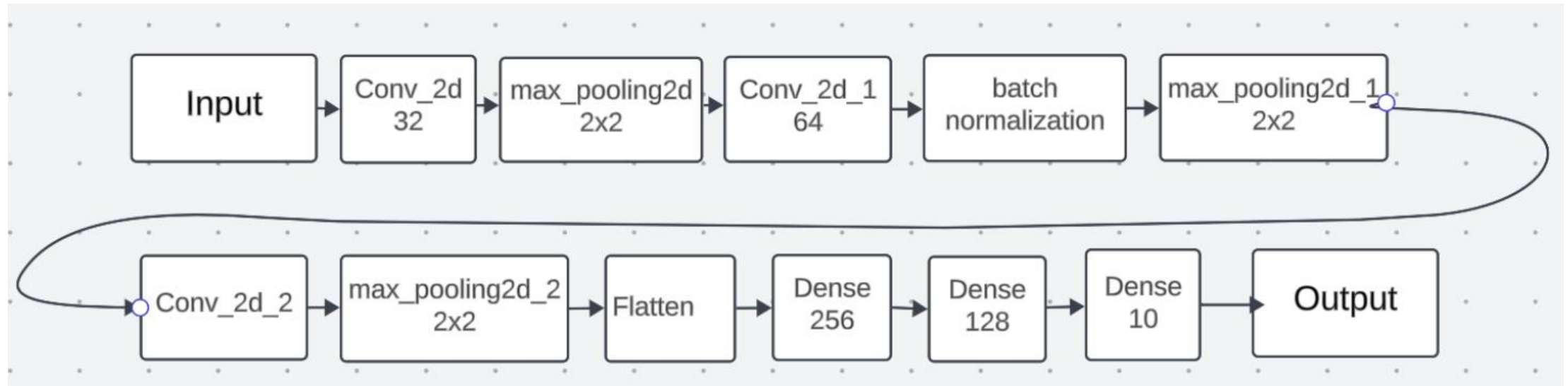


Class 10

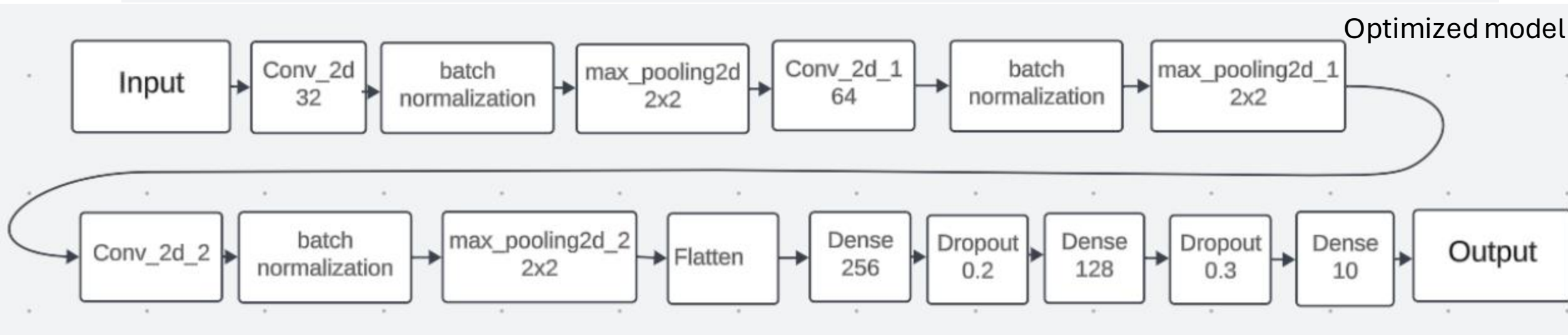


CNN-Model Architecture

Original model



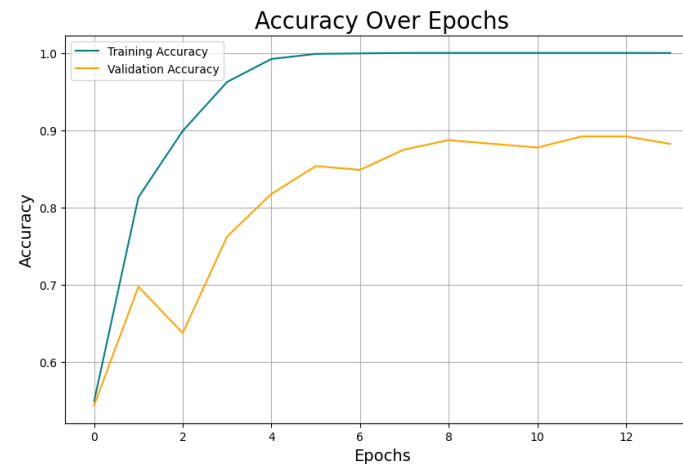
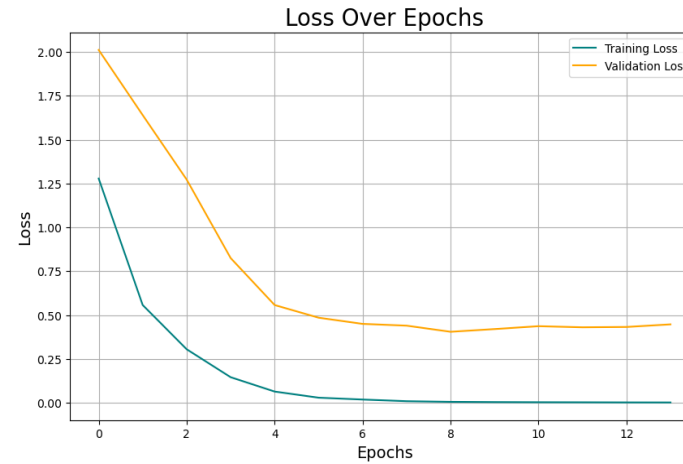
Optimized model



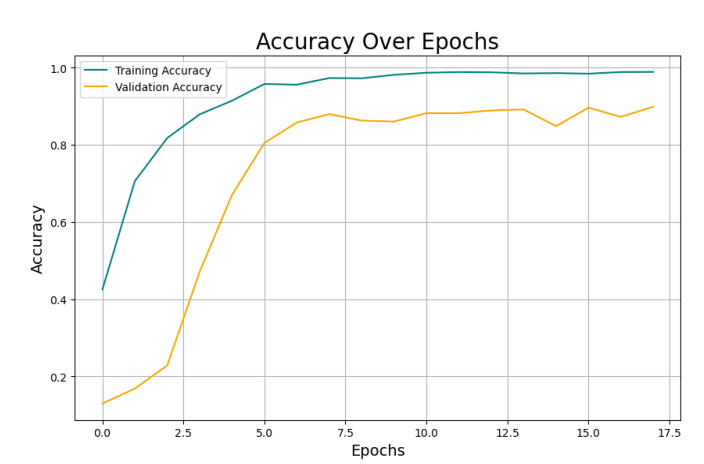
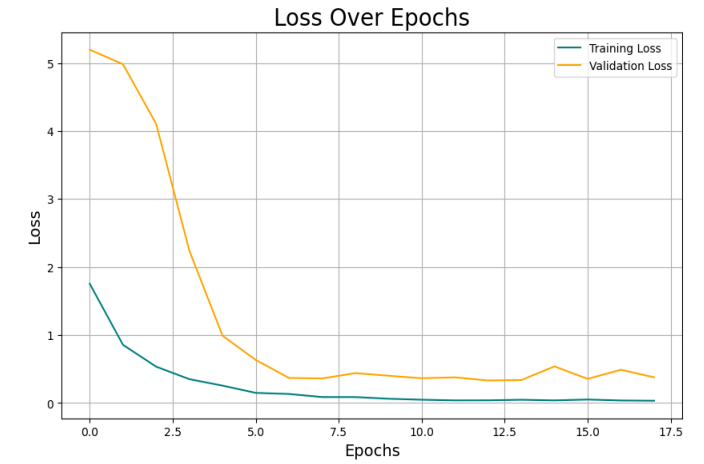
Model Performance

- Data split:
Training set 80%,
Validation & Test set each
10%

Original Model



Optimized Model



Results

Accuracy = 93 %

True: 1, Pred: 2



True: 5, Pred: 5



True: 6, Pred: 6



True: 5, Pred: 5



True: 8, Pred: 7



True: 6, Pred: 6



True: 3, Pred: 3



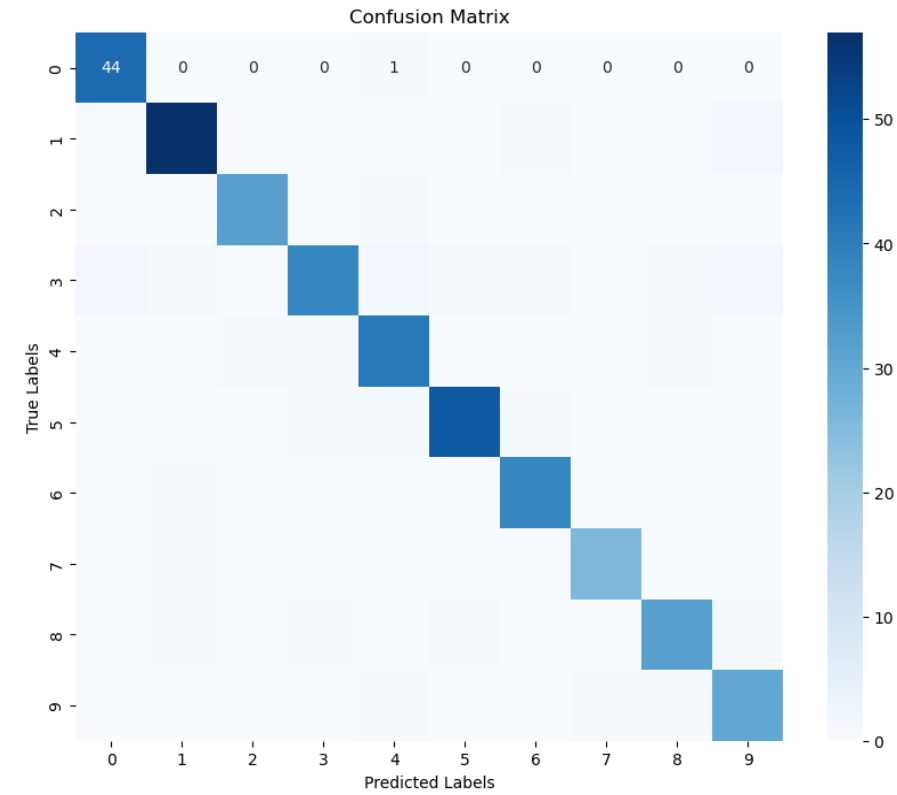
True: 2, Pred: 2



True: 1, Pred: 1




True: 4, Pred: 4



Challenges

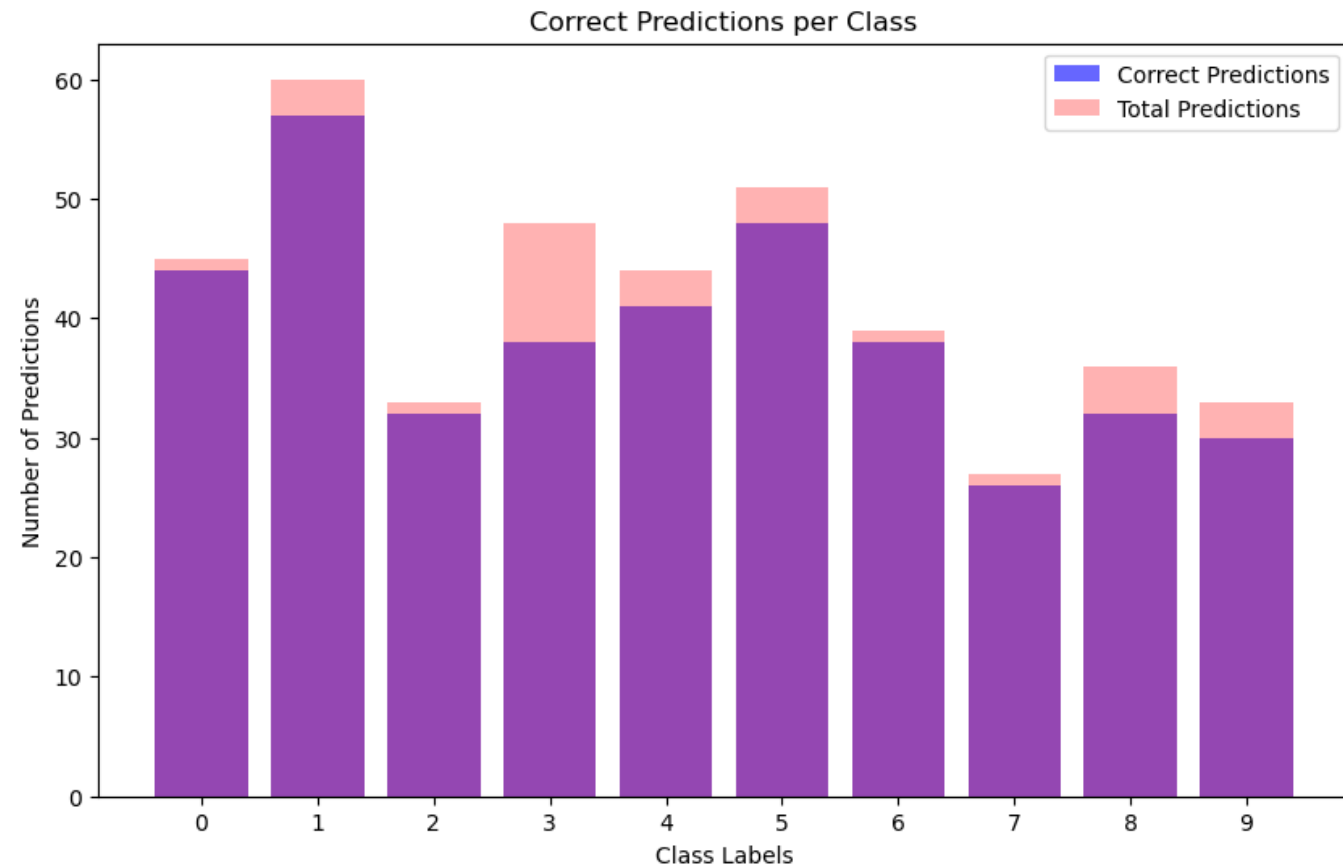
- Manual parameter tuning was better than random search (accuracy=0.76)

The hyperparameter search is complete. The optimal number of units in the first densely-connected layer is 256.
The optimal dropout rate for the first layer is 0.1.
The optimal number of units in the second densely-connected layer is 128.
The optimal dropout rate for the second layer is 0.3.
The optimal learning rate is 0.001.

26/26  6s 210ms/step - accuracy: 0.1145 - loss: 7.9928
Test accuracy of the new model: 0.11298076808452606

Future work

- Use pre-trained models
- More data for class 3
(lowest accuracy 79% among classes)



Questions?