



ALLEN LI

RECOGNITION OF IMAGES FROM CIFAR-10 DATASET USING DEEP LEARNING NETWORK

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Abstract

This project is to implement image recognition using a fine-tuned vgg19 network model on the CIFAR10 dataset. After training and validation of the model the accuracy was able to reach more than 80%. Finally the trained model needs to be applied to a GUI. The GUI of the model is intended to enable users to upload images to a web page for image recognition.

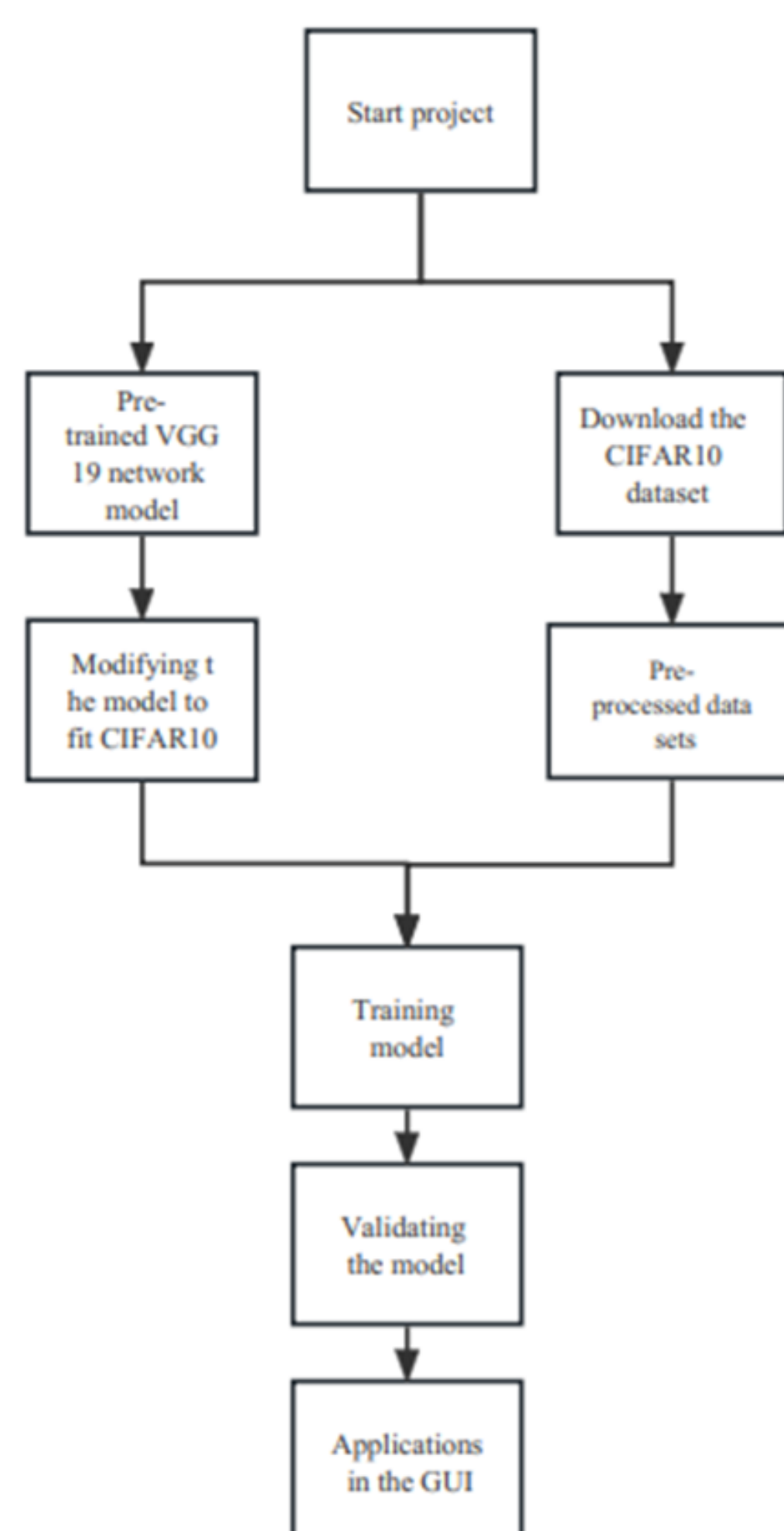
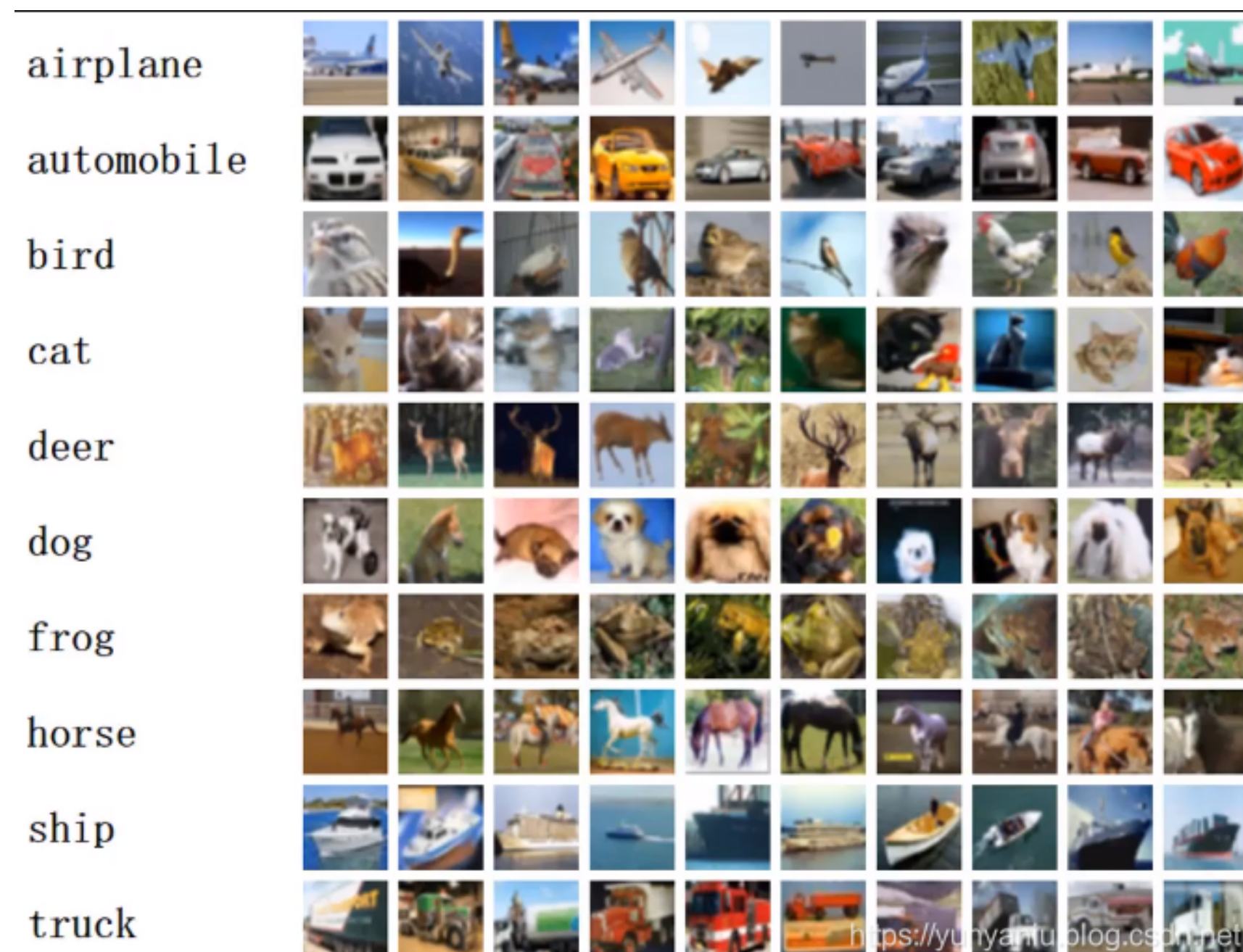
INTRODUCTION

The ability to recognize visual objects is crucial to the daily life of humans. Most studies on image recognition are based on convolutional neural network models (CNNs) for this purpose [1]. Meanwhile some experiments based on the CIFAR-10 dataset have shown that CNNs have effective image recognition capabilities [2]. One of the migration learning used in the training process has been shown to be applicable to classification tasks [3]. This project intends to use the CIFAR-10 dataset to train deep learning algorithms to recognize images.

METHODOLOGY

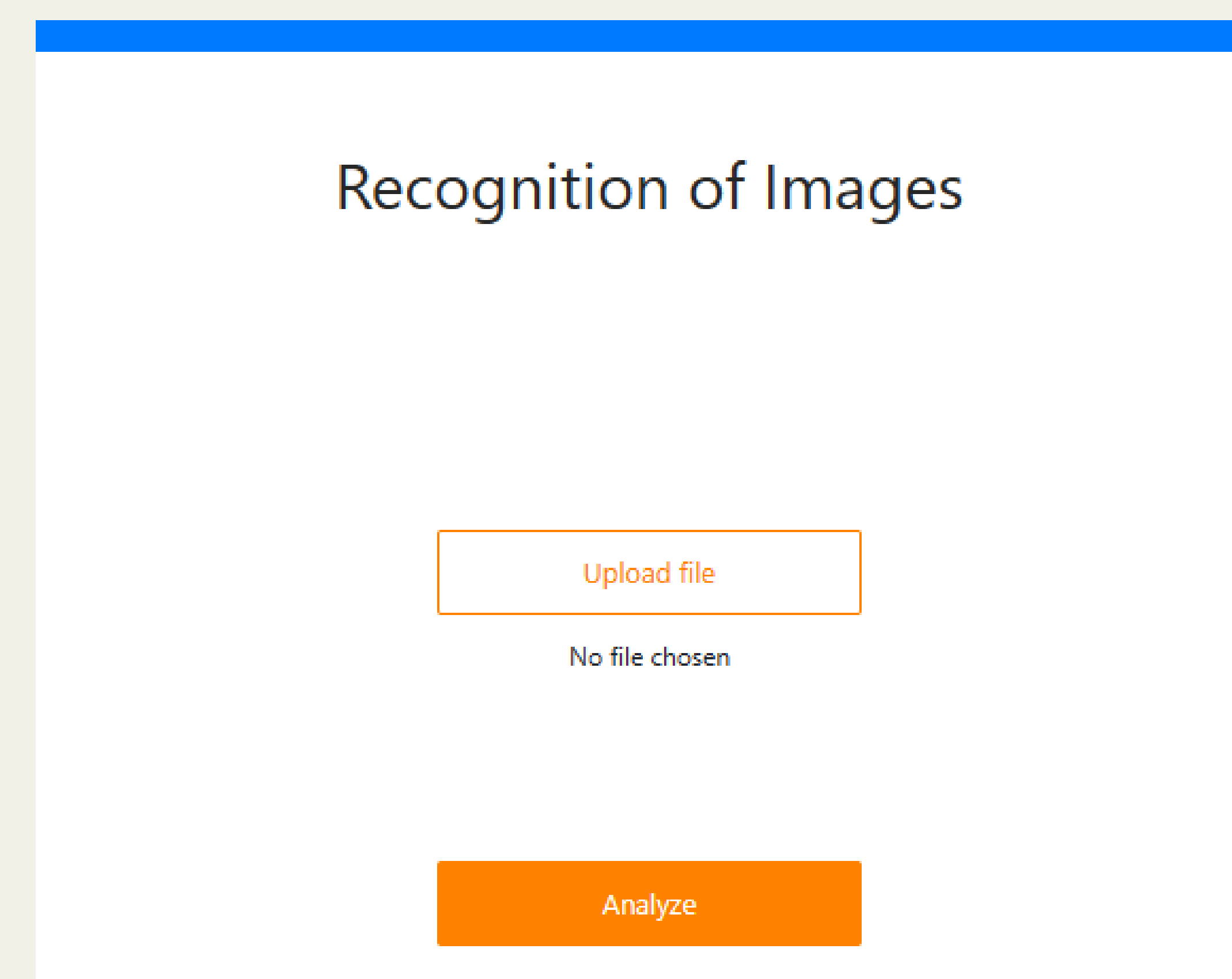
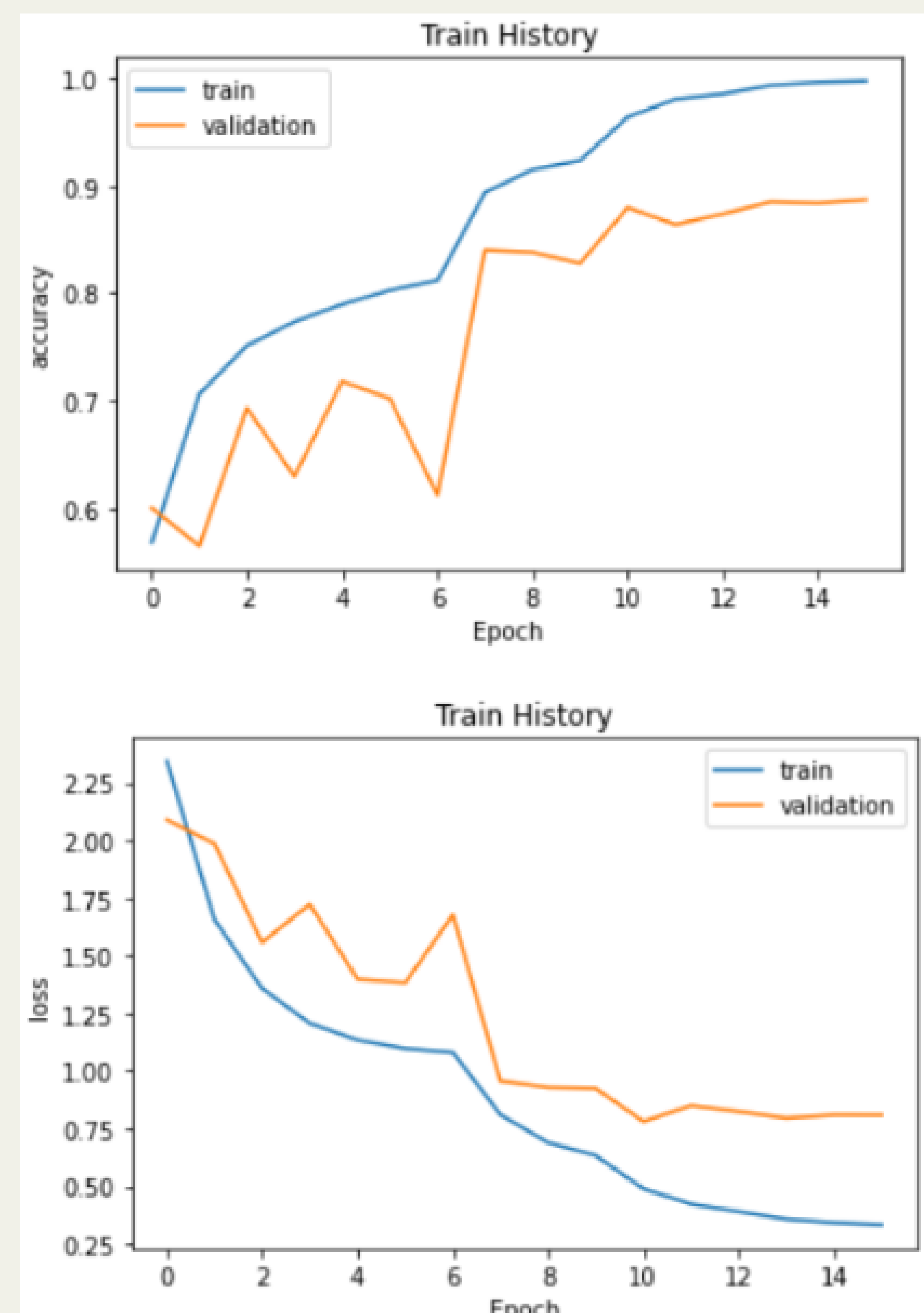
In order to implement the image recognition function:

- The CIFAR10 dataset first needs to be pre-processed.
- The tuned VGG19 network model is trained and validated.
- The model is called in a well-written GUI program to complete the project.



RESULTS & GUI

The images below show the process of training the VGG19 model, including the variation in loss and accuracy. Also, this section shows a simple GUI and the results of the image recognition.



CONCLUSION

This project illustrates how well the VGG19 neural convolutional network is able to perform image recognition functions. However, there are also some recognition errors, which shows that there is still much room for improvement in the CNN model compared to the human eye's ability to recognise objects.

REFERENCES

- [1] Phan, H.-H., & Vu, N.-S. (2019). Information theory based pruning for CNN compression and its application to image classification and action recognition. 2019 16th IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS), 1–8. <https://doi.org/10.1109/AVSS.2019.8909826>
- [2] Ho-Phuoc, T. (2018). CIFAR10 to Compare Visual Recognition Performance between Deep Neural Networks and Humans.
- [3] L. Torrey and J. Shavlik, "Transfer Learning," Handb. Res. Mach. Learn. Appl., pp. 657–665, 2009, doi: 10.1201/b17320.