

MAIS 202: Kaggle Competition Write-Up

[Github Repository](#)

*I. Implementation of the model*

We decided to implement a convolutional neural network in order to classify the images. We used the Keras library to implement the CNN model.

*II. Results (how your model performed with various hyperparameters + your best model for the Kaggle competition)*

Our first few tries used the Adam optimizer and had a training accuracy of about 87% after 50 epochs (no early stopping was needed). We then increased the number of epochs to 100 and it hit a training accuracy of 90.18%.

For the second submission, we tried a few different optimizers and changed the number of epochs to 150 and reached the highest accuracy using nadam with a training accuracy of 90.89% and validation accuracy of 88.15%.

For the third submission, we added an extra fully-connected layer at the end of the CNN and split the training/validation data 100:1. Using adamax, we reached a training accuracy of 91.6% and a validation accuracy of 90.2%.

*III. Challenges (what was hard about the challenge/implementation)*

One challenge we faced was getting the training and testing data to be the right shape to feed into the CNN. In addition, the output of the model is an array of probabilities for each label, which needed to be converted to the index (an integer representing the classification). The CNN also takes a long time to run, so it was difficult to gauge if we were making progress when tweaking the parameters and optimizers.

*IV. Conclusion(what did you learn from this assignment)*

We learned a lot about how to set up and preprocess data to create CNNs. In addition, we also learned how to better interpret documentation and have gained more

insight into gauging the performance of a model and seeing what changes were effective and what lead to more overfitting.

*V. Individual Contribution (for each student, write briefly about what you specifically did for this assignment)*

Elinor imported the data, set up the basic neural network pipeline, trained and tested the model with multiple optimization parameters and made the entire first two submissions. She also coded the conversion of the output of the model into an array and then csv file for submission.

Nathalie helped Elinor implement early stopping, helped with troubleshooting in setting up the CNN, and created a README.

Andrew figured out how to import the data directly from Kaggle, completed hyperparameter tuning and submitted the 3rd submission.