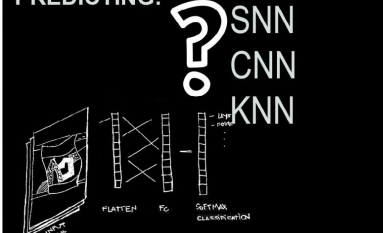


SUPERMARKET PRODUCT RECOGNITION

CS 230 Deep Learning



We identify supermarket products by interpreting their labels. Users take a photo of a packaged product, and the neural network recognizes the specific product the user is capturing.

The main idea is to build a smart-choice food app that gives product recommendations for users that want to achieve specific "goals" and have specific food "filters". The algorithm can classify 165 classes of products with 100% accuracy on dev/test set. A future step will connect each product with its nutritional content and provide users with recommendations.

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DATA AND FEATURES

Created own dataset from five supermarkets: 50 snapshots per class (different angles, zoom, quality). 165-class recognition.



$X = 8920$ RGB images (4032, 3024, 3) scaled down to (256, 256, 3)

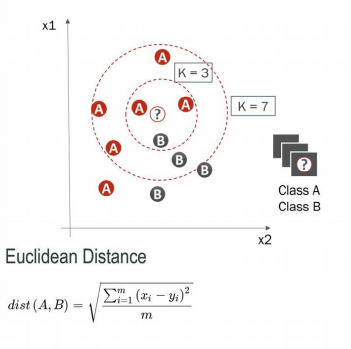
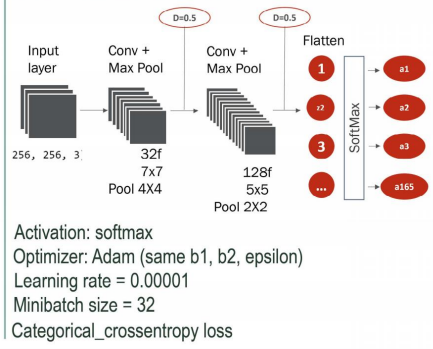
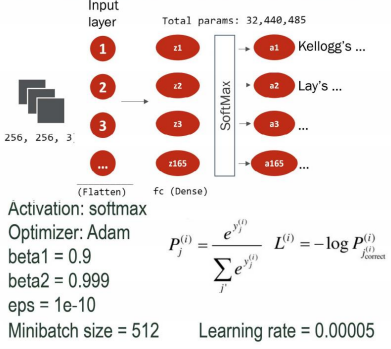
Y one hot vector (165,)

196,608 input features normalized by dividing each pixel by 255
The data was divided into 70% train - 15% dev - 15% test sets

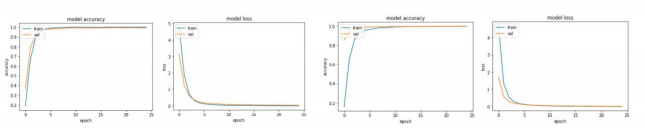
```
[ ] y_pred = BaseModel.predict(X_test)
[ ] np.argmax(y_pred[0])
[ ] 13
[ ] plt.imshow(X_test[0])
[ ] matplotlib.pyplot.imshow at 0x
```



MODELS



RESULTS



Model	Train Accuracy	Sample (#)	Test Accuracy	Sample (#)	AUC ROC score
SNN	0.9875	6244	0.9858	1338	0.9899
CNN	0.9994	6244	1.0	1338	1.0
KNN	-	-	0.994	1338	-

DISCUSSION AND FUTURE WORK

The SNN & CNN with softmax activations almost perfectly classify our 165 packed products. A KNN achieves similar performance, but is not commercially applicable (i.e. takes hours to predict).

We plan to increase difficulty with web pictures and outdoor markets to change lighting. We also want to detect more than one product at once.

Next steps are increasing the number of products to 20,000 and testing multi-class algorithms and OCR to make the application more robust.

REFERENCES

D'Almeida, W. (2018) Retraining Inception V3 for Custom Image Classification. / Hoffman, S. C. & Thiagarajan, D. (2016), Revisiting Grocery Recognition using TensorFlow