



What Are You Eating? Food Recognition Using Deep Neural Networks

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Predicting

- Current trends have demonstrated an increase tendency for phone users to take pictures of their food items before consumption.
- Millions of pictures are posted on a daily basis without any tag format.
- As a way to enable an easier process to tag photos, I created a Convolutional NN that detects multiple food items.



Result

	Training Accuracy	Test Accuracy
7 Conv CNN	0.74	0.62
15 Conv CNN	0.70	0.64

Dataset

- Online databased consisting of 101,000 color images of 101 different food categories.
- Data was augmented through the inclusion of rotated/cropped/ and inverted images.
- The images were reshaped to a standard 128x128 resolution.
- Data was split into a 75-25 split between train and test set.

Discussion

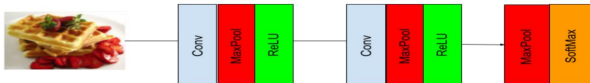
- Small dataset per food item limits high levels of accuracy
- I believe that pictures with similar-color food items and extreme zoom-ins were a problem as many of them were mislabeled.
- With further training and changes, I believe that this could be utilize in mobile platforms as a way to help users upload their pictures.



True Label: Bread
Given Label: Chocolate Cake

Training/Model

- I trained two different CNN models with different layers
- ReLU activations across the hidden layers with a Softmax for the last layer
 - MaxPool + Dropout also utilized in the hidden layers
- Categorical Crossentropy loss function utilized with an RMSprop optimizer.



Future Work

- Fine-tune hyperparameters to ensure biggest efficiency possible.
- Gather more data on the existing and new categories to ensure broad targets
- Implement the neural network on a portable device to allow users to utilize it in real life.
- Backpropagation through the CNN layers
- Enforce Neural Network- Investigate different variations on neural networks.

Citations: <http://www.cs.cmu.edu/~bhiksha/courses/deeplearning/Fall.2016/pdfs/Simard.pdf>