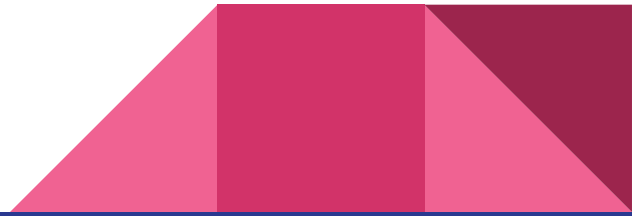
Yelp Photo Classification

Group 4: Selvyn Perez, Ritika Agarwal, Tanaya Pole

Project Goal

- Yelp needs help identifying what labels images belong to
- Learn to use Convolutional Neural Networks
- Compare frameworks: PyTorch, Tensorflow, Keras



Dataset

- Yelp Open ended challenge
- 280,000 images
- JSON file with photo id and labels
- CSV file with photo id and 99 columns of data

1. Food
2. Drink
3. Inside
4. Outside
5. Menu

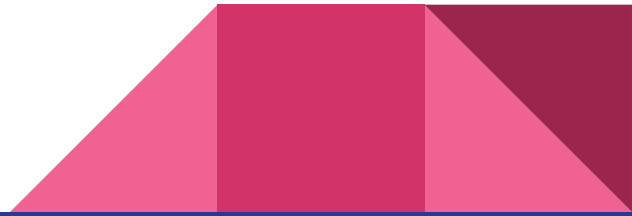



Data Preprocessing

- Downloaded yelp images and json data file
  - Mapped picture_ids to labels
- Resized images
  - 32x32x3
- One hot encoded labels
- Split data using Scikit-Learn

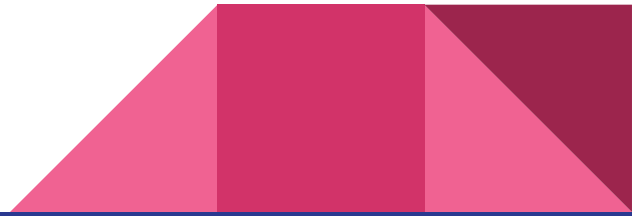
Pytorch Library

- Open-source machine learning library for Python
- Based on Torch,
- Used for applications such as CNN and natural language processing.



PyTorch Implementation

- Stochastic Gradient Descent
  - SGD Optimizer
- Linear Transformation Layer
  - nn.Linear
- Softmax Activation
  - nn.Softmax



PyTorch

Accuracy: 0.76

Loss: 0.7141

Time: 424.4s

- Optimizer: sgd
- Learning rate: 0.0001
- Batch size: 100
- Epochs: 100
- No dropout layer

PyTorch

Accuracy: 0.81

Loss: 0.5483

Time: 639.1s

- Optimizer: sgd
- Learning rate: 0.0001
- Batch size: 10
- Epochs: 100
- No dropout layer

PyTorch

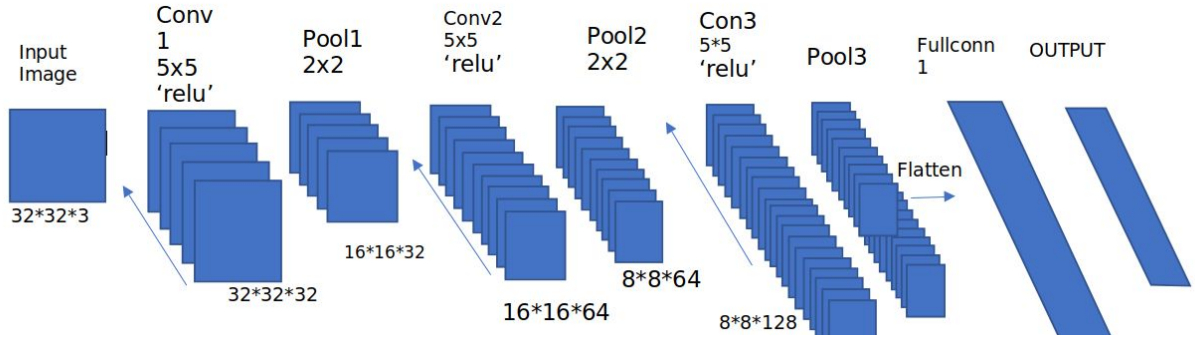
Accuracy: 0.65

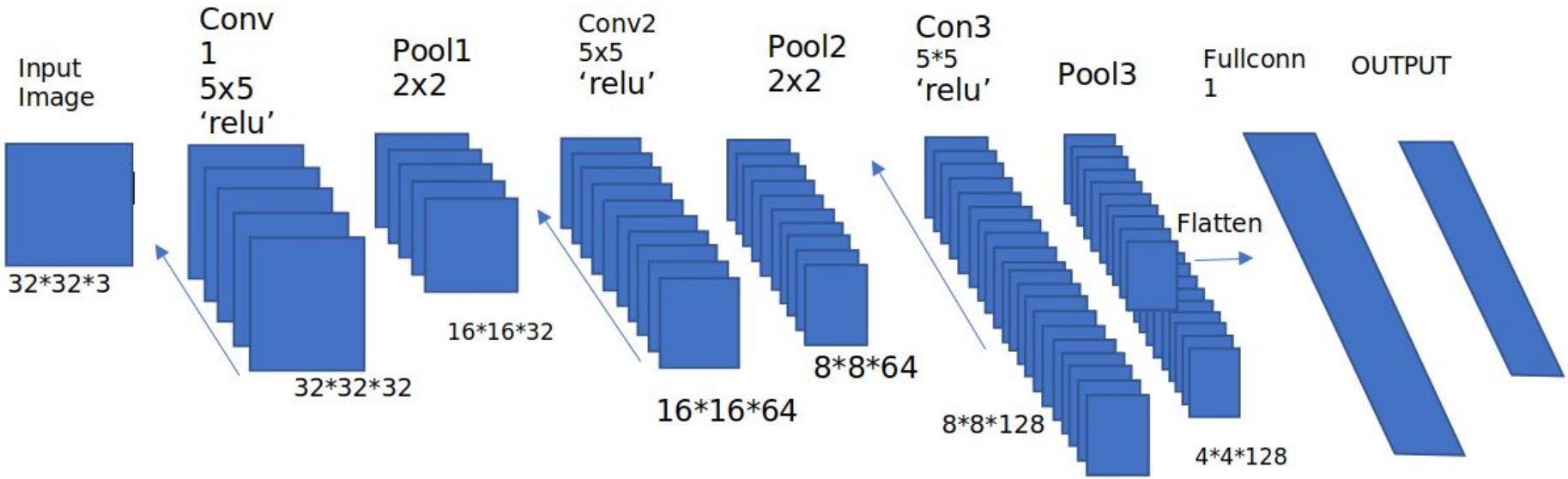
Loss: 1.1605

Time: 529.4325

- Optimizer: sgd
- Learning rate: 0.0001
- Hidden layers: 2
- Batch size: 20
- Epochs: 100

Tensorflow Network Architecture





Tensorflow

PARAMETERS ADJUSTED:

BATCH SIZE

LEARNING RATE

OPTIMIZER

NUMBER OF NEURONS

ADDED A LAYER

DROPOUT

WITH DROPOUT

ACCURACY: 0.86

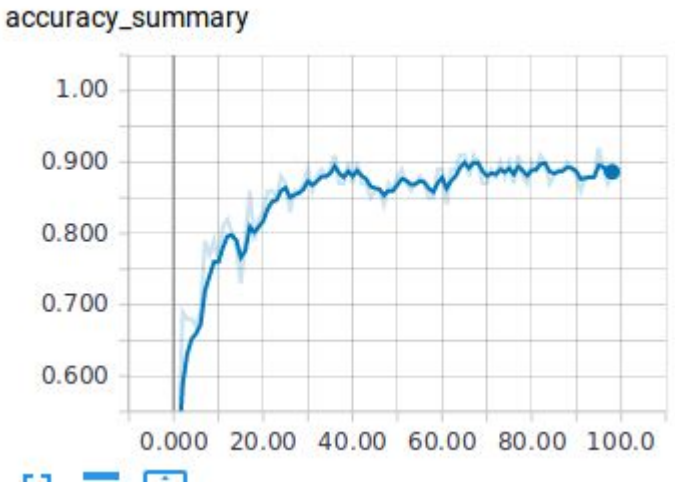
LOSS: 0.103

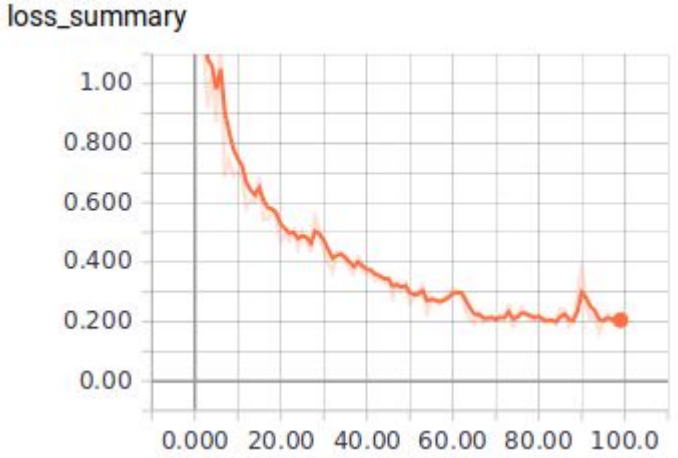
WITHOUT DROPOUT:

ACCURACY:0.91

LOSS:0.048

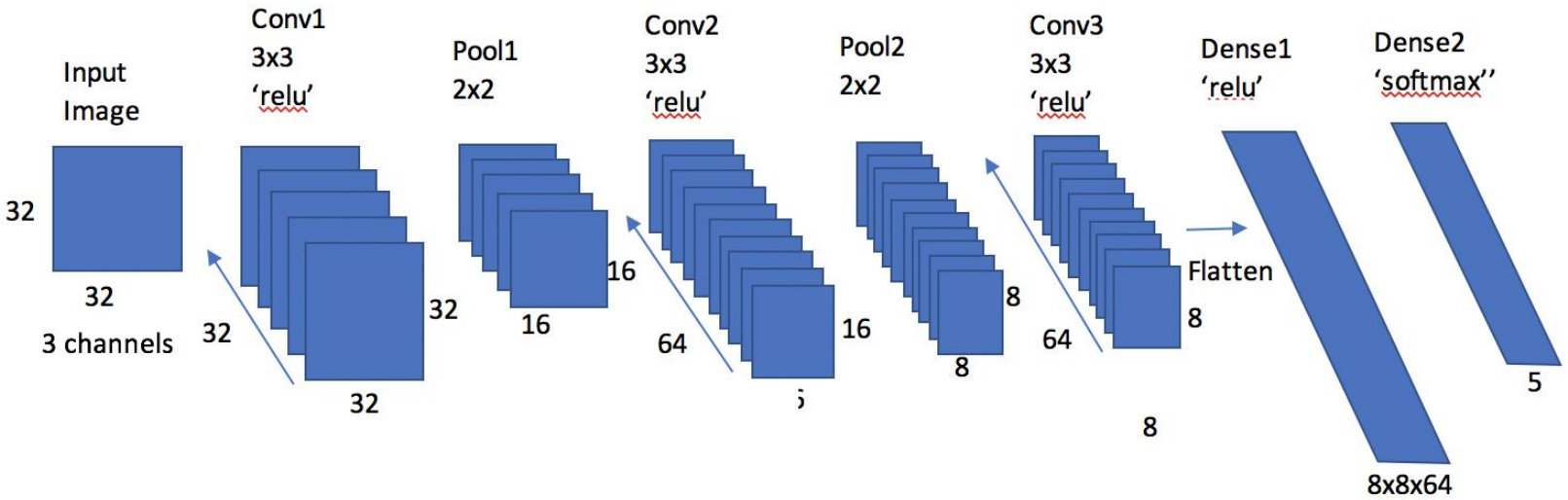
TENSORBOARD





Keras

- open source neural network library that runs on top of Tensorflow
- Fastest and simplest



Keras Parameters

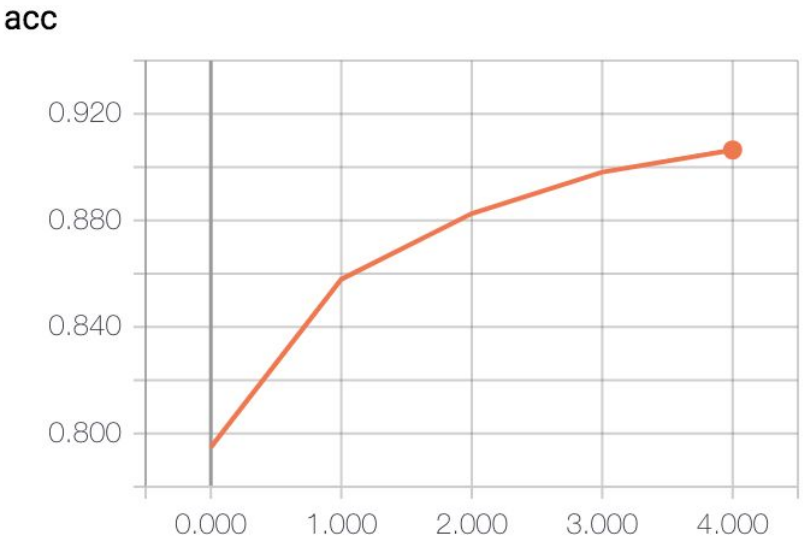
- Optimizer: rmsprop
- Learning rate: 0.001
- Batch size: 100
- Epochs: 5
- No dropout layer

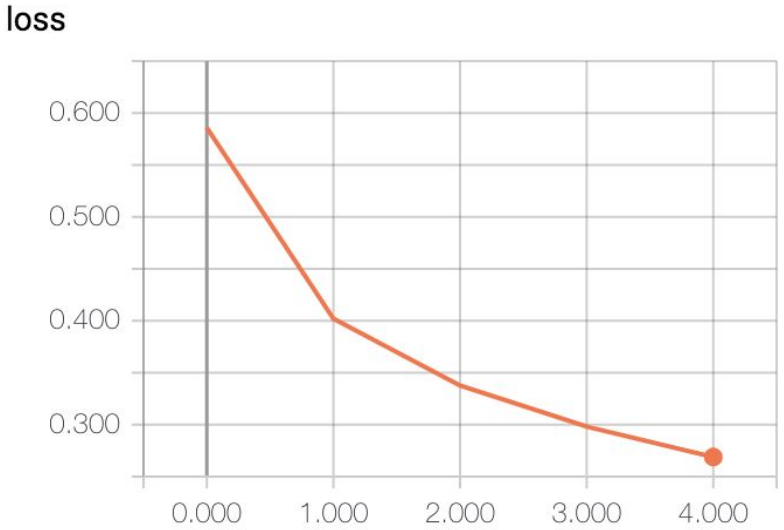
Accuracy: 0.8923

Loss: 0.3177

Time: 71.4s

Keras - Tensorboard





Conclusion

- Keras and Tensorflow gave highest accuracy
- Keras has best computational efficiency
- Improvement
  - Can use more images to train
  - Test for more specific labels such as “hot dog or not”