Making Deep Learning Models Accessible for Non-Experts

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ABSTRACT

Deep learning is a subset of machine learning that focuses primarily on using Artificial Neural Networks (ANN) with multiple hidden layers to train a model for performing a certain task or set of tasks. It has allowed for significant advancements in classification systems, mainly image classification, speech recognition, and natural language processing. Deep learning allows a computer system to classify objects at a much higher rate than, and with similar accuracy to, human experts. This program is designed to allow deep learning to be utilized by those who are not proficient in typical machine learning algorithms, but can benefit greatly from using ANNs. The program implements models created by researchers at Oxford, Google, and Microsoft to be used with any custom dataset, allowing users to use pre-trained deep learning models (or train their own) to classify their own datasets.

WHAT IS DEEP LEARNING?

What is Machine Learning?

- Machine Learning (ML) allows a computer to learn the steps to complete a problem

What is Deep Learning?

- Deep Learning is a method within ML that uses multiple hidden layers to transform data until it can create an output

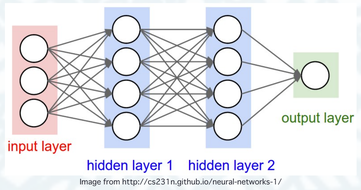
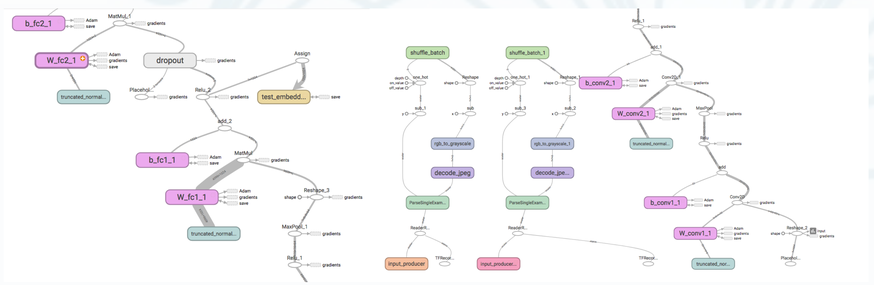


Image from http://cs231n.github.io/neural-networks-1/

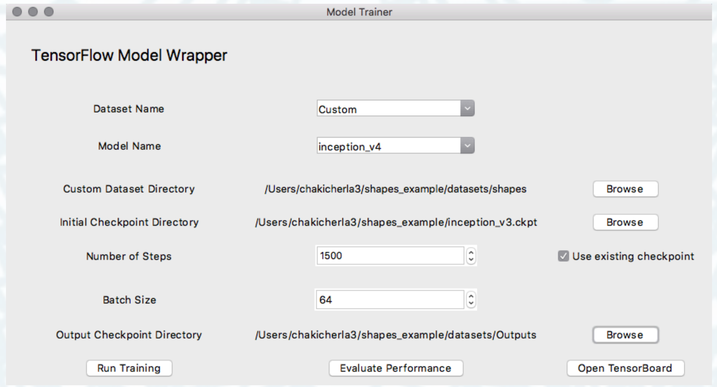
- Hidden layers extract important features for image recognition

WHAT IS TENSORFLOW?

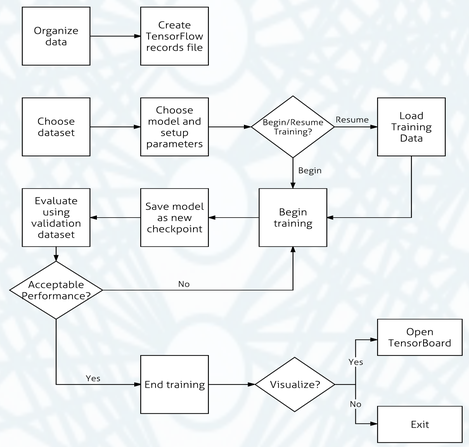
- Machine learning library for Python developed by Google
- Moves tensors (n-dimensional arrays) through a computational graph of operations



USER INTERFACE



USAGE



FUTURE DEVELOPMENTS

- Tool designed for users with little to no ML experience
- Currently supports only image classification
  - Word2Vec is a popular model for converting text data for training in TensorFlow

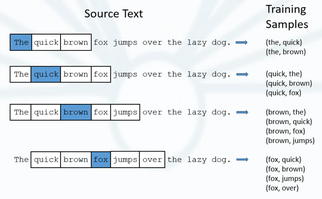


Image from http://mccormickml.com/assets/word2vec/training_data.png

FEATURES

Allows use of premade datasets

- MNIST, Cifar10, and Flowers standardized datasets

Easy wrapper for custom datasets

- Datasets in standard format can be read in and trained with

Contains several pre-trained models developed by Google, Oxford, and Microsoft

- Inception, ResNet, and VGG models are standardized

Can use custom checkpoints for pre-trained models

- Using pre-trained checkpoints to speed up training

TENSORBOARD

- Built in feature of TensorFlow for visualization of data from training and validation

TensorBoard Embedding Visualizer

Accuracy and cross entropy graphs over training period

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