Project 2 Report

Dhia Kennouche -05150000760-

Ege University

Note

Source code: https://github.com/kendhia/ip_skimage_api_app

1. Difference between Object Detection and Localization

Object Detection and Localization are most of the time used together in Computer Vision. In order for an object inside an image to be detected, it should first be localized. But if we want to give specific difference between then, we can do that by giving the definition of each one. Localization is the identification where the object is, and draw/put a bounding box around it. Localization is very similar to object detection only difference being instead of detecting all the objects, localization focuses on only one main object. On the other hand, Object detection is a classification model which predicts whether the object is present (in case of single object) or what are all the objects that are present (in case of multiple objects).

2. Deep Learning

“Deep Learning is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called artificial neural networks.” *Jason Brownlee*

The fast growth of Deep learning in recent years is mostly thanks to the development in computation systems (like computers), and the availability of huge sets of data. These resources gave the chance to mimic the work of our brain in an algorithmic way, which allowed us to build Neural Networks with high accuracy.

Hinton's Advice For people Who wants to learn about Deep Learning:
#1 - Read the literature but don't read too much of it.
#2 - For creative researchers, I think what you want to do is to read a little bit of the literature and notice something that you think everybody is doing wrong and contrarian in that sense, you look at it and it just doesn't feel right and then figure out how to do it right, and when people tell you that's no good....just keep at it. And I have a very good principle for helping people keep at it. Which is, either your intuitions are good or they're not. If your intuitions are good, you should follow them and you will eventually be successful. If your intuitions are not good, it doesn't matter what you do.
#3 - Never stop programming!
#4 - I think one should reach enough to start building intuitions and then trust your intuitions and go for it. And, don't be too worried if everybody else says is nonsense.
#5 - If you think it’s a really good idea and other people tell you it's complete nonsense, then you know you're really on to something.
#6 - one good piece of advice for new grad students, see if you can find an adviser who has beliefs similar to yours because if you work on stuff that your adviser feels deeply about you'll get a lot of good advice and time from your adviser.

Different algorithms are used to develop models that “teach” the machine to self learn. No one can claim that he developed the perfect model, but some models have a better accuracy than others in some specific domains. Some of the most used models are :

A. Multilayer Perceptron Neural Network (MLPNN)
B. Backpropagation
C. Convolutional Neural Network (CNN)
D. Recurrent Neural Network (RNN)
E. Long Short-Term Memory (LSTM)
F. Generative Adversarial Network (GAN)
G. Restricted Boltzmann Machine (RBM)
H. Deep Belief Network (DBN)

In addition to the huge size of datasets available, amount of tools that made practicing MI and DL grew with time, especially with big companies like Google and Facebook sharing publicly their inside used and developed frameworks. Some of the most famous and used frameworks are :

A. TensorFlow
B. PyTorch
C. Sonnet
D. Keras
E. MXNet
F. Gluon
G. Chainer
H. DL4J
I. DL4J

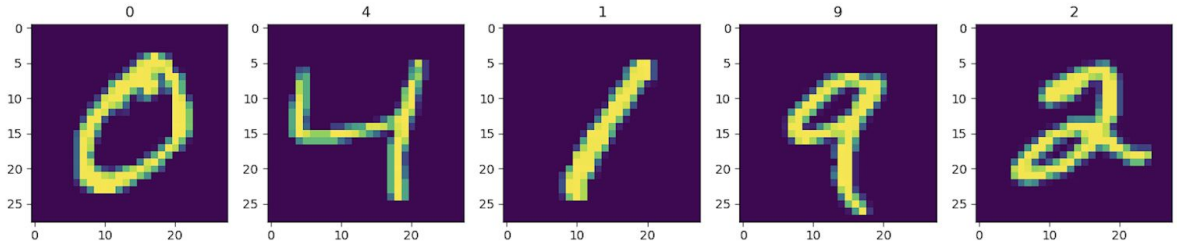
Resources used for this report:

(1) https://www.youtube.com/watch?v=n1ViNeWhC24
(2) https://machinelearningmastery.com/what-is-deep-learning/
(3) https://www.simplilearn.com/deep-learning-algorithms-article
(4) https://towardsdatascience.com/top-10-best-deep-learning-frameworks-in-2019-5ccb90ea6de
(5) https://www.youtube.com/watch?v=-eyhCTvrEtE&t=438s
(6) https://towardsdatascience.com/mnist-handwritten-digits-classification-using-a-convolutional-neural-network-cnn-af5fafbc35e9

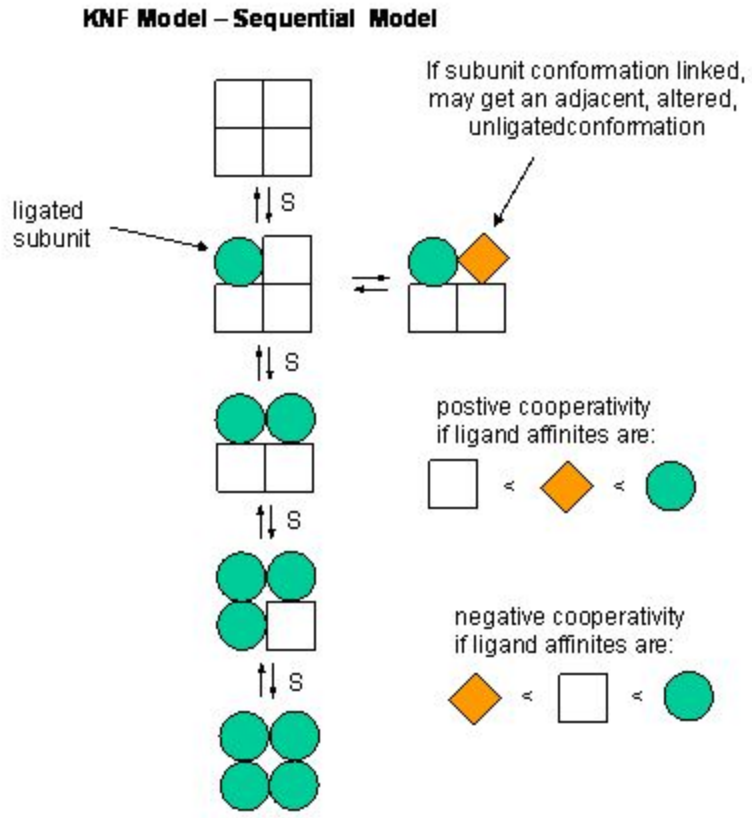
3. Data Details & Modal Used

Used framework: Tensorflow | Keras
Version : 1.9 | 2.2.4
Dataset used: MNIST
Description of Dataset : The MNIST database of handwritten digits, available from this page, has a training set of 60,000 examples, and a test set of 10,000 examples.

Visualization of data:



Used Modal: Sequential Model
The sequential model is a linear stack of layers.



Activation Functions used:

1) ReLU is the most commonly used activation function in neural networks, especially in CNNs. It is linear (identity) for all positive values, and zero for all negative values.
2) Softmax: Softmax function, a wonderful activation function that turns numbers aka logits into probabilities that sum to one. Softmax function outputs a vector that represents the probability distributions of a list of potential outcomes.

Optimizer used: **Adam** is an adaptive learning rate optimization algorithm that's been designed specifically for training deep neural networks

Loss function: sparse_categorical_crossentropy

Experiment

(Excel file is available in the same folder with source code shared on GitHub)