Applying Deep Learning for Image Recognition

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Capstone Project

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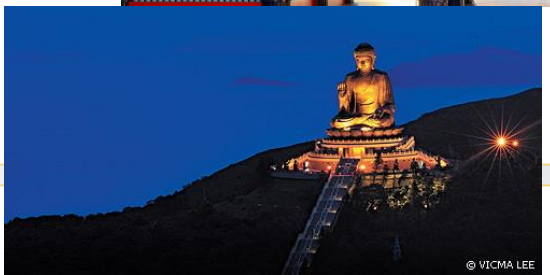
My Travels – My Inspirations

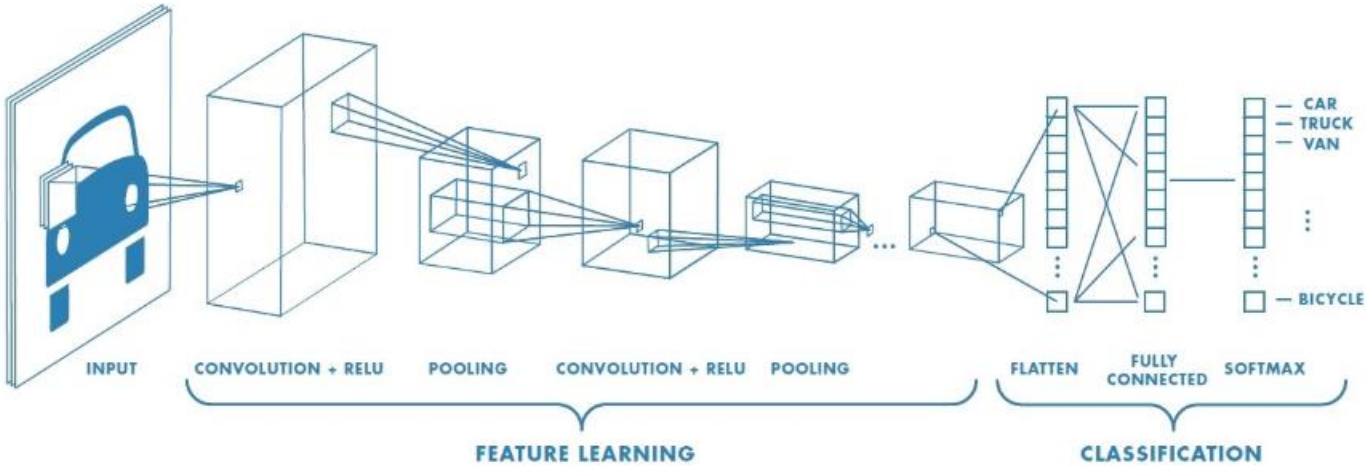


Problem Statement

Architectual structures such as mosques and churches are often hard to distinguish

Build and Evaluate a CNN model to classify architectual structures, such as churches, mosques and temples

Deep Learning and CNN



- Each image will pass through a series of convolutional layers with filters (kernals), pooling, and fully connected layers (FC)
- Then Softmax is apply to classify and object with probabilistic values between 0 and 1

https://medium.com/@RaghavPrabhu/understanding-of-convolutional-neural-network-cnn-deep-learning-99760835f148

What is VGGNet16

VGG16 and VGG19

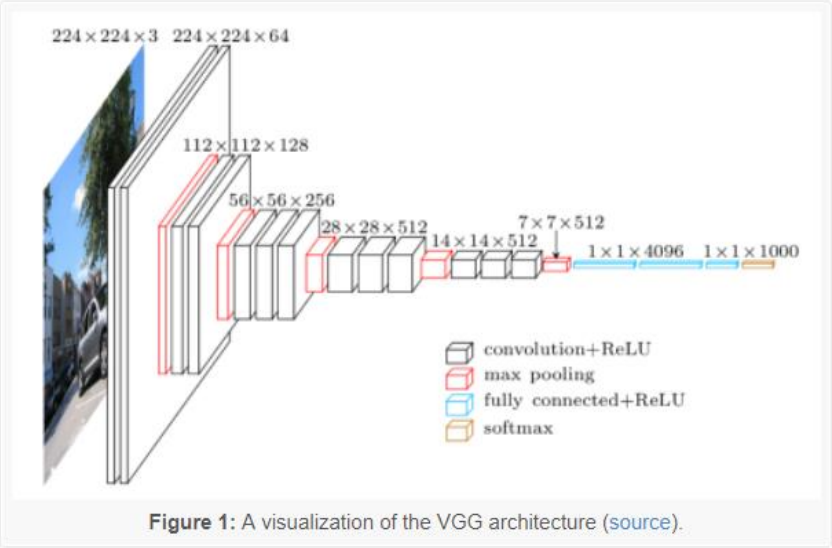


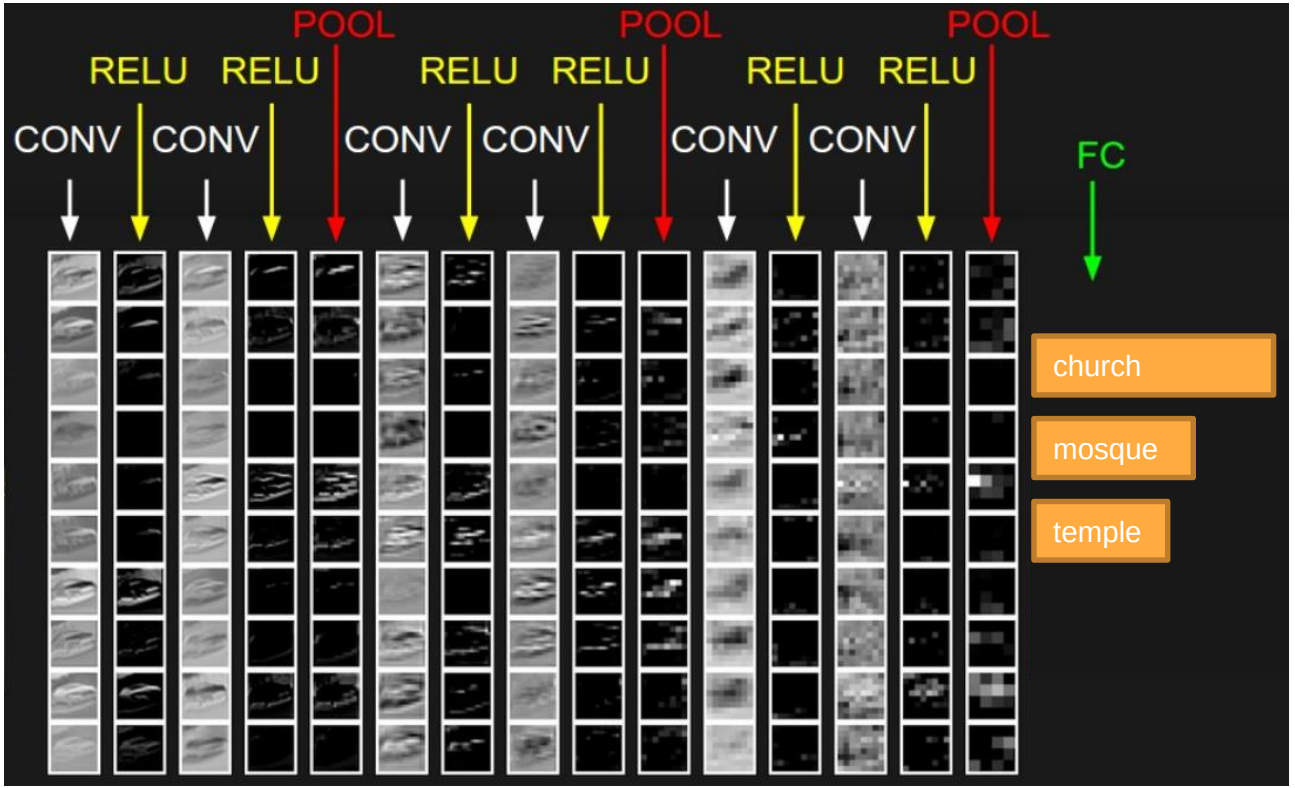
Figure 1: A visualization of the VGG architecture (source).

Transfer Learning

- Utilize Visual Geometry Group's VGG16 with weights trained from ImageNet
- Convolutional layers using only 3X3
- Max pooling layers using only 2X2
- Fully connected layer at the end
- Total of 16 layers

https://www.pyimagesearch.com/2017/03/20/imagenet-vggnet-resnet-inception-xception-keras/

Complete CNN Architecture



http://cs231n.github.io/convolutional-networks/

Collect Data

Church	Mosque	Temple
782	714	394



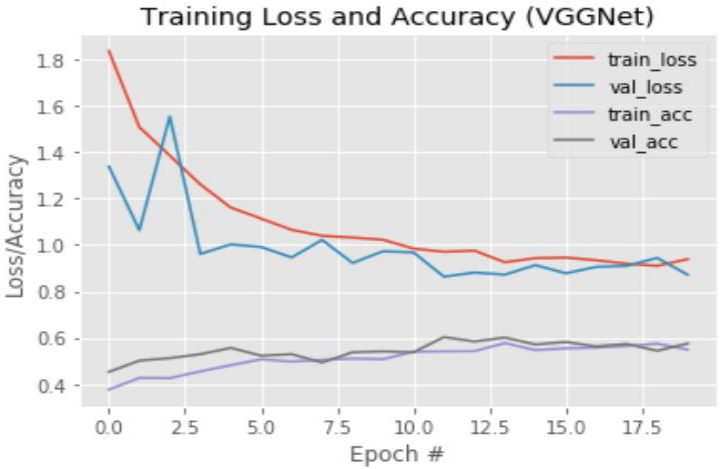






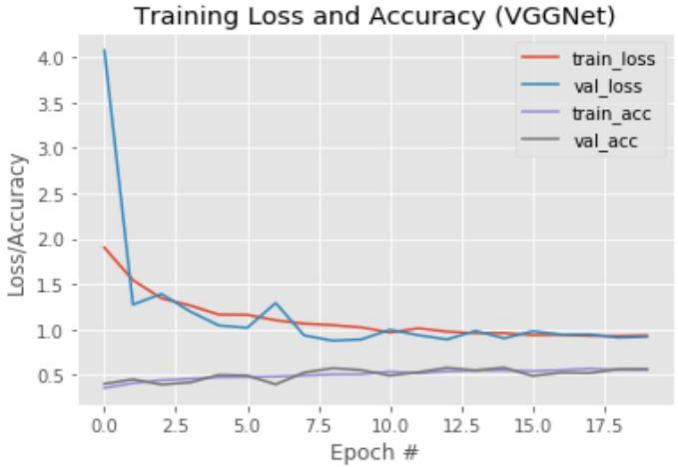
Model Results:

Model 1



Accuracy score: 57.5%

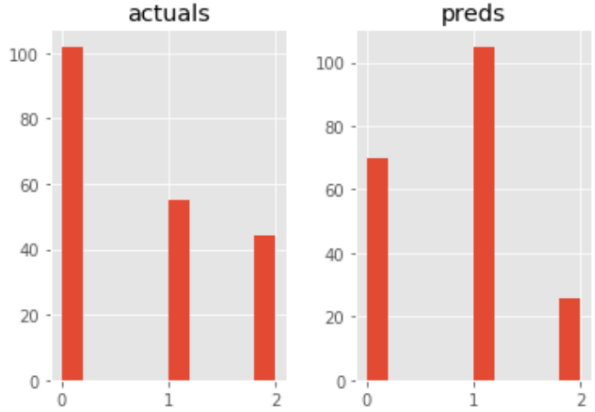
Model 2



Accuracy score: 56.7%

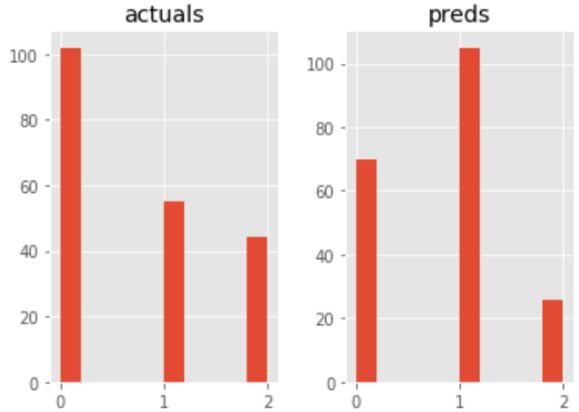
Model Results:

Model 1



Actual \ Prediction	Church	Mosque	Temple
Church	98	86	16
Mosque	45	120	10
Temple	25	19	54

Model 2



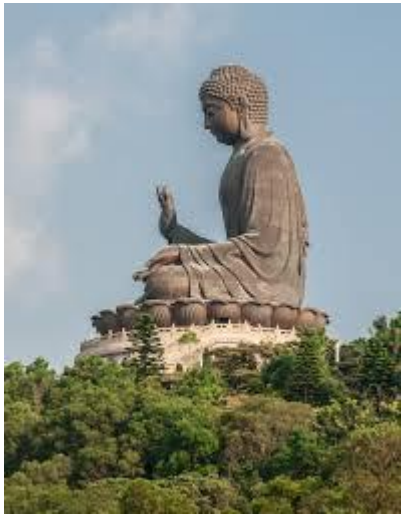
Actual \ Prediction	Church	Mosque	Temple
Church	102	89	9
Mosque	48	125	2
Temple	40	17	41

Live Demo

Westminster Abbey

Sensoji Temple

Predictions?



Tian Tan Buddha
Po Lin Monastery

Further Research

- Collect better and more data
- Incorporate other pre-trained models like VGG19, Resnet50
- Leverage AWS to get better computing power

Sources

https://images.google.com/

https://www.pyimagesearch.com/2018/09/10/keras-tutorial-how-to-get-started-with-keras-deep-learning-and-python/

https://www.pyimagesearch.com/2017/03/20/imagenet-vggnet-resnet-inception-xception-keras/

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