QUAIL IMAGE CLASSIFICATION USING VGG CONVOLUTIONAL NEURAL NETWORK

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PREFACE

- This is an incredibly dense topic which this slideshow will only cover portions of. If you have any questions, I'm 30% sure I can answer them.

- No quail were harmed in the development of this project

OVERVIEW

- Image Classification
- Convolutional Neural Networks (CNN)
- Quail Classification Project
- Questions?

IMAGE CLASSIFICATION

- Image classification is a supervised learning problem that does the following:

  1.) Defines a set of target classes (objects to identify)

  2.) Train a model to recognize the object using labeled example photos

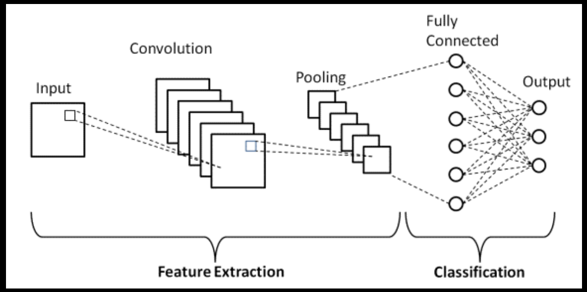
- Early image classification models used raw pixel data to generate predictions
  - The problem with this is that there are so many variations (camera angle, lighting, background) and it can be difficult to make inferences or corrections.
  - Further image classification models used an increasing amount of feature engineering to compensate, which became cumbersome.

DOG OR MUFFIN?

CONVOLUTIONAL NEURAL NETWORKS

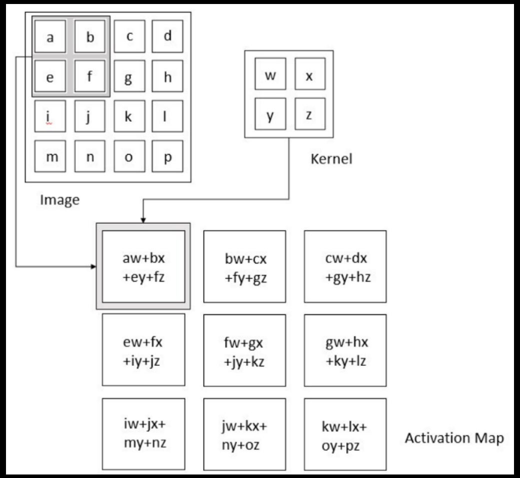
- Convolutional Neural Networks are the new hotness for image classification
- They also have application in Recommender Systems, Image Segmentation, Natural Language Processing, Brain-Computer Interfaces and Financial Time Series

- There are two main parts to a CNN architecture
  - Convolution tool that separates and identifies the features (feature extraction)
  - Classification



CNN CONT.

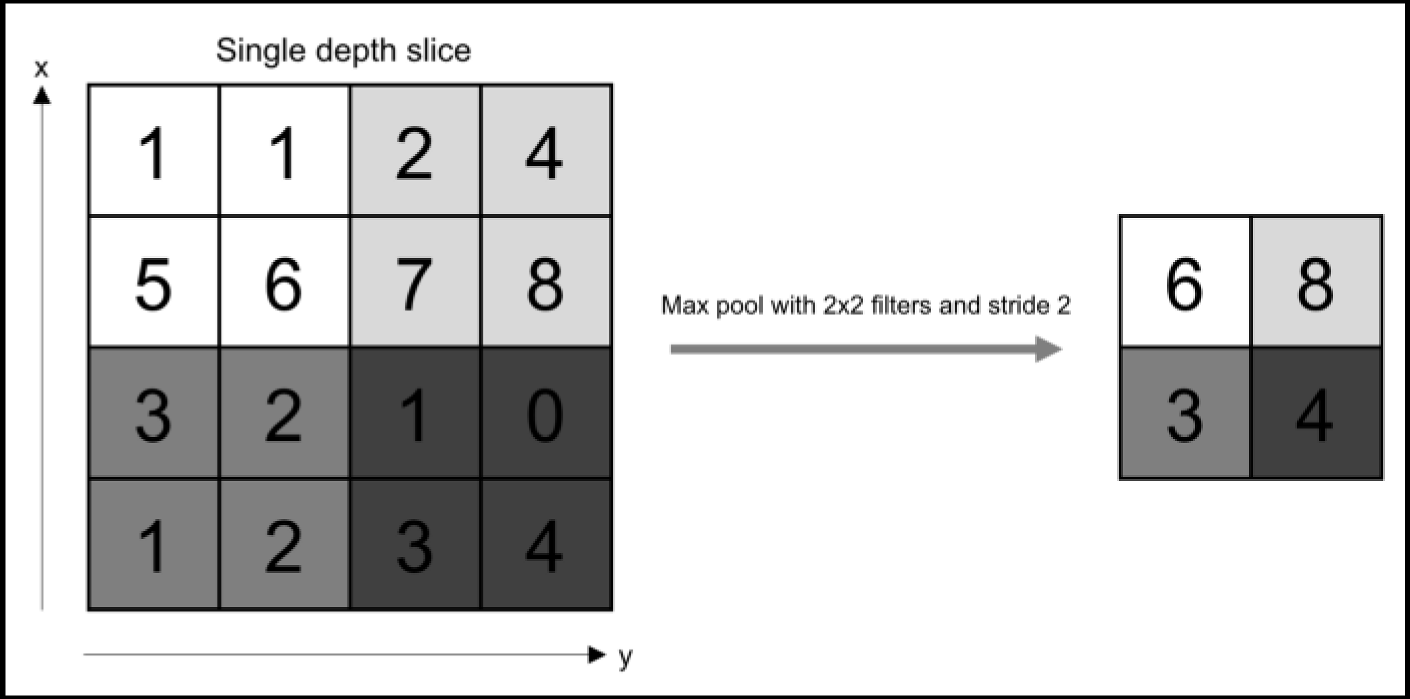
- Data pre-processing
  - Convolution is the process of turning an image into something a computer can "understand"
  - Consider an image as a series of pixels denoted by some value (how bright, what color etc)
  - Then some black magic happens:
  - Convolution Diagram:



  - Why?
  - We can store fewer parameters, reducing the memory use and improve statistical efficiency.

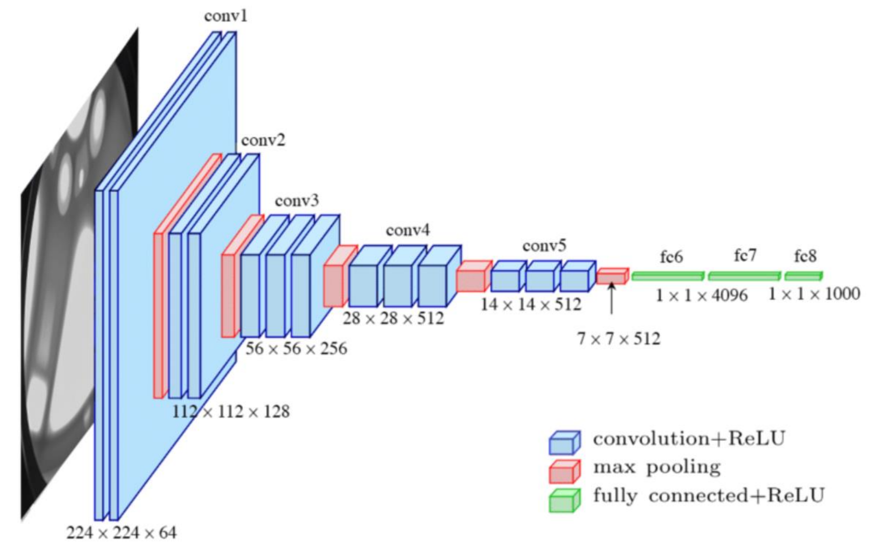
CNN PREPROCESSING CONT.

- Pooling is the process of taking a larger area and applying a function to create a generalization of that area.



CNN PREPROCESSING CONT.

- The Fully Connected Layer helps to map the representation between input and output (Mishra, 2020)
- Non-Linearity layers add functionality that I don't totally understand...yet
- Everything gets layered multiple times usually depending on the algorithm



QUAIL CLASSIFICATION USING VGG CNN AND CUDA PROCESSING

CODE DEMO

POST ANALYSIS

- Why was VGG11 so much better than the other models?
- Should we have tuned various hyperparameters?
- What hyperparameters make sense to tune?

QUESTIONS?

- Please, no.

RESOURCES

- https://towardsdatascience.com/convolutional-neural-networks-explained-9cc5188c4939