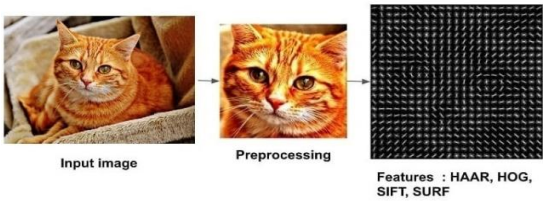
Image Recognition (Classification)

Background: Image recognition refers to the task of inputting an image into a neural network and having it output some kind of label for that image. The label that the network outputs will correspond to a pre-defined class. There can be multiple classes that the image can be labeled as, or just one. If there is a single class, the term "recognition" is often applied, whereas a multi-class recognition task is often called "classification". A subset of image classification is object detection, where specific instances of objects are identified as belonging to a certain class like animals, cars, or people.

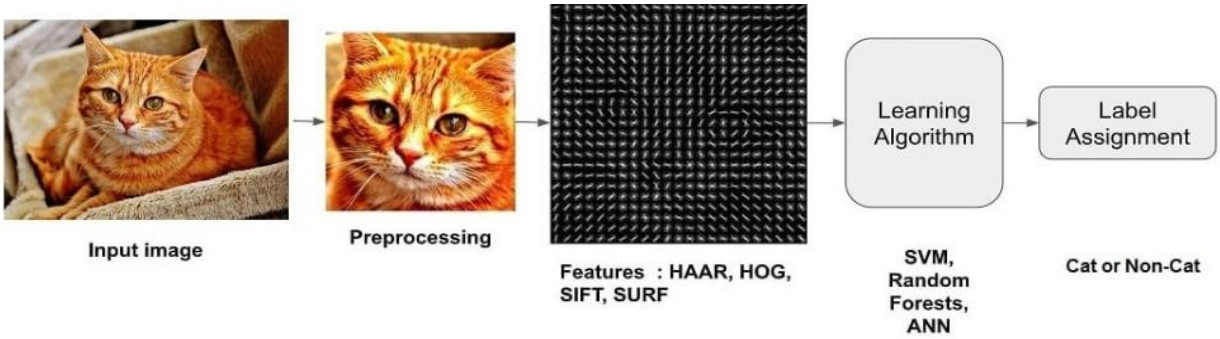
It utilizes these two algorithms and the datasets to achieve the overall Image Recognition task:

1. **Feature extraction with Filters** //Filtering input images using pooling and convolutional layers



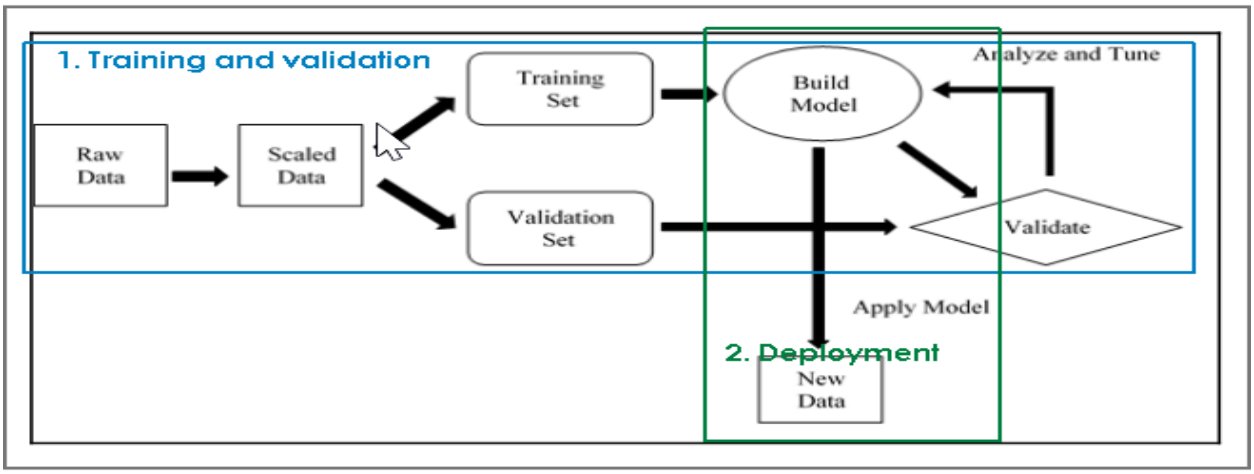
2. **k-nearest neighbors (KNN) classification:**

Contributions/hypotheses of the project: The application will be able to classify the different objects/images based on its trained neural network. For example, please refer image below where the application model is fed with a new input image which it has not seen before, it extracts the features out of it using filters and performs the K-NN classification on top it to classify it as the nearest matched label in its trained network.

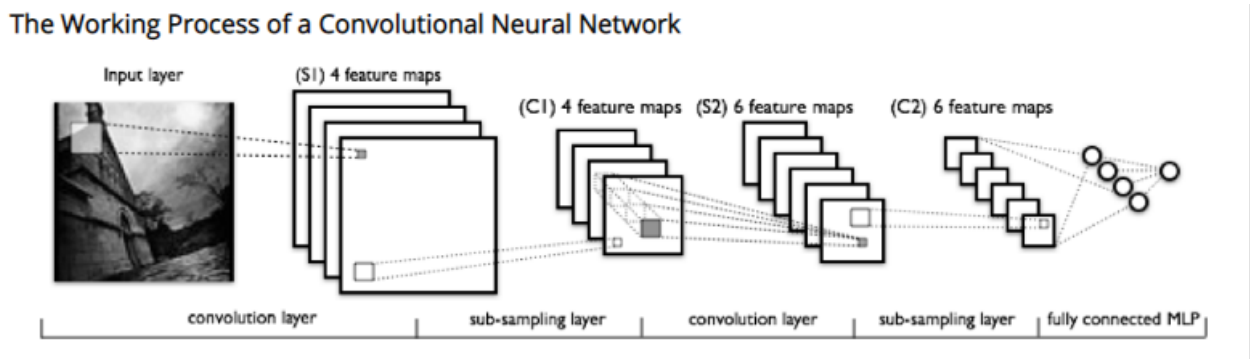


Implementation Details:

Description:



For implementing details, please refer to the image above. To build the image recognition application, we will be using datasets which are processed images. This dataset will be divided into two sets, one will be training set and other one Validation set. Around 1000+ images will be used as dataset to provide a considerable level of accuracy to the model. The neural network model will be modelled using filters including pooling and convolution layer. Please see below the working process of CNN.



Once the model is trained using training and validation set, the model is ready to recognize and put label on any unclassified object. For that, we will simply feed any random images not seen before by the model. The model should be able to correctly classify it. For classification, we will be using the K-NN algorithm.

Algorithms: Filtering using CNN **,** K- NN Classification
Algorithm Design Parameters: Block Size and Grid Size
Implementation Platform: GPU
Benchmarks: Number of GPU's, shared memory, using data pipelining

Evaluation/Criteria of Success:

Dataset -> Training + Validation set of images
Evaluation Metrics -> Accuracy