***DETAILED INFORMATION OF SOME NEW TERMS USED IN PROJECT***

**TRAINING DATASET:**

Training data is the data you use to train an algorithm or machine learning model to predict the outcome you design your model to predict.

I have prepared my training dataset using fatkun extension that allows us to download batch of images required through google.

I have done multiclass image classification and have taken four classes of vehicles .

**VALIDATION DATASET:**

The validation set is used to evaluate a given model, but this is for frequent evaluation. We, as machine learning engineers, use this data to fine-tune the model hyperparameters. Hence the model occasionally *sees* this data, but never does it “*Learn*” from this. We use the validation set results, and update higher level hyperparameters. So the validation set affects a model, but only indirectly. The validation set is also known as the Dev set or the Development set. This makes sense since this dataset helps during the “development” stage of the model.

I have prepared my validation dataset using fatkun extension that allows us to download batch of images required through google.

I have done multiclass image classification and have taken four classes of vehicles .

**TEST DATASET:**

Test data is used to measure the performance, such as accuracy or efficiency, of the algorithm you are using to train the machine.

I have taken a few images for testing through our saved model(in which the weights i.e. the important information is stored).

**PREPROCESSING OF DATA:**

Data Preprocessing is that step in which the data gets transformed, or Encoded, to bring it to such a state that now the machine can easily parse it.

In other words, the features of the data can now be easily interpreted by the algorithm.

In my project , I have used ImageDataGenerator library for preprocessing.

Using ImageDataGenerator to ease data preparation as it labels images based on the folder name which is ideal for the way dataset is arranged.

In preprocessing , I have resized all the images to 150 \* 150 so that it becomes easier for us to use the dataset without any complication.

**CONVOLUTIONAL NEURAL NETWORK:**

A convolutional neural network (CNN) is a type of [artificial neural network](https://searchenterpriseai.techtarget.com/definition/neural-network) used in [image recognition](https://searchenterpriseai.techtarget.com/definition/image-recognition) and processing that is specifically designed to process pixel data.

CNNs are powerful image processing, artificial intelligence that use deep learning to perform both generative and descriptive tasks, often using machine vison that includes image and video recognition and classification, along with recommender systems and natural language processing .

A neural network is a system of hardware and/or software patterned after the operation of neurons in the human brain. Traditional neural networks are not ideal for image processing and must be fed images in reduced-resolution pieces. CNN have their “neurons” arranged more like those of the frontal lobe, the area responsible for processing visual stimuli in humans and other animals. The layers of neurons are arranged in such a way as to cover the entire visual field avoiding the piecemeal image processing problem of traditional neural networks.

**LAYERS OF CNN ADDED:**

* **Input layer**:

Input layer in CNN should contain image data. Image data is represented by three dimensional matrix. You need to reshape it into a single column.  If you have “m” training examples then dimension of input will be (784, m).

* **Convo layer:**

Convo layer is sometimes called feature extractor layer because features of the image are get extracted within this layer. First of all, a part of image is connected to Convo layer to perform convolution operation as we saw earlier and calculating the dot product between receptive field(it is a local region of the input image that has the same size as that of filter) and the filter. Result of the operation is single integer of the output volume. Then we slide the filter over the next receptive field of the same input image by a Stride and do the same operation again. We will repeat the same process again and again until we go through the whole image. The output will be the input for the next layer.Convo layer also contains ReLU activation to make all negative value to zero.

* **Pooling layer:**

Pooling layer is used to reduce the spatial volume of input image after convolution. It is used between two convolution layer. If we apply FC after Convo layer without applying pooling or max pooling, then it will be computationally expensive and we don’t want it. So, the max pooling is only way to reduce the spatial volume of input image.

* **Fully Connected layer:**

Fully connected layer involves weights, biases, and neurons. It connects neurons in one layer to neurons in another layer. It is used to classify images between different category by training.

* **Output Layer:**

Output layer contains the label which is in the form of one-hot encoded.