# CYCLEGANS-
# TRANSLATING IMAGES

MID-TERM EVALUATION PRESENTATION

**SNT Summer Project**
**2024**

ICG

# TIMELINE(Till Week 4)

**WEEK 1**

Python and its Libraries

**WEEK 2**

BASICS OF ML - Regression and Classification

**WEEK 3**

NEURAL NETWORK- From Scratch and Using Libraries

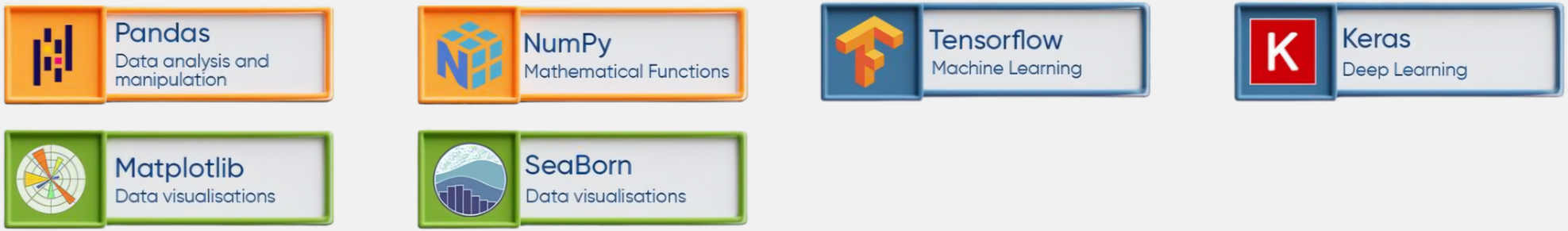
**WEEK 4**

CNN- Convolutional Neural Network

# WEEK 1

# PYTHON AND ITS LIBRARIES

CycleGans project which is based on Machine Learning kickstarted with the very basics i.e. python and its libraries. We learned about python-syntax and all the tools for writing python programs efficiently.




ASSIGNMENT OVERVIEW

At the end of this week we did our first assignment which was based on setting our hands in python programming, numpy and pandas basics.

# WEEK 2

# BASICS OF ML ALGORITHMS

## TOPICS COVERED

- >> DATA MODELING
- >> REGRESSION
- >> OVERFITTING
- >> REGULARIZATION
- >> CLOSED FORM SOLUTION
- >> GRADIENT DESCENT
- >> LOGISTIC REGRESSION
- >> K MEANS CLUSTERING
- >> PCA(PRINCIPAL COMPONENT ANALYSIS)

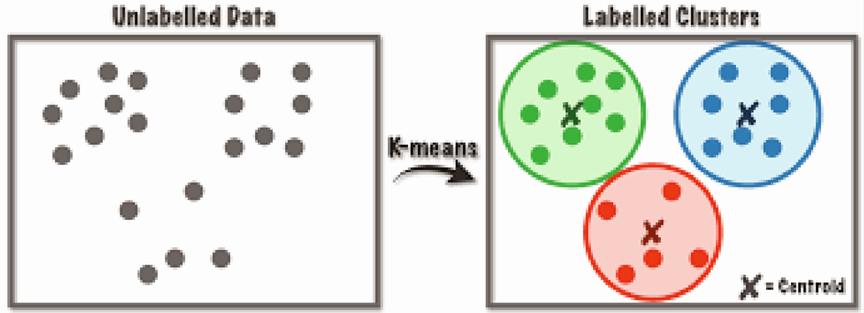
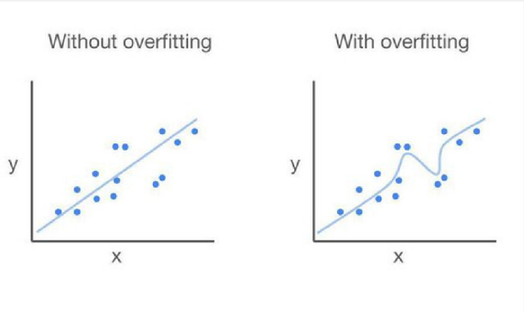


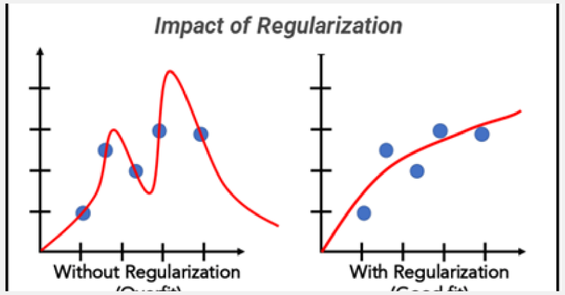

IMAGE EXPLAINING K MEANS CLUSTERING

# WEEK 2

# BASICS OF ML ALGORITHMS




>> OVERFITTING




>> REGULARIZATION

For example, in simple linear regression:

- Let's assume we have inputs (predictors) X and a target variable y.
- The linear regression model can be represented as:
- $y=\beta 0+\beta 1X1+...+\beta pXp$
- The closed-form solution for the regression parameters is obtained using matrix operations.

>> CLOSED FORM SOLUTION

>> CLASSIFICATION

>> BINARY CLASSIFICATION

In binary classification, the task involves categorizing data into two distinct classes.

>> MULTICLASS CLASSIFICATION

In multiclass classification,the goal is to categorize data into more than two classes.

## ASSIGNMENT OVERVIEW

In this week we did assignments based on linear and logistic regression from scratch and as well as using libraries along with K-means clustering, closed form solution. It comprised of implementing Evaluation Metric(MSE, accuracy), Multiple Linear Regression, Normalization and use of Newton Raphson Method.

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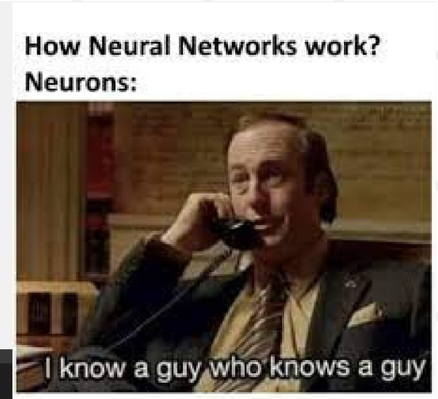
# WEEK 3
# NEURAL NETWORK

In week 3, we started neural networks and basic terminologies used optimizers (Adam, SGD, mini batch gradient descent),regularization techniques (L1, L2, dropout) and implemented neural networks from scratch and using libraries.




```
model=models.Sequential()

model.add(layers.Dense(2056,input_shape=(9,),activation='relu'))
model.add(layers.Dropout(0.2))

model.add(layers.Dense(1028,activation='relu'))
model.add(layers.Dropout(0.2))

model.add(layers.Dense(512,activation='relu'))
model.add(layers.Dropout(0.2))

model.add(layers.Dense(16,activation='softmax'))

model.compile(optimizer='adam',loss='sparse_categorical_crossentropy',metrics=['accuracy'])
```

NEURAL NETWORK MODEL(CODE SNIPPET)

# WEEK 3

# NEURAL NETWORK

## ASSIGNMENT OVERVIEW

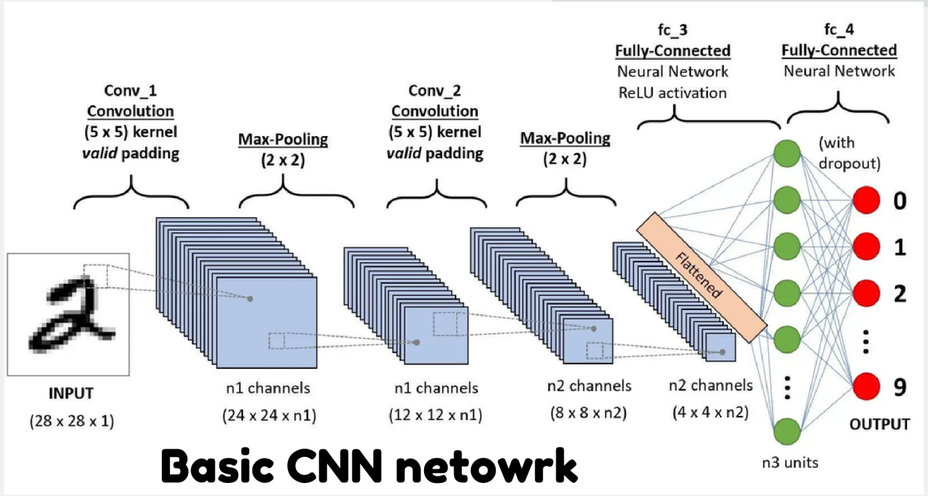
In this week, we did assignment which was divided into three parts. First part was based on theoretical part of neural networks and deep learning. Second part was based on implementation of neural network from scratch in a multiclass classification problem and third part involved data preprocessing, visualization and then training a neural network  using tensorflow framework..

## OFFLINE TEST

An offline test was also conducted at the end of this week which involved predictions of a feature from given many features by implementing neural network so as to ensure better understanding of the concept.

# WEEK 4

# CONVOLUTIONAL NEURAL NETWORK




**Basic CNN netowrk**

```
model=Sequential()

model.add(layers.Conv2D(filters=32,kernel_size=(3,3),input_shape=(128,128,3),activation='relu'
model.add(layers.MaxPooling2D((2,2)))

model.add(layers.Conv2D(filters=32,kernel_size=(3,3),activation='relu'))
model.add(layers.MaxPooling2D((2,2)))

model.add(layers.Flatten())

model.add(layers.Dense(64,activation='relu'))

model.add(layers.Dense(32,activation='relu'))

model.add(layers.Dense(3,activation='softmax'))
```

**Code Snippet**
**(Representing CNN model)**

In Week 4 , we learned about CNN which is mainly used to find patterns in images to recognize objects, classes and categories. We learned how to build a CNN model by applying convolution layers, pooling layers and then how to train the dataset using the created model. Before this we also learnt about data augmentation.

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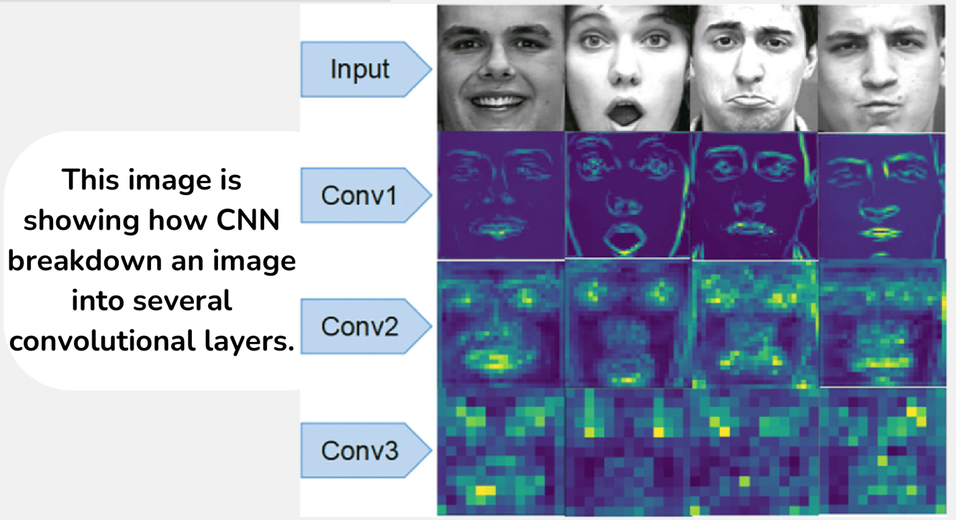
# WEEK 4
# CONVOLUTIONAL NEURAL NETWORK

**ASSIGNMENT OVERVIEW**

In this week, we did assignment which was divided into two parts. First part was based on implementing convolution filters(Prewitt filter, Sobel filter) and pooling layers.

Second part was based on using visualization libraries to see how data augmentation works and training a CNN model and evaluating test data using multiple models( Transfer Learning also)




**This image is showing how CNN breakdown an image into several convolutional layers.**

**OFFLINE TEST**

An offline test was also conducted which involved predictions of a disease of plants from given testing dataset images features by training a CNN model on given training dataset images.

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# THANK YOU

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