# 11.0 BUILDING A CNN USING PyTorch

Convolutional neural network

## Advantages, Disadvantages, and Limitations of ANN-based Approaches

| Advantages | Disadvantages | Limitations |
|---|---|---|
| High accuracy in modeling complex systems | Overfitting | Sensitivity to noisy and irrelevant inputs |
| Adaptability to changing environments | Requirement for extensive training data | Lack of interpretability |
| Can handle non-linear relationships | Prone to local minima | Requires careful selection of network architecture and hyperparameters |
| Generalization capabilities | Can be computationally intensive | Can be sensitive to the choice of initial weights |
| Can perform feature learning | Can have poor interpretability | Requires large amounts of computational resources for training and inference |
| Can handle multivariate data | Sensitivity to initialization | Can be prone to overfitting without proper regularization |
| Can be implemented in various hardware platforms | Difficulty in determining the optimal architecture | Requires careful normalization of input data |
| Can perform online learning | Can have poor generalization performance | Can be sensitive to the choice of optimization algorithm |

first forks for given more better results when we are working on problems involving images as data

## 1) LeNet Model :-

Review simple CNN still can better results than MLP

Fashion MNIST dataset → Basic CNN

Optimize + Hyperparameter tuning

Complex tasking

Keras Based data

3 using Tensorflow models

## 2) AlexNet :- (2012)

Combined neural networks (CNN) are a type of deep learning model specifically designed for processing and analyzing structured data, such as images or video.

They are particularly effective in tasks like image classification, image recognition, and object detection due to their ability to automatically and efficiently learn spatial hierarchies of features

→ Image classification → Cat / Dog

## 3) ResNet(152) :-

Shallow Architecture
Input
Conv
Pooling
Conv
Pooling
Output
Deep Architecture
Input
Conv
Pooling
Conv
Pooling
Conv
Pooling
Conv
Pooling
Conv
Pooling
Output
Feature Extraction
Classification
Feature Extraction
Classification
Feature Extraction
Classification