PadhAI: Expert Systems & 6 Jars

One Fourth Labs

Six Jars Summary

Part 1

Concepts of importance

1. Loss Function: hinge loss, max-margin, lasso, square error, kl divergence, cross validation
2. Model: LSTM, GRU, RNN, CNN, FFNN, MP Neuron, Sigmoid Neuron, Perceptron, AlexNet, ZF Net
3. Data: Find open source datasets, from amazon, google, own organization etc
4. Tasks: Focus on supervised learning - Classification, Regression, transliteration, Object detection, character recognition, multiclass classification
5. Learning ALgorithm: Stochastic GD, Backprop, Adagrad, Adam, Nesetrov accelerated GD, RMSprop, Momentum based GD
6. Evaluation: Precision, Top-K-Accuracy, Recall, F1 score

Mathematical Concepts

1. Linear Algebra:
    a. Used in model formation. For eg: $f(Wx + b)$
    b. W is mxn matrix, x is nx1 vector
2. Probability:
    a. Likelihood, cross-entropy, KL-divergence, distribution(discrete etc)
3. Calculus:
    a. Learning algorithms are based off of calculus
    b. Taylor Series, maxima, chain-rule, differentiable function, gradient, minima etc

Why is ML successful

1. Standardised Evaluation
    a. IMAGENET has a standardised training set for you to test your model performance
    b. Pascal2 is a standardised dataset for object detection
2. Improvised Learning/Loss function
    a. Largely improvised and standardised over the years
    b. Tensorflow and pytorch
    c. These frameworks have very good solutions for almost all conventional ML problems
3. Democratized Model
    a. People have openly published their models
    b. Lot of community strength in democratization of model information
    c. We know exactly what equations go into these functions
4. Abundance of Data
    a. Abundance of data present

PadhAI: Expert Systems & 6 Jars

One Fourth Labs

Connecting to the capstone

1. Data
    a. Two sets of training data
    b. Signboard with text and the exact bounding box around the text
    c. Text in Hindi and the transliteration of the test
2. Task
    a. Binary classification to see if image has text or no text
    b. Character-recognition/Multiclass-classification to identify individual characters
    c. Object detection (regression) finding the bounding box
    d. Transliteration (Classification, Regression and a bit of Generation)
3. Model
    a. Sigmoid model
    b. Deep Neural Networks
    c. Recurrent Neural Networks
    d. Convolution Neural Networks
    e. Class of models combining the above models.
4. Loss
    a. Mean square error
    b. Cross entropy loss
5. Learning
    a. Various gradient descent
6. Evaluation
    a. Accuracy, precision, recall, F1