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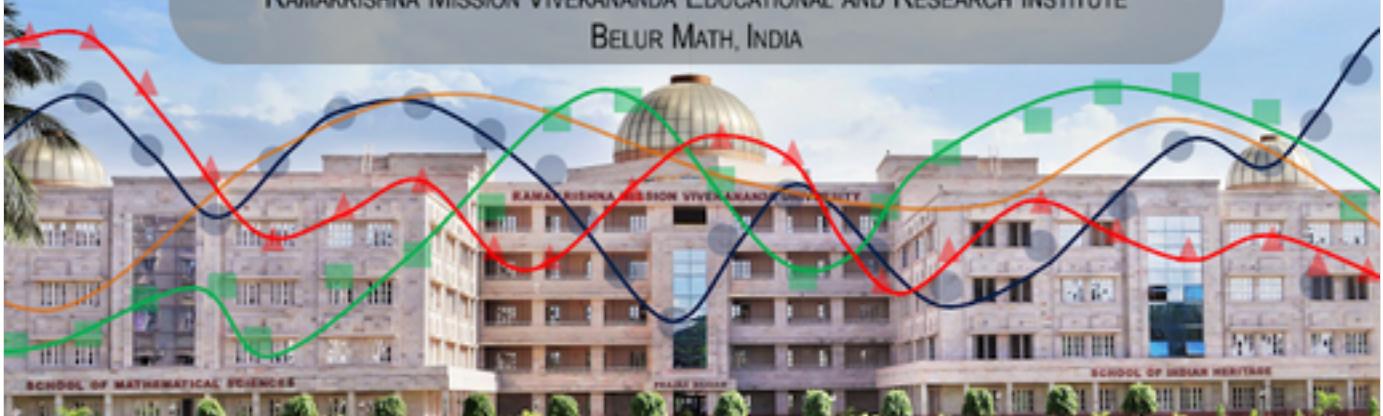
MACHINE LEARNING

Introduction to Machine Learning

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Introduction-1.pdf

Introduction to Machine Learning

- Why machine learning?
- Overview of regression, classification, clustering
- Features
- Training and test data
- Model selection
- Probabilistic modelling

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Linear Regression

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The background image shows a large, multi-story stone building with several domes and arched windows. The text "RAMAKRISHNA MISSION VIVEKANANDA EDUCATIONAL AND RESEARCH INSTITUTE" and "BELUR MATH, INDIA" is visible above the entrance. Overlaid on the image are several colored curves (red, blue, green, orange) representing different regression models, with small red and green arrows pointing to specific points on the curves.

Linear_Regression-1.pdf

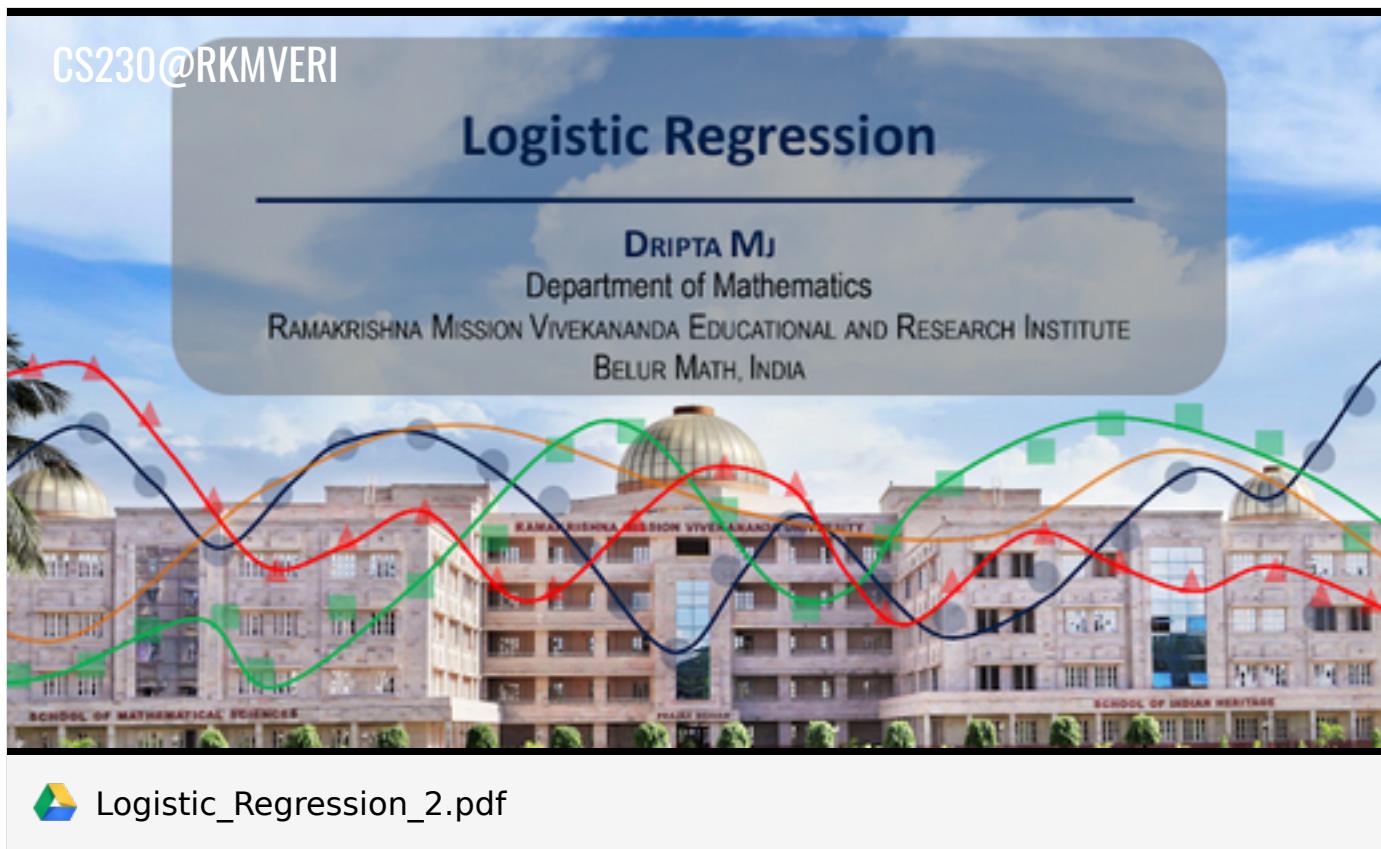
Linear Regression

- Modelling using basis functions
- Least squares algorithm
- Probabilistic approach
- Mean least squares algorithm
- Geometrical interpretation

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Logistic Regression

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The background image shows a large, multi-story stone building with several domes and arched windows. The building is identified as the 'RAMAKRISHNA MISSION VIVEKANANDA EDUCATIONAL AND RESEARCH INSTITUTE' and 'BELUR MATH, INDIA'. In front of the building, there are several colorful, wavy lines (red, blue, green, orange) that represent logistic regression models being fitted to data points. Some red triangles point upwards, and some green squares are placed on the curves.

 Logistic_Regression_2.pdf

Logistic Regression

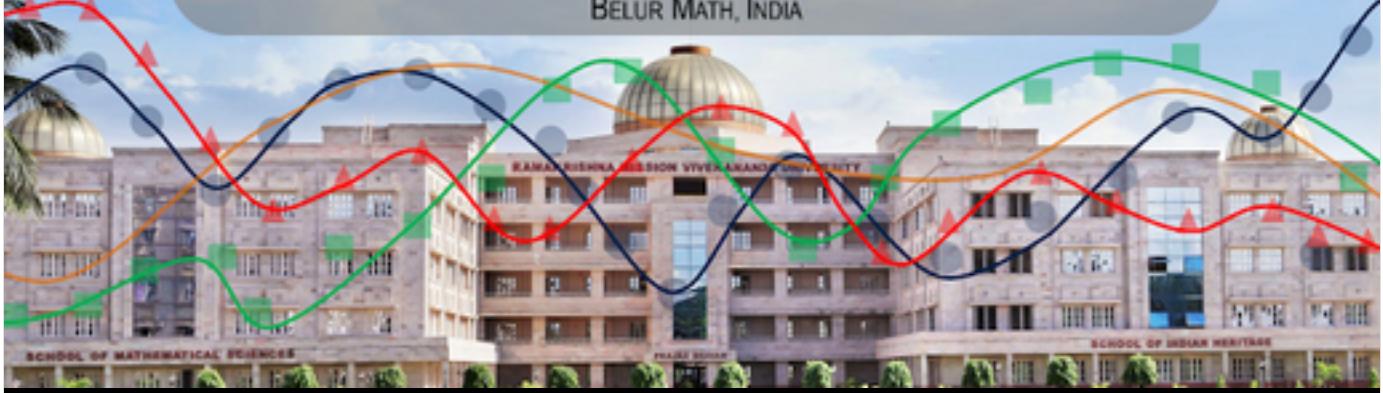
- Binary classification
- Sigmoid function, probabilistic modelling
- Log-likelihood, training and prediction
- Confusion matrix, recall, precision
- Softmax regression -- modelling, training and prediction

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Bias-Variance trade-off

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Bias-variance-trade-off.pdf

Bias-Variance trade-off

- Error vs model complexity
- Bias-variance decomposition -- variance, bias, noise
- Bias, variance vs model complexity
- Underfitting and Overfitting

Regularization

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Regularization.pdf

Regularization

- Polynomial curve fitting
- Ridge regression (L2 Regularization)
- LASSO (L1 Regularization)
- K-fold cross-validation

Minimum distance classifier

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SCHOOL OF MATHEMATICAL SCIENCES RAMAKRISHNA MISSION VIVEKANANDA UNIVERSITY SCHOOL OF INDIAN HERITAGE

Minimum_distance_classifier.pdf

Minimum distance classifier

- Mean (centroid) of each class
- Assigning class to new examples
- Decision boundary

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Bayes decision theory

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The background image shows a large, multi-story stone building with a prominent golden dome. The building has multiple sections labeled "SCHOOL OF MATHEMATICAL SCIENCES" and "SCHOOL OF INDIAN HERITAGE". Overlaid on the image are several smooth, colored curves (red, blue, green, orange) representing probability density functions. Some of these curves have small red triangles pointing upwards along their peaks. The sky above the building is blue with white clouds.

Bayes_decision_theory.pdf

Bayes decision theory

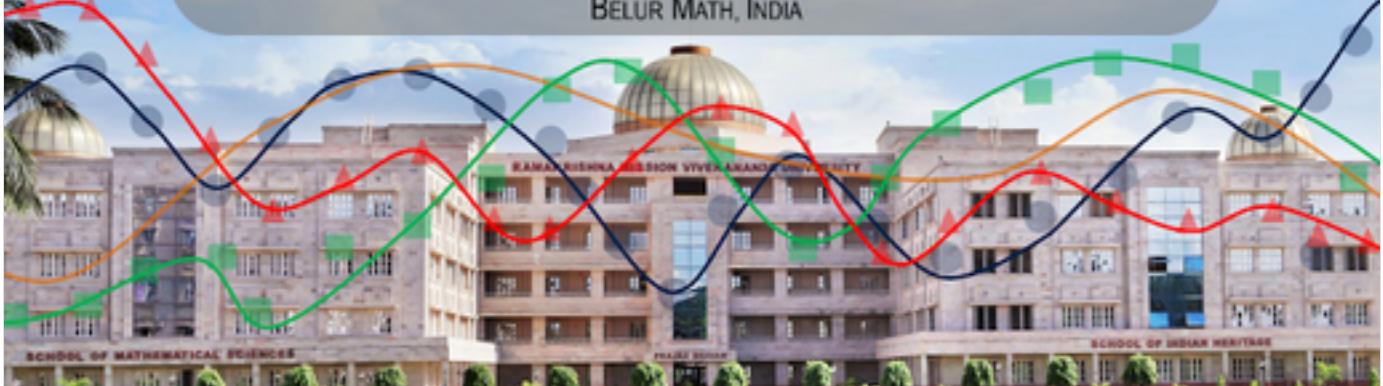
- Bayes rule in classification problems
- Class-likelihood, prior, posterior probability
- Average probability of error
- Reducible error
- Bayes decision rule
- General theory
- Zero-one loss function

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Naive Bayes

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Naive_Bayes.pdf

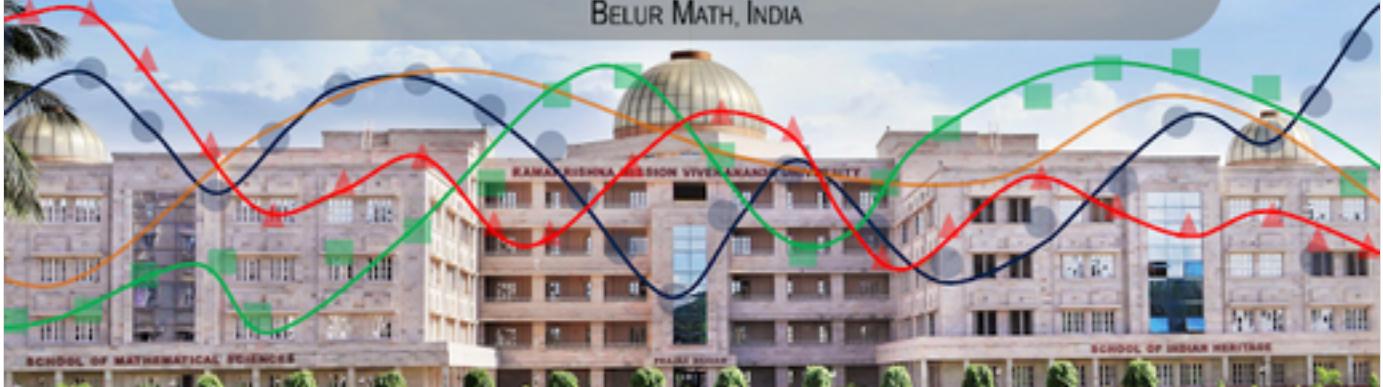
Naive Bayes

- Bernoulli Model
- Gaussian Model
- Multinomial Model
- Laplace Smoothing

Linear Discriminant Function

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Linear_Discriminant_Function.pdf

Linear Discriminant Function

- What is discriminant function?
- 2 classes linear discriminant
- Multiple classes
- Decision boundary from Gaussian distribution

Decision Trees

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[Decision_Trees.pdf](#)

Decision Trees

- Entropy
- Information Gain
- Binary classification problem
- Gini Index
- Gain Ratio
- Pruning
- Regression Trees

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K-NN

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k-NN.pdf

K-NN

- Distance metric
- Procedure
- Kvalues
- Weighted K-NN

Principal Component Analysis

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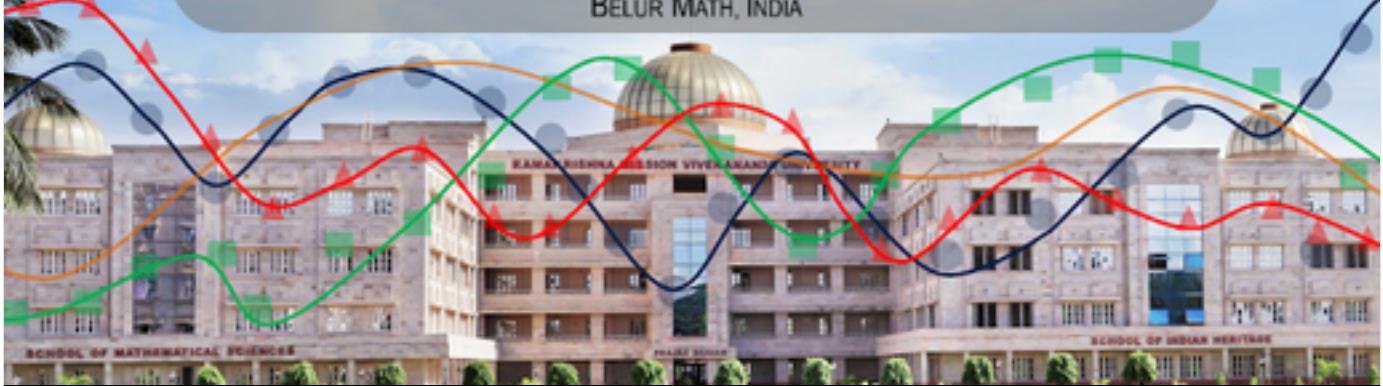
Principal Component Analysis

K-means & K-medoids

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k-means_and_k-medoids.pdf

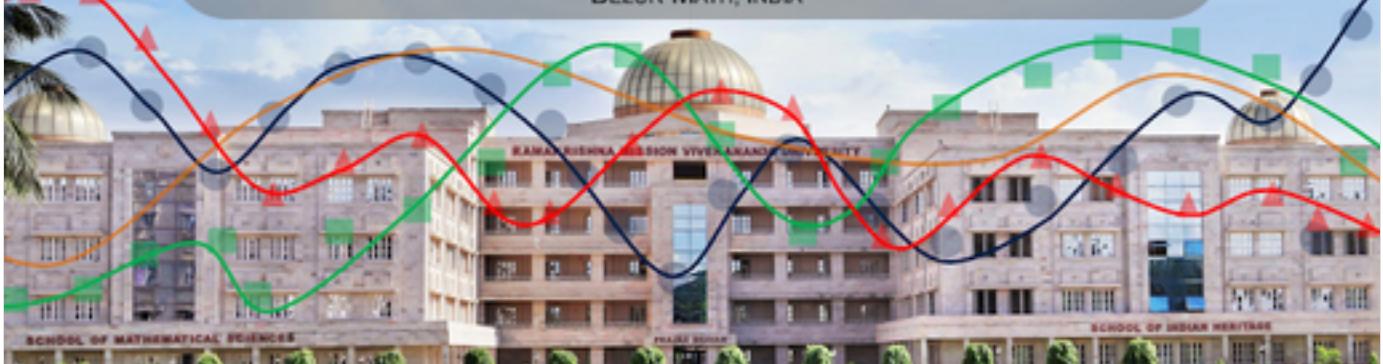
K-means

Support Vector Machines

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SVM.pdf

Support Vector Machines

- Hard-margin SVM
- Soft-margin SVM
- Constrained optimization problem
- Solution to hard- and soft-margin SVM

Perceptron Learning

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Perceptron.pdf

Perceptron Learning

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Multi-layer perceptron

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multi-layer_perceptron.pdf

Multi-layer Perceptron

Backpropagation

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Backpropagation.pdf

Backpropagation

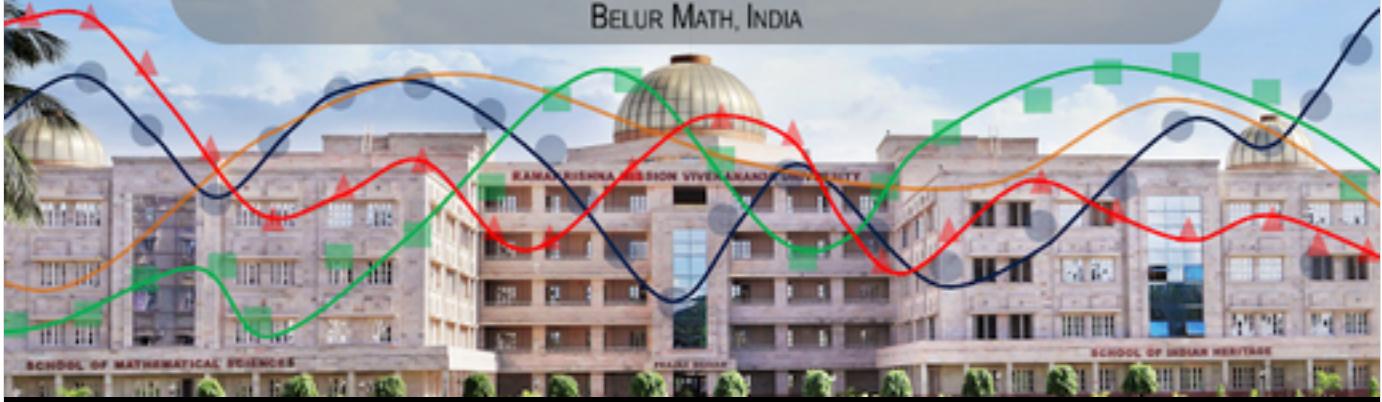
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Optimization in Neural Networks

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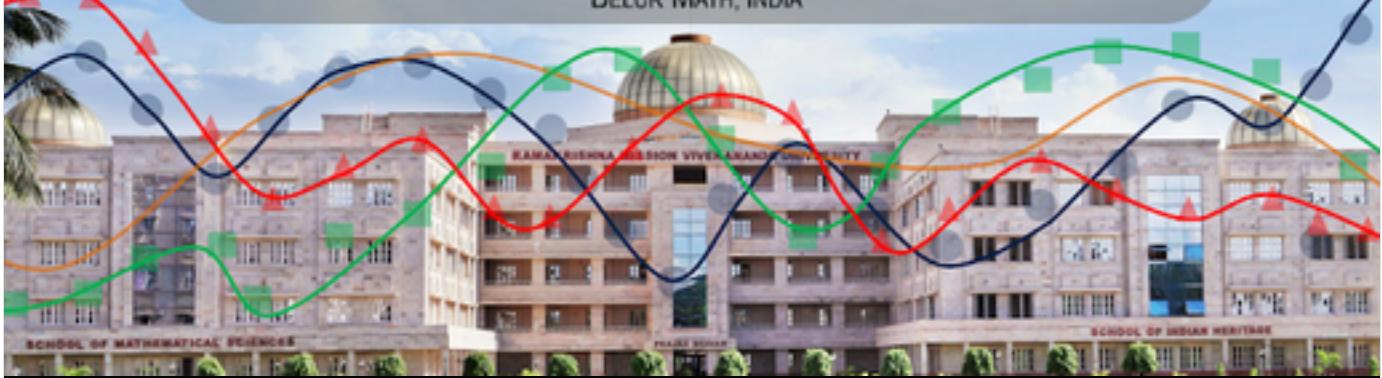
Optimization_in_Neural_networks.pdf

Optimization in neural networks

Convolutional Neural Networks

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CNN.pdf

Convolutional neural networks

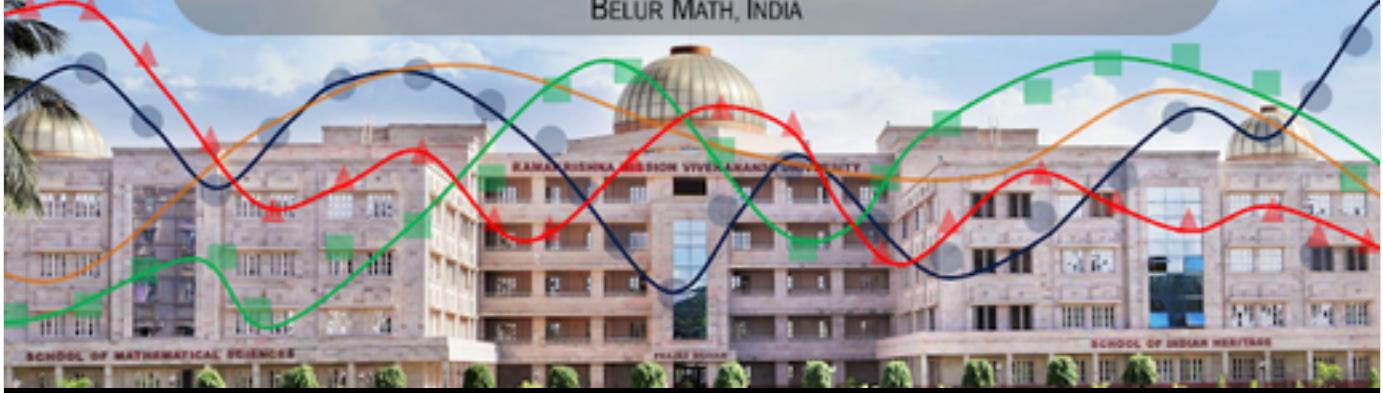
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Dropout, Batch normalization

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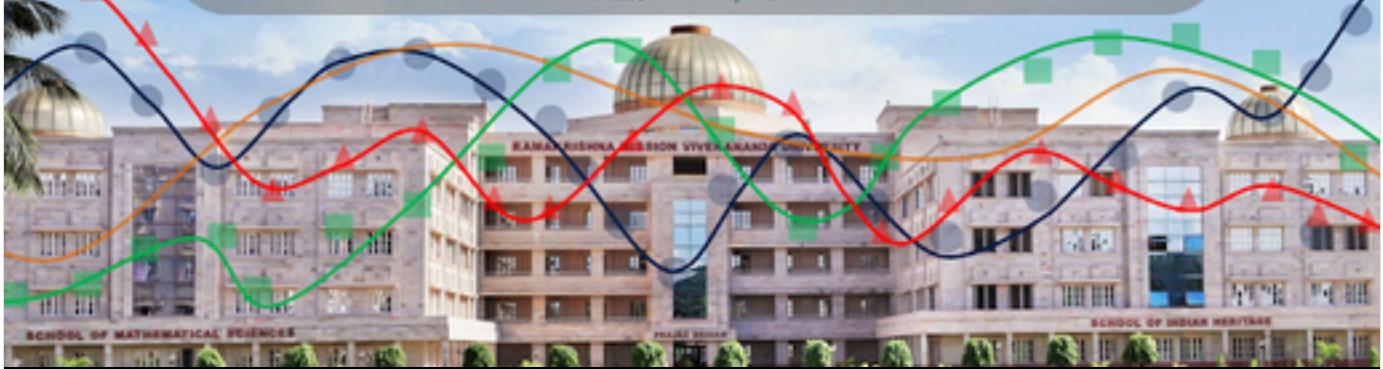
Dropout-batch.pdf

Dropout, Batch normalization

Recurrent Neural Networks

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RNN-2.pdf

Recurrent Neural Networks

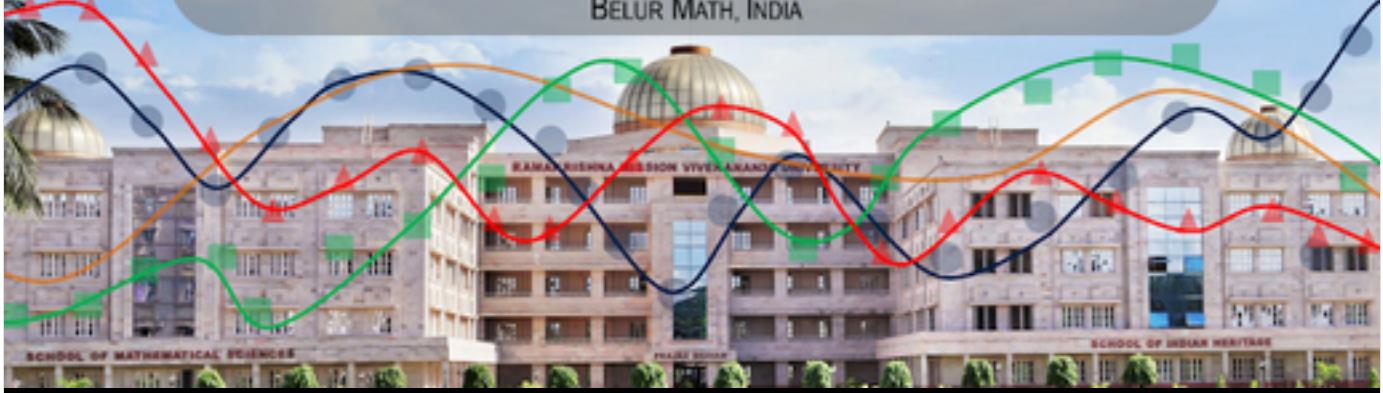


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Kernel methods

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Kernel methods

Gaussian Process

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Gaussian Process

