

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-Artificial Intelligence and Machine Learning/ Artificial Intelligence and Machine Learning, V-Semester

Open Elective AL504 (A) AI in Health Care

Course Objective: The students should be able to understand how AI is transforming the practice of medicine. The students should learn the practical experience in applying machine learning to concrete problems in medicine. Detailed contents:

Unit I: Disease detection with computer vision Medical Image Diagnosis, Eye Disease and Cancer Diagnosis, Building and Training a Model for Medical Diagnosis, Training, prediction, and loss, ImageClassification and Class Imbalance, Generating More Samples, Model Testing

Unit II: Evaluating models Sensitivity, Specificity, and Evaluation Metrics, Accuracy in terms of conditional probability, Confusion matrix, ROC curve and Threshold Image segmentation on MRI images Medical Image Segmentation, MRI Data and Image Registration, Segmentation, 2D U-Net and 3D U-Net Data augmentation and loss function for segmentation, Different Populations and DiagnosticTechnology, External validation.

Unit III: Linear prognostic models Medical Prognosis, Atrial fibrillation, Liver Disease Mortality, Risk of heart disease, Evaluating Prognostic Models, Concordant Pairs, Risk Ties, Permissible Pairs. Prognosis with Tree-based models Decision trees for prognosis, fix overfitting, Different distributions,Missing Data example, Imputation.

Unit IV: Survival Models and Time Survival Model, Survival function, collecting time data, estimating the survival function. Build a risk model using linear and tree-based models Hazard Functions, Relativerisk, Individual vs. baseline hazard, Survival Trees, Nelson Aalen estimator.

Unit V: Medical Treatment Effect Estimation Analyze data from a randomized control trial, Average treatment effect, Conditional average treatment effect, T-Learner, S-Learner, C-for-benefit.

Text Books/Suggested References:

1. <https://www.coursera.org/learn/ai-for-medical-diagnosis>
2. <https://www.coursera.org/learn/ai-for-medical-prognosis#syllabus>
3. <https://www.coursera.org/learn/ai-for-medical-treatment#syllabus>
4. Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again, Eric Topol, BasicBooks, 1st edition 2019.
5. Machine Learning and AI for Healthcare: Big Data for Improved Health Outcomes, Arjun Panesar, Apress, 1st ed. Edition, 2019.
6. Artificial Intelligence in Healthcare, 2020, ISBN 978-0-12-818438-7,Elsevier Inc