AIPE4002 AI IN HEALTHCARE APPLICATIONS (3-0-0)

COURSE OBJECTIVES:

- To understand the need and significance of AI for Healthcare.
- To learn computational intelligence techniques.
- To understand evaluation metrics and ethics in intelligence for healthcare systems.
- To learn various Natural Language Processing (NLP) algorithms and their application in healthcare.
- To investigate the current scope, implications of AI for developing futuristic Healthcare Applications.

MODULE – I (7 HOURS)

Introduction:

Overview of AI, applications of AI in healthcare- Prediction, Diagnosis, personalized treatment and Behavior modification, follow up care and drug discovery- History and evolution of AI in drug discovery, overview and key application of AI across the pipeline, realizing the potential of AI in healthcare.

MODULE - II (9 HOURS)

Computational Intelligence Techniques:

Knowledge discovery, Multi classifier decision fusion, ensemble learning, evolutionary algorithms, Illustrative medical application- Multiagent Infectious Disease Propagation and outbreak Prediction, deep learning, dimensionality reduction algorithms.

MODULE - III (8 HOURS)

Evaluating learning for intelligence:

Model development and workflow, evaluation metrics, parameters and Hyperparameters, tuning hyperparameters, Hyperparameter tuning algorithms-Grid search, Random search, multivariate testing, Ethics of intelligence- Basic ethical principles: Legal/Regulatory Issues, Responsible AI Design, future challenges, prediction ethics.

MODULE - IV (8 HOURS)

Natural Language Processing (NLP) in healthcare:

NLP tasks in healthcare, low-level and high-level NLP components, methods, clinical NLP resources and tools, model interpretability for applications in healthcare, techniques used within NLP (N-grams, Latent Semantic Analysis, Cosine Similarity, Naive Bayesian Classifier)

MODULE – V (8 HOURS)

Future of Healthcare:

Evidence based medicine, Virtual and Augmented reality, Digital health and Therapeutics, Blockchain for verifying supply chain, patient record access, Robot- Assisted Surgery, smart hospitals, case studies on use of AI for Disease Risk Diagnosis from patient data, augmented reality applications.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Understand the role of AI for handling Healthcare data.
- Learn and apply various Computational Intelligence techniques for Healthcare Application.
- Use evaluation metrics for evaluating healthcare systems.
- Develop Natural Language Processing (NLP) applications for healthcare.
- Apply AI for building Healthcare Applications.

TEXTBOOKS:

1. Arjun Panesar," Machine Learning and AI for Healthcare", Apress.
2. Arvin Agah," Medical applications of Artificial Intelligence", CRC Press.

REFERENCE BOOKS:

1. Dan Jurafsky and James Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Prentice Hall, Second Edition, 2009.
2. Artificial Intelligence in Surgery: Understanding the Role of AI in Surgical Practice Authored by Daniel A. Hashimoto, Ozanan R. Meireles, and Guy Rosman

WEBLINKS AND VIDEO LECTURES (E-RESOURCES):

1. https://nptel.ac.in/courses/127106006
2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ch96