CSBA 3009	Cognitive Analytics	L	T	P	C
Version 1.0		2	0	0	2
Pre-requisites/Exposure	Basics of mathematics, AI and machine learning				
Co-requisites					

Course Objectives

1. To understand the fundamentals of cognitive analytics
2. To explore potentially successful applications in Cognitive Computing.
3. Evaluate future directions of Cognitive Computing.

Course Outcomes

On completion of this course, the students will be able to

CO1. To discuss the concept of cognitive computing and predictive modelling.
CO2. Practice the machine learning algorithms using programming language.
CO3. To discuss the various available cognitive services on cloud.

Catalog Description

Cognitive computing systems use computerized models to simulate the human cognition process to find solutions in complex situations where the answers may be ambiguous and uncertain. While the term cognitive computing is often used interchangeably with artificial intelligence (AI), the phrase is closely associated with IBM's cognitive computer system, Watson. Cognitive computing systems can synthesize data from various information sources, while weighing context and conflicting evidence to suggest the best possible answers. To achieve this, cognitive systems include self-learning technologies that use data mining, pattern recognition and natural language processing (NLP) to mimic the way the human brain works. Using computer systems to solve the types of problems that humans are typically tasked with requires vast amounts of structured and unstructured data, fed to machine learning algorithms.

Course Content

Unit 1. Introduction & Basic of Cognitive computing

What is Cognitive, Cognitive Applications, Data & Data visualization, Basics of statistics

Unit 2. Predictive Modeling

Introduction to Big data life cycle, Introduction to Data mining, Data mining process, Modeling techniques, Modeling evaluation

Unit 3. Machine learning using Python

Introduction to Machine Learning, Regression, Classification, Unsupervised Learning

Unit 4. Machine learning using R

Machine Learning vs Statistical Modeling & Supervised vs Unsupervised Learning, Supervised Learning, Unsupervised Learning, Dimensionality Reduction & Collaborative Filtering

Unit 5. Cognitive Services on cloud

Introduction to cloud, Cognitive services on cloud, Use case for cognitive services, Examples of cognitive service

Text Book - Cognitive Analytics (IBM ICE Publications)

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	MSE	Quiz/Assignment/ etc.	ESE
Weightage (%)	20%	30%	50%

Relationship between the Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes(PSOs):

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1			1	1	1								1	2	3
CO2			1	1	1								1	2	3
CO3			1	1	1								1	2	3
Average			1	1	1								1	2	3

1=Weak 2= Moderate 3=Strong

CSBA 3109	Cognitive Analytics Lab	L	T	P	C
Version 1.0		0	0	2	1
Pre-requisites/Exposure	Artificial Intelligence, Machine Learning;				
Co-requisites	Python, CoLab, Jupyter Notebook				

Course Objectives

1. Apply and validate data pre-processing methods
2. Development of data processing models and validation against evaluation metrics

Course Outcomes

At the end of this course student should be able

CO 1	Understand the concept of Cognitive computing and Predictive Modeling.
CO 2	Development of knowledge system using cognitive approach
CO 3	Development of Cognitive solution using multiple pathways.

Catalog Description

The practice aspect of this subject is associated with hands on in to data modeling in which, cognitive criteria at multiple stages can be made visible. A clear distinction between traditional intelligence vs congnitive intelligence should be explored for feasible decision to be chosen for usecase.

List of Experiments:

S. No	Contents
1	Introduction to "Colab" and data visualization techniques.
2	Regression analysis from scratch
3	Polynomial regression analysis application.
4	Go through chapter 6 about Lasso & Ridge regression in the book attached. ICLR Book Understand the concepts. Develop a Lasso and a Ridge regression model to predict the salary of the player using the given dataset.
5	Data pre-processing techniques and applying Random Forest Regression. Design a random forest regression model for predicting the Airbnb prices using a grid search.
6	Go through the attached research paper. Research Paper Learn the working and parameters for the XGBOOST algorithm. Develop the XGBOOST model for predicting the diameter of the asteroid.
7	Hands on data science competition platform (Kaggle) and applying logistic regression on playground challenge. Problems to be solved:

	1. Descriptive Analysis of the dataset (Statistical analysis and visualization with explanation) 2. Choose the 10 most important features for predicting house prices. 3. Apply at least 3 prediction models on the selected features and discuss the proposed model's pros and cons for the underlying dataset.
8	Applying decision trees algorithm on online marketing data.
9	Explore and visualize the famous MNIST dataset on the given link. http://yann.lecun.com/exdb/mnist/ Try to fit a Random Forest Model on the given classification problem.
10	Understanding the voice data set and applying support vector machine on it for classifying the voice type (Male/Female)
11	Developing convolutional neural network based model for MNIST dataset classification.
12	Developing the AlexNet model from scratch for CIFAR10 dataset.

Continuous Evaluation-

- Components of evaluation
  a. Performance & Records
  b. Lab performance and record evaluation shall be a continuous process throughout the semester.

Relationship between the Program Outcomes (POs), Course Outcomes (COs) and Program Specific Outcomes (PSOs):

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	1									1		1
CO2	1	2	2	1									1		1
CO3	1	2	2	1									1		1

1=Weak 2= Moderate 3= Strong