

COURSE TITLE	INTELLIGENT MEDIA SYSTEMS
COURSE CODE	01AL0504
COURSE CREDITS	4

Objective:

- 1 The course aims to provide an understanding of the role of AI in modern media industries, enable the application of machine learning and deep learning techniques to multimedia content, explore intelligent systems for media recommendation and analysis, and develop practical skills in AI-based media applications.

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand the role and applications of AI in media and entertainment systems.
- 2 Apply machine learning and deep learning techniques to process image, audio, and video data.
- 3 Analyze multimedia data using AI models for tasks such as classification, detection, and recommendation.
- 4 Design and develop intelligent media systems for real-world applications.
- 5 Evaluate ethical, legal, and societal issues related to AI-based media technologies.

Pre-requisite of course: Python programming, Linear Algebra and Basic Statistics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction to AI in Media & Entertainment Overview of media technologies, Role of AI in media industry, Types of media: Image, Audio, Video, Text, Applications: Streaming platforms (recommendation systems), Gaming AI, Social media content analysis, Case Studies: Netflix, YouTube, Spotify	9
2	Media Data Processing Digital image fundamentals, Audio signal basics, Video representation & processing, Feature extraction techniques, Introduction to OpenCV and media libraries	9
3	Machine Learning for Media Classification & clustering for media data, Content-based filtering , Collaborative filtering , Recommendation systems , Sentiment analysis in media	9

Contents : Unit	Topics	Contact Hours
4	Deep Learning for Media Applications CNN for image and video analysis, RNN/LSTM for audio & text, Object detection and facial recognition, Speech recognition basics, Introduction to Generative AI	9
5	Generative AI & Creative Media GANs - Generative Adversarial Networks, Deepfake technology, AI in music and video generation, Text-to-image and text-to-video models, Tools: Stable Diffusion, DALL·E (conceptual)	9
Total Hours		45

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Practical 1 Perform basic image operations using OpenCV such as Read, display, resize, grayscale conversion	2
2	Practical 2 Apply image filtering techniques (Blur, edge detection using Sobel/Canny)	2
3	Practical 3 Extract basic audio features (MFCC) using Librosa library	2
4	Practical 4 Perform basic video processing Frame extraction and simple transformations	2
5	Practical 5 Perform basic video processing Frame extraction and simple transformations	2
6	Practical 6 Apply object detection using a pre-trained model YOLO/SSD – demo	2
7	Practical 7 Perform sentiment analysis on text data using a library e.g. TextBlob/VADER	2
8	Practical 8 Build a simple image classifier using pre-trained model. Perform transfer learning	2
9	Practical 9 Implement a basic recommendation system using user-item matrix concept	2
10	Practical 10 Perform collaborative filtering using a simple dataset using library	2
11	Practical 11 Convert speech to text using available APIs such as Google Speech API	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
12	Practical 12 Generate images using pre-trained GAN tools (demo-based)	2
Total Hours		24

Textbook :

- 1 Artificial Intelligence: A Modern Approach, Stuart Russell & Peter Norvig, Pearson (Prentice Hall), 2020
- 2 Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 2016
- 3 Computer Vision: Algorithms and Applications, Richard Szeliski, Springer, 2022
- 4 Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 2006
- 5 Speech and Language Processing, Daniel Jurafsky & James H. Martin, Pearson (Prentice Hall), 2024

References:

- 1 Hands-On Machine Learning with Scikit-Learn & TensorFlow, Hands-On Machine Learning with Scikit-Learn & TensorFlow, Aurélien Géron, O'Reilly Media, 2022
- 2 Deep Learning for Vision Systems, Deep Learning for Vision Systems, Mohamed Elgendy, Manning Publications, 2020
- 3 Multimedia: Computing, Communications and Applications, Multimedia: Computing, Communications and Applications, Ralf Steinmetz, Pearson, 2012
- 4 Programming Computer Vision with Python, Programming Computer Vision with Python, Jan Erik Solem, O'Reilly Media, 2012
- 5 AI for Games, AI for Games, Ian Millington, CRC Press, 2019

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	25.00	20.00	10.00	15.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

Instructional Method:

- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.