



Kot Bhalwal, Jammu

Model Institute of Engineering
& Technology (Autonomous)
Course Handout

COURSE HANDOUT

ARTIFICIAL INTELLIGENCE WITH COMPUTER VISION (COM-602)

BE-6TH SEMESTER

ACADEMIC YEAR (2024-25)

Dr. Palvi Sharma

Assistant Professor

Department of Computer Science and Engineering



Department of Computer Science and Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1



Please Do Not Print Unless Necessary



Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-601	Artificial Intelligence with Computer Vision	PCC	4	3	1	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Develop intelligent solutions for classification, regression, and clustering problems.
CO2	Design distinguishing features for pattern and object recognition.
CO3	Apply image processing techniques, including color and geometric transforms.
CO4	Evaluate motion models for tracking objects over time.
CO5	Implement feature tracking to match frames in images.

Unit-I

Introduction to Artificial Intelligence: Basic of AI, history of AI, various techniques of Artificial Intelligence (Machine learning, NLP, Automation & Robotics and Computer vision, Types of AI, Applications of Artificial Intelligence.

(8 Hours)

Unit-II

Convolutional Neural Networks: Architecture, Convolution, Pooling Layers, Edge Detection, Object Detection, Padding, Types of CNN Networks, Case Studies using CNN.

(8 Hours)

Unit-III

Image Processing: Fundamentals of Image Processing, Image Acquisition, Color Models, cameras and Projections, rigid and affine transformation, Adaptive Background Subtraction; Camera Geometry, Calibration (camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration), and Feature Extraction.

(10 Hours)

Unit-IV

Tracking: Feature Tracking (Selecting features, Nose Tracking); Direct Method (Image-Based Tracking): Head Tracking, Face feature tracking; Model-based Tracking: (Hand tracking, Body tracking, Fingertip Tracking), Kalman Filtering, Particle Filtering and Mean shift tracking.

(10 Hours)

Unit-V

Recognition: Space-Time Methods: Discriminant Analysis, Bayesian Network Classifiers; Temporal Methods; Model-Based Methods (Markov-Dynamic Networks); Hidden Markov Models.

(8 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	Pearson	4 th (2020)



2.	Computer Vision - A modern Approach	D. Forsyth and J. Ponce	McGraw-Hill	2 nd (2018)
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Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Artificial Intelligence: Strategies and Techniques for complex problems solving	George Luger	Addison Wesley	6 th (2008)
2	Introductory Techniques for 3D Computer Vision	E. Trucco and A. Verri	Prentice Hal	2 nd (2009)

COURSE PLAN

Unit-I Introduction to Artificial Intelligence

S.No	Topics	Recommended Books
1	Introduction to Artificial Intelligence	Book 1, Ch.1
2	Basic of AI	Book 1, Ch.1
3	History of AI	Book 1, Ch.1
4	How AI is related to Computer Vision	Book 2, Ch.2
5	Various Techniques of Artificial intelligence	Book 2, Ch.2
6	Types of AI	Book 2, Ch.2
7	Applications of Artificial Intelligence	Book 2, Ch.2
8	Two ways of Artificial intelligence work i.e., symbolic and Data Based.	Book 2, Ch.2
Unit-II Foundation of Machine learning:		
9	Terminology used in ML	Book 1, Ch.2
10	ML Process (Building the Model)	Book 1, Ch.1
11	Supervised ML, Unsupervised ML and Reinforcement ML	Book 2, Ch.2
12	Algorithms	Book 2, Ch.2
13	types of problems solved using ML (Regression)	Book 2, Ch.2
14	types of problems solved using ML (Classification)	Book 2, Ch.2
15	types of problems solved using ML (Clustering)	Book 2, Ch.2
16	Exploratory Data Analysis on Real world Problem i.e., possibility of Rain including the variable dependency.	Book 2, Ch.2
Unit-III Image Processing, Computer Vision and Computer Graphics		
17	Computer Vision - Low-level	Book 2, Ch.2
18	Computer Vision - Mid-level	Book 2, Ch.2
19	Computer Vision - High-level	Book 2, Ch.2
20	Overview of Diverse Computer Vision Applications	Book 2, Ch.2
21	Light-Models, Image Acquisition, and Backgrounds	Book 2, Ch.2
22	Adaptive Background Subtraction	Book 2, Ch.2
23	Camera Geometry, Calibration,	Book 2, Ch.2



24	Stereo Interest Operators and Feature Extraction	Book 2, Ch.2
Unit-IV Tracking:		
25	Feature Tracking (Selecting features, Nose Tracking)	Book 2, Ch.3
26	Direct Method (Image-Based Tracking)	Book 1, Ch.4
27	Head Tracking	Book 1, Ch.4
28	Face feature tracking	Book 2, Ch.3
29	Model-based Tracking: (Hand tracking, Body tracking, Fingertip Tracking)	Book 1, Ch.3
30	Kalman Filtering,	Book 2, Ch.3
31	Particle Filtering.	Book 1, Ch.3
32	Mean shift tracking	
Unit-V Recognition		
33	Space-Time Methods	Book 2, Ch.8
34	Discriminant Analysis	Book 1, Ch.8
35	Bayesian Network Classifiers	Book 2, Ch.8
36	Temporal Methods	Book 1, Ch.8
37	Model-Based Methods (Markov-Dynamic Networks)	Book 2, Ch.8
38	Hidden Markov Models	Book2, Ch. 8
39	Integration of Discriminant Analysis and Bayesian Networks	Book 2, Ch.2
40	Dynamic Spatial Networks	Book 2, Ch.2

ADDITIONAL WEB RESOURCES

1.	MOOC: Introduction to Computer Vision and Image Processing https://www.coursera.org/programs/b-e-faculty-learning-path-julcd/learn/introduction-computer-vision-watson-opencv?source=search
2.	COURSERA: Introduction to Artificial Intelligence (AI) https://www.coursera.org/programs/b-e-faculty-learning-path-julcd/learn/introduction-to-ai?source=search

GRADING AND ASSESSMENT

- **Sessional Test:** 20 marks
- **Assignment:** 20 marks
- **Attendance:** 10 marks
- **Final Examination:** 100 marks

COURSE POLICIES

- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**





Model Institute of Engineering & Technology (Autonomous) Course Handout

Kot Bhalwal, Jammu

Monday (12:05 PM - 12:55 PM)

Friday (12:05 PM - 12:55 PM)

- **Contact Information**
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