Course Competency

CAI 2840C Introduction to Computer Vision

Course Description

Students will learn fundamental concepts in Computer Vision (CV) and image processing, including introduction to necessary proprietary and open-source Python libraries. Recommended preparation: COP1047C or equivalent knowledge of Python programming language. (2 hr. lecture, 2 hr. lab)

Course Competency	Learning Outcomes
Competency 1: Students will describe Computer Vision and associated applications by:	1. Numbers / Data 2. Critical thinking 3. Information Literacy 4. Ethical Issues 5. Computer / Technology Usage
1. a) Defining Computer Vision and the evolution of the field. b) Identifying and listing several applications of Computer Vision. c) Discussing the societal impact of Computer Vision. d) Recognizing and demonstrating the mathematical concepts used for various the computer vision applications.	
Competency 2: Students will describe the data acquisition and exploration processes in Computer Vision by:	1. Numbers / Data 2. Critical thinking 3. Information Literacy 4. Ethical Issues 5. Computer / Technology Usage
1. a) Analyzing the steps involved in executing a Computer Vision project. b) Distinguishing between types of Computer Vision data, various data sources, and methods involved in acquiring computer vision data. c) Evaluating the ethical considerations during acquiring data for	

Computer Vision. d) Describing and applying preprocessing methods on several example datasets. e) Balancing an imbalanced dataset. f) Describing and differentiating image segmentation and color segmentation. g) Implementing advanced pre-processing of computer vision datasets.	
Competency 3: Students will explore Convolutional Neural Networks (CNN) by:	1. Numbers / Data 2. Critical thinking 3. Ethical Issues 4. Computer / Technology Usage
1. a) Comparing and contrasting the biological visual cortex and CNN. b) Describing and tuning the hyperparameters in CNN. c) Defining and explain activation functions and their importance. d) Constructing CNN models and differentiating between several CNN layers. e) Distinguishing between popular CNN architectures. f) Explaining the working of transfer learning. g) Exploring and implementing pretrained models.	
Competency 4: Students will implement Computer Vision projects using proprietary and open-source Python libraries:	1. Numbers / Data 2. Critical thinking 3. Information Literacy 4. Ethical Issues 5. Computer / Technology Usage
1. a) Outlining several proprietary and open-source Python library operations and functions. b) Demonstrating the use of proprietary and open-source computer vision applications.	
Competency 5: Students will explore Generative Adversarial Networks (GANs) by:	1. Numbers / Data 2. Critical thinking 3. Information Literacy

	4. Ethical Issues 5. Computer / Technology Usage
1. a) Explaining the internal working of GANs. b) Identifying several applications of GANs. c) Evaluating the ethical considerations behind using GANs. d) Developing an end-to-end GAN model.	
Competency 6: Students will explore vendor Computer Vision solutions by:	1. Numbers / Data 2. Critical thinking 3. Information Literacy 4. Ethical Issues 5. Computer / Technology Usage
1. a) Recognizing vendor specific implementation of the AI project cycle. b) Develop various solutions utilizing vendor pretrained models and toolkits. c) Describing, identifying, and building Edge AI and IoT application and solutions. d) Summarizing and deploying CV models and Edge IoT and AI solutions on vendor clouds.	
Competency 7: Students will explore the future of Computer Vision by:	1. Numbers / Data 2. Critical thinking 3. Information Literacy 4. Ethical Issues 5. Computer / Technology Usage
1. a) Discussing advancements in the field of Computer Vision. b) Assessing future ethical and computational limitations for Computer Vision application.	

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