Syllabus
# MMI5192E Introduction to Artificial Intelligence - Applications and Practices
Prof. Dr. Pin Luarn
Winter Semester 2023 / 24

| Level | Master | | |
|---|---|---|---|
| **Credits** | 3 | | |
| **Student Contact Hours** | 2 | | |
| **Workload** | 90 h | | |
| **Prerequisites** | none | | |
| **Time** | see LSF | | |
| **Room** | see LSF | | |
| **Start Date** | see LSF | | |
| **Lecturer** | **Name** | Prof. Dr. Pin Luarn | |
| | **Office** | - | |
| | **Virtual Office** | - | |
| | **Office Hours** | - | |
| | **Phone** | - | |
| | **Email** | luarn@mail.ntust.edu.tw, luarn@gapps.ntust.edu.tw | |

## Summary

This course is designed to teach management school students about AI application development using Google MediaPipe. Students will learn the basic concepts and techniques of AI and gain hands-on experience in building practical AI application. Thecourse covers many interesting topics, including image and video processing, facial recognition, object detection, and pose estimation.

## Outline of the Course

Unit 1: Introduction to AI and MediaPipe
- Introduction to AI concepts and applications.
- Overview of the MediaPipe framework.
- Setting up the development environment.
- Hands-on exercise: MediaPipe installation and basic usage.

Unit 2: Image Classification with MediaPipe
- Image classification techniques using MediaPipe Image Classifier.
- Hands-on exercise: Implementing image classification with MediaPipe.
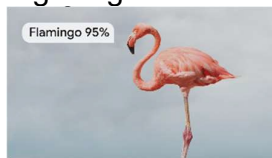


Unit 3: Object Detection with MediaPipe
- Introduction to object detection algorithms.
- Implementing real-time object detection with MediaPipe.
- Hands-on exercise: Creating an object detection application.



Unit 4: Image Segmentation
- Introduction to MediaPipe Image Segmenter.
- Implementing image segmentation with MediaPipe.
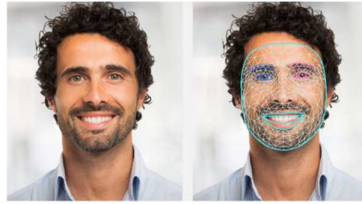- Hands-on exercise: Creating an image segmentation application.



Unit 5: Face Detection with MediaPipe
- Face detection algorithms and techniques.
- Implementing real-time face detection with MediaPipe.
- Hands-on exercise: Developing a face detection application.
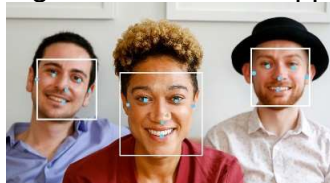
Unit 6: Face Landmark Detection with MediaPipe
- MediaPipe Face Landmarker algorithms and techniques.
- Implementing real-time face landmark detection with MediaPipe.
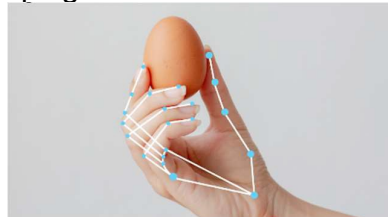- Hands-on exercise: Developing a face landmark detection application.



Unit 7: Pose Estimation
- Understanding pose estimation algorithms.
- Implementing real-time pose estimation with MediaPipe.
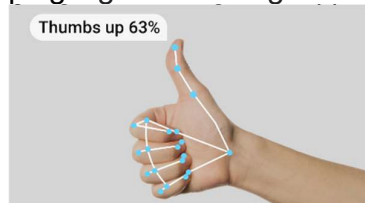- Hands-on exercise: Building a pose estimation application.



Unit 8: Hand Landmarks Detection
- MediaPipe Hand Landmarker algorithms and techniques.
- Implementing real-time hand landmarks detection with MediaPipe.
- Hands-on exercise: Developing a hand landmarks detection application.



Unit 9: Gesture recognition
- MediaPipe Gesture Recognizer algorithms and techniques.
- Implementing real-time gesture recognition with MediaPipe.
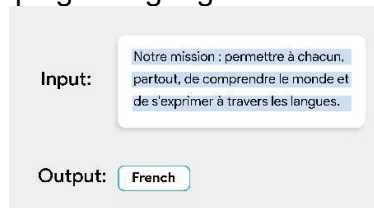- Hands-on exercise: Developing a gesture recognition application.



Unit 10: Text Classification
- Introduction to MediaPipe Text Classifier techniques.
- Implementing real-time text classification with MediaPipe.
- Hands-on exercise: Building a text classification application.

Unit 11: Language Detection
- Techniques for MediaPipe Language Detector.
- Implementing language detection with MediaPipe.
- Hands-on exercise: Developing a language detection application.



Input: Notre mission : permettre à chacun, partout, de comprendre le monde et de s'exprimer à travers les langues.

Output: French

Unit 12: Advanced Topics and Future Directions
- Exploring advanced features and tools in MediaPipe
- Emerging trends and future directions in AI and MediaPipe
- Final project showcase and discussion

## Course Intended Learning Outcomes and their Contribution to Program Intended Learning Outcomes / Program Goals

| Program Intended Learning Outcomes | Course Intended Learning Outcomes | Assessment Methods | | |
|---|---|---|---|---|
| After completion of the program the students will be able… | After completion of the course the students will be able… | Project Work | Participation in Class | Non-Graded Examination |
| | | 60% | 30% | 10% |
| | | Individual | Individual | Collective |
| **1** | **Responsible Leadership in Organizational Contexts** | | | |
| **2** | **Creative Problem Solving Skills in a Complex Business Environment** | | | |
| 2.2 ...to analyze problems of Marketing Intelligence. | … to analyze marketing intelligence problems, through the AI application development process of this course. | X | X | X |
| 2.3 ...to develop and evaluate creative solutions to complex problems of Marketing Intelligence. | … to develop and evaluate creative solutions to complex problems through the process of learning AI application development. | X | X | X |
| **3** | **Applied Research Skills** | | | |
| **4** | **Interdisciplinary and agile working** | | | |
| 4.2 ... are able to design and manage marketing intelligence projects independently and on their own responsibility. | … to design and manage marketing intelligence projects independently and take responsibility for them. | X | X | |

## Teaching and Learning Approach

The course will follow a blended learning approach, combining theoretical knowledge with hands-on practical exercises. The teaching methods will include:

- Lectures: Engaging lectures to introduce and explain the theoretical concepts and principles of AI and its applications.
- Hands-on Exercises: Practical exercises using Google Colab and MediaPipe to reinforce the concepts learned and provide hands-on experience in developing AI applications.
- Project-Based Learning: Encouraging students to work on individual or group projects to apply their knowledge and skills acquired throughout the course.
- Assessments: There will be assignment and report to evaluate students' understanding and progress.
- Feedback and Support: Providing regular feedback and support to students during the project development phase, ensuring their understanding and addressing any challenges they encounter.

## Literature and Course Materials

1. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville: This book provides a comprehensive introduction to deep learning concepts, including neural networks and various architectures.
2. MediaPipe Documentation: The official documentation of MediaPipe provides detailed information on the functionalities, APIs, and usage of the MediaPipe framework for AI application development.
3. Google Colab Tutorials and Documentation: The official tutorials and documentation of Google Colab offer step-by-step guides and examples on using Colab for AI development.
5. Research Papers and Articles: Selected research papers and articles related to AI applications, image processing, facial recognition, object detection, and pose estimation will be provided as supplementary reading materials.
6. Online Resources and Video Tutorials: Curated online resources, such as blogs, articles, and video tutorials, will be shared to enhance students' understanding and provide additional learning materials.
7. Course Slides and Handouts: Lecture slides and handouts prepared by the instructor, covering key concepts, code snippets, and examples, will be provided for each session.
8. Sample Code: Ready-to-use sample code will be shared to assist students in implementing AI algorithms and applications using Google Colab and MediaPipe.

## Assessment

1. Assignments: Assignment will be given to students throughout the course, focusing on implementing AI algorithms, developing applications, and analyzing results.

2. Quizzes: Short quizzes may be conducted to assess students' understanding of the theoretical concepts and practical applications covered in the lectures.

3. Project Evaluation: The final projects developed by students will be assessed based on criteria such as functionality, creativity, technical implementation, and presentation.

4. Class Participation: Active participation in class discussions, group activities, and project presentations will be considered when assessing students' engagement and contribution to the learning process.

## Schedule

| | Monday Oct. 16 | Tuesday Oct. 17 | Wednesday Oct. 18 | Thursday Oct. 19 | Friday Oct. 20 |
|---|---|---|---|---|---|
| 08:00~09:30 | | | | V | |
| 09:45~11:15 | | | V | V | |
| 11:30~13:00 | | | V | V | V |

| | Monday Oct. 23 | Tuesday Oct. 24 | Wednesday Oct. 25 | Thursday Oct. 26 | Friday Oct. 27 |
|---|---|---|---|---|---|
| 08:00~09:30 | | | | V | |
| 09:45~11:15 | | | V | V | |
| 11:30~13:00 | | | V | V | V |