

Overview

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<http://xplan-lab.org/AI-course/>

What is the course about?

- What do web search, speech recognition, face recognition, machine translation, autonomous driving, and automatic scheduling have in common?
- AI aims to tackle these issues with rigorous mathematical tools.
- Specific topics include:
 - search, game playing, markov decision processes, constraint satisfaction, planning, logic, and machine learning.

Prerequisites

- This course is fast-paced and covers a lot of ground, so it is important that you have a solid foundation on both the theoretical and empirical fronts.
- You should have taken the following classes (or their equivalents)
 - Programming
 - Discrete math
 - Probability

Reading

- There is no required textbook for this class, and you should be able to learn everything from the lecture notes. However, if you would like to pursue more advanced topics or get another perspective on the same material, some books can be:
 - Russell and Norvig. **Artificial Intelligence: A Modern Approach.**
 - A comprehensive reference for all the AI topics that we will cover.
 - Koller and Friedman. **Probabilistic Graphical Models.**
 - Covers factor graphs and Bayesian networks.
 - Sutton and Barto. **Reinforcement Learning: An Introduction.**
 - Covers Markov decision processes and reinforcement learning. Available free online
 - Hastie, Tibshirani, and Friedman. **The elements of statistical learning.**
 - Covers machine learning. Available free online.
 - Tsang. **Foundations of constraint satisfaction.**
 - Covers constraint satisfaction problems. Available free online.
- Bear in mind that some of these books can be quite dense and use different **notation terminology**, so it might take some effort to connect up with the material from class

Datasets

- You are free to use existing datasets, but these might be not necessarily the best match for your problem, in which case you are probably better off making your own dataset.
 - [Kaggle](#) is a website that runs machine learning competitions for predicting for monetary reward.
 - [SAT competition](#): satisfiability problems are a special important class of CSPs.
 - [Natural language processing datasets](#): links to many NLP datasets for different languages.
 - [Poker hand dataset](#).
 - [Planning domains](#).

Libraries

- You are free to use existing tools for parts of your project as long as you're clear what you used. When you use existing tools, the expectation is that you will do more on other dimensions.
 - [scikit-learn](#): machine learning library implemented in Python
 - [Natural language Toolkit \(NLTK\)](#): a set of tools for basic NLP in Python
 - [OpenCV](#): Python libraries for simple computer vision
 - [Tensorflow](#): machine learning tool
 - [Planning](#): IPC (International Planning Competition)

Some project ideas

- Build an intelligent manufacture simulator by scheduling different agents such as drones, robots, etc.
- Predict the price of airline ticket prices given day, time, location, etc.
- Predict the amount of electricity consumed over the course of a day.
- Predict whether the phone should be switched off / silenced based on sensor readings from your smartphone.
- Auto-complete code when you're programming.
- Answer natural language questions for a restricted domain (e.g., insurance, sports).
- Find the optimal way to get from one place on SYSU campus to another place, taking into account uncertain travel times due to traffic.
- Solve Sudoku puzzles or crossword puzzles.
- Build an engine to play Go, chess, 2048, Poker, etc.
- Generate poetry on a given topic.
- Activity recognition