

Syllabus

Advanced Topics in Systems and Applications

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1. Course Description

The recent success of AI has been in large part due in part to advances in hardware and software systems. These systems have enabled training increasingly complex models on ever-larger datasets. In the process, these systems have also simplified model development, enabling the rapid growth in the machine learning community. These new hardware and software systems include a new generation of GPUs and hardware accelerators (e.g., NPU and TPU), open-source frameworks such as TensorFlow, PyTorch, MXNet, etc. At the same time, we are witnessing a flurry of ML/RL applications to improve hardware and system designs in various aspects.

2. Teaching Methods

In this course, we will describe the latest trends in systems designs to better support the next generation of AI applications, and applications of AI to optimize the architecture and the performance of systems. The format of this course will be a mix of lectures, seminar-style discussions, and student presentations. Students are expected to read a set of papers and complete a hands-on project.

3. Evaluation

1. Midterm or final exam: 20%
2. Paper presentation (2 times): 20% for each
3. Project: 40%

4. TextBooks

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5. Lecture Schedule

Week	Lecture contents	Lesson type	Remark
1	Course introduction and overview of ML systems	Lecture	
2	Machine Learning Frameworks	Lecture	
3	Paper discussion	Discussion	
4	Distributed Model Training	Lecture	
5	Paper discussion	Discussion	
6	Training Large Models	Lecture	
7	Paper discussion	Discussion	
8	Midterm		
9	Hardware Acceleration for Machine Learning	Lecture	
10	Paper discussion	Discussion	
11	Prediction Serving	Lecture	
12	Paper discussion	Discussion	
13	ML Cluster Management	Lecture	
14	Paper discussion	Discussion	
15	Present your final project	Presentation	
16	Present your final project	Presentation	

6. Others

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