CS294: Scheduling Deep Learning Workloads

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What is the problem?
You have a bunch of training jobs sharing the cluster

You want to optimize for a scheduling metric:

• Makespan / average completion time
• Throughput
• Fairness
• A combination of the above
Why care about this?

Training a single model very expensive

AI and Compute (https://blog.openai.com/ai-and-compute/)
Why care about this?

Training a single model very expensive

Models brittle so might want to train multiple times

And, we want to do hyperparameter search!
  • Network architecture design
  • AutoML
  • …
Minimize job average completion time

For one processor: shortest job first is optimal

For parallel systems is an approximation but need to bin the jobs carefully

Assumption: you need to know completion time
  • Otherwise need to predict it
  • Complex because it can depend on parallelism, time when you get a particular resource, etc
Maximize throughput

This is what cluster operators want!
  • Justify their investment

It can be gamed!

Need to be careful about how we pack jobs
  • Can lead to starvation
Fairness

A trip in the history lane…
  • see Dominant Resource Fairness (DRF) presentation