CSC2547H Course Project Proposal

- **Scope**
  - Something relevant to automated reasoning and machine learning
  - Machine learning for SAT, SMT, program analysis/verification/synthesis, theorem proving related projects are highly encouraged
  - Machine learning for other important solvers (e.g., MaxSAT, MaxSMT, model counting, mixed integer programming, weighted Boolean optimization)
  - Using reasoning techniques (e.g., SAT/SMT, analysis, verification, testing) to improve (or attack) machine learning models
  - Combining reasoning and learning to build interesting systems
- **Group**
  - Up to 3 people
  - Talk to the instructor if your project is ambitious and needs 4 or more people
- **Proposal**
  - 2~4 pages (single column, NeurIPS paper like format) + unlimited references
  - One report per group
  - It's OK if you end up with doing something different from your original proposal

Some project ideas

- **Reproduce and extend existing work**
  - Find a paper related to one of our topics that interests you most; collect relevant research artifacts (e.g., code, data, trained models), or re-implement
  - Propose some new extensions (or adaptions) and evaluate
  - Or perform deep ablation studies, visualizations, designing new metrics, and figure out what really works and what does not
- **New project**
  - You know a problem well (e.g., your own research problem) and you want to investigate a novel solution of using machine learning or automated reasoning techniques
  - You simply want to try something crazy, risky and fun, and randomly apply X to Y (e.g., diffusion models for SMT solving; SAT solving for image generation)
  - Post on Ed (projects->brainstorming), talk to TA/instructor/classmates to get some suggestions or inspirations

Grading rubrics

- **Abstract (20%)**
  - Briefly summarize the problem, novelty, and expected outcome in 5~10 sentences
- **Introduction (20%)**
  - Problem background, importance, expected challenges, articulate promises of the proposed solution
- **Working plan (40%)**
  - What new approach(es) you are going to try? What things/skills you are going to learn or practice?
  - What dataset you will collect or have to create? What baseline you may use?
  - Articulate some milestones or success/failure checks (e.g., you are sure you will get something meaningful when X is done; or if X turns out to be unexpected, you will need to try something different)
  - Estimation of the workload and task distribution among your team (A will do X; B will do Y; C will do Z; then AB will do W; sync up daily/weekly/bi-weekly etc.)
- **Related work (20%)**
  - 1~3 sentence summary of at least three closely-related work and discuss important difference from the proposed work