Main Semester-Long Project

Two-person teams

- Problem
  - Interesting to you
  - Some prospect of being useful broadly
  - Needn't be new but may have a new twist on an old problem
- Envisioned software artifacts
- Underlying sources of knowledge
  - Lexicons or location services
  - Software libraries
  - Datasets for evaluation
  - Way to have humans help evaluate
- What you will contribute to the world's body of knowledge?

Software Artifact

Not needed in detail in the early report

- High-level view of your method
  - Identify what knowledge is needed to carry out the method
  - Identify what knowledge is available
- Processing "pipeline" or graph
  - Main components, ideally mostly based on existing libraries
  - What you will *add* to complete the artifact
- Don't get stuck in product-like details
  - Unless your main idea is a "product" such as a new messaging app

Scientific Thinking

Critical thinking going beyond the artifact

- What do we learn from the exercise?
- What reusable knowledge will you create?
- State hypotheses that relate to the main topic
  - One or more about the quality of your solution
  - One or more about the effectiveness of specific components in your approach
- Describe how you will evaluate these hypotheses

Hypotheses and Evaluation

The nature of the evaluation depends on the specific hypothesis being evaluated

$$\boxed{\text{Hypothesis} \neq \text{assumption}}$$

- Should be interesting in that an answer would affect how future developers would build related apps
- Should nontrivial and nonobvious
- A comparative framing helps
  - Vary the nature and amount of input (data or supervision)
  - Vary the methods
- Good to identify one or more baselines ($\approx$ prior methods)
- In typical artifacts, multiple components (or capabilities) make it difficult to figure out the relative importance
  - Ablation studies: consider the components and capabilities separately

Project Topic Ideas for NLP

Extremely small sample: just for discussion

- Understanding sender's intent from email
  - Extracting to-do items
  - Extracting which tasks are assigned and which are completed
- Developing a chatbot for car repair
- Dealing with custom named entities, e.g., apps, equipment
- Resolving pronouns `https://paperswithcode.com/paper/bridging-anaphora-resolution-as-question-1`
- Dealing with novel words `https://arxiv.org/pdf/1811.03866.pdf`