CS – 344 Guide 1

- What is artificial intelligence?
  - Also called machine intelligence (in contrast to natural intelligence by animals)
  - The intelligence demonstrated by machines
  - "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation"
- What are the following ideas and why are they relevant?
  - Church-Turing thesis:
    - A hypothesis about the nature of computable functions
    - States a function on the natural numbers is computable by a human being following an algorithm, ignoring resource limitations, if and only if it is computable by a Turing machine.
  - The Turing test:
    - A test of a machine's ability to exhibit intelligence behavior equivalent to, or indistinguishable from, that of a human.
  - Occam's razor:
    - The problem-solving principle that states that simpler solutions are more likely to be correct than complex ones.
  - Moravec's paradox:
    - A discovery by A.I. and robotics researchers that, contrary to traditional assumptions, high-level reasoning requires very little computation, but low-level sensory-motor skills require enormous computational resources.
  - Expert Systems:
    - In A.I., a computer system that emulates the decision-making ability of a human expert.
    - Designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if-then rules rather than through procedural code.
- When was the field of AI born and who were the founding researchers?
  - Founded as an academic discipline in 1956.
  - Founding researchers were: Allen Newell, Herbert Simon, John McCarthy, Marvin Minsky, and Arthur Samuel.
- Compare and contrast:
  - GOFAI: (good old-fashioned artificial intelligence)
    - Term for the collection of all methods in A.I. research that are based on high-level symbolic (human-readable) representations of problems, logic, and search.
  - Probabilistic Approaches:
    - Bayesian networks as a general tool used for large number of problems
    - Bayesian inference is computationally expensive.
  - Statistical Approaches:
    - Classifiers – functions that use pattern matching to determine a closest match.
      - Performance depends on characteristics of data to be classified – dataset size, distribution of samples across classes, dimensionality, level of noise, etc.
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  - Neats:
    - A label for a type of A.I.
    - Considers that solutions should be elegant, clear, and provably correct

- Scruffies:
  - A label for a type of A.I.
  - Believes intelligence is too complicated (or computationally intractable) to be solved with the sorts of homogenous system neat requirements mandate.