CISC Introduction to Machine Learning
Practice # 1

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- Question 1. Suppose that you are going to learn a function $f : X \to Y$, where $Y = \{0, 1\}$ and each $x \in X$ is given by $x = (x_1, ..., x_k)$ with $x_i \in \{0, 1\}$. Given a collection of data D, consider the following learning strategy:

  1. let $V_{H,D}$ be the set of all the functions that are consistent with D.
  2. for a new input x, make a prediction using the following rule:
     - if $|V_{H,D}| = 1$, use the function in $V_{H,D}$;
     - if $|V_{H,D}| > 1$, trust the majority.

  Please discuss the usefulness of the above learning strategy.

- Question 2. Suppose that you are going to learn a function $f : X \to Y$, where $Y = \{0, 1\}$ and each $x \in X$ is given by $x = (x_1, ..., x_k)$ with $x_i \in \{0, 1\}$. Given a collection of data D, consider the following learning strategy:

  1. let $V_{H,D}$ be the set of all the decision trees that can correctly classify all the instances in D.
  2. for a new input x, make a prediction using the following rule:
     - if $|V_{H,D}| = 1$, use the tree in $V_{H,D}$;
     - if $|V_{H,D}| > 1$, trust the majority.

  Please discuss the usefulness of the above learning strategy.

- Question 3. For the concept learning problem in the class, please draw a decision tree of a conjunction of constraints.