Classification with decision trees

Lecture 2

Decision trees

- Decision support tool
- Input: a situation or an object described by a set of attributes
- Output: decision

Decision tree – mental model

▸ Situation: restaurant

▸ Question: to leave or to stay?

Decision tree – mental model

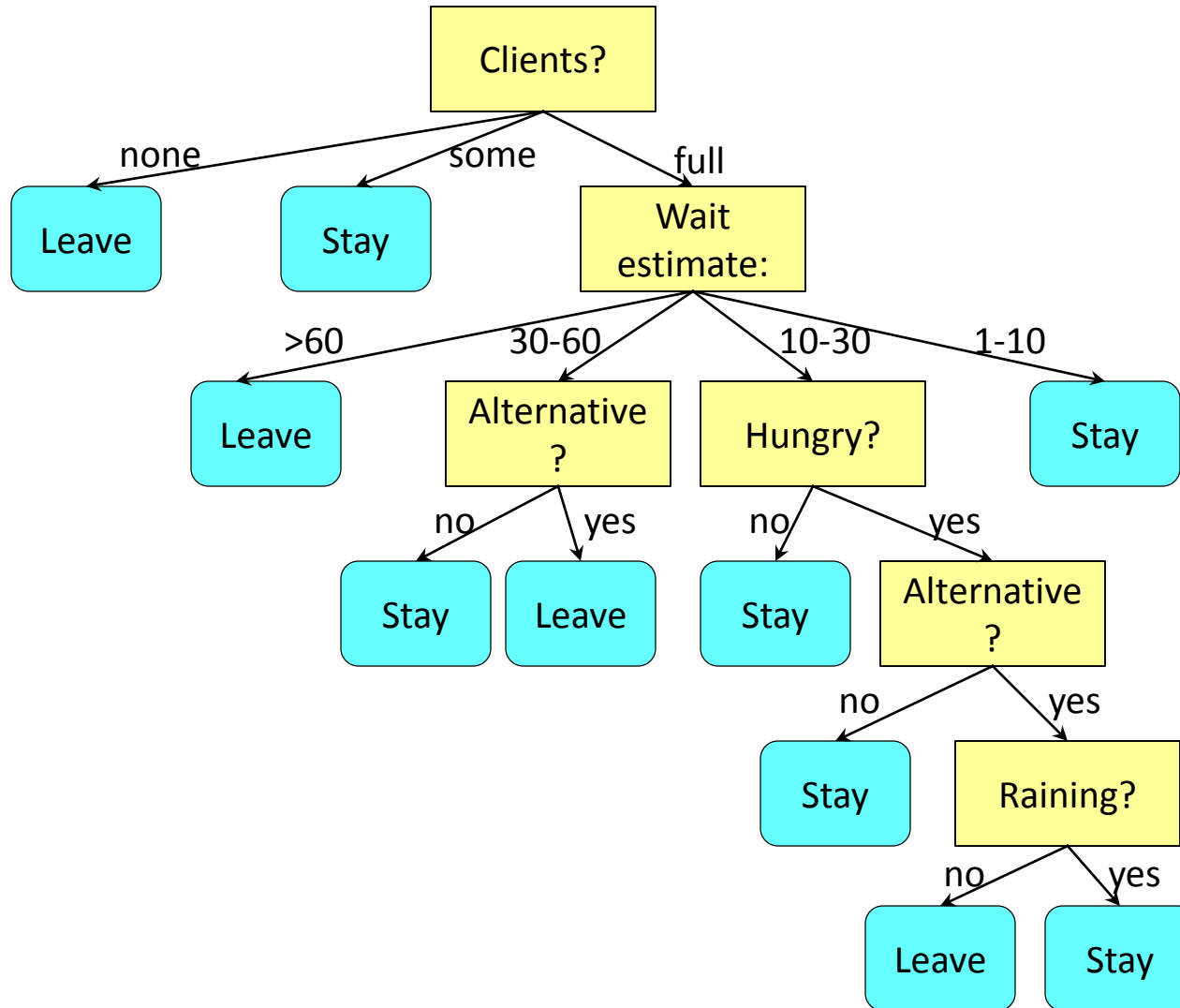- Situation: restaurant
- Question: to leave or to stay?

- Set of important attributes:
  - Alternative restaurants: yes, no
  - Am I hungry?: yes, no
  - Clients?: none, some, full
  - Is it raining?: yes, no
  - Wait estimate: 0-10, 10-30, 30-60, >60 min
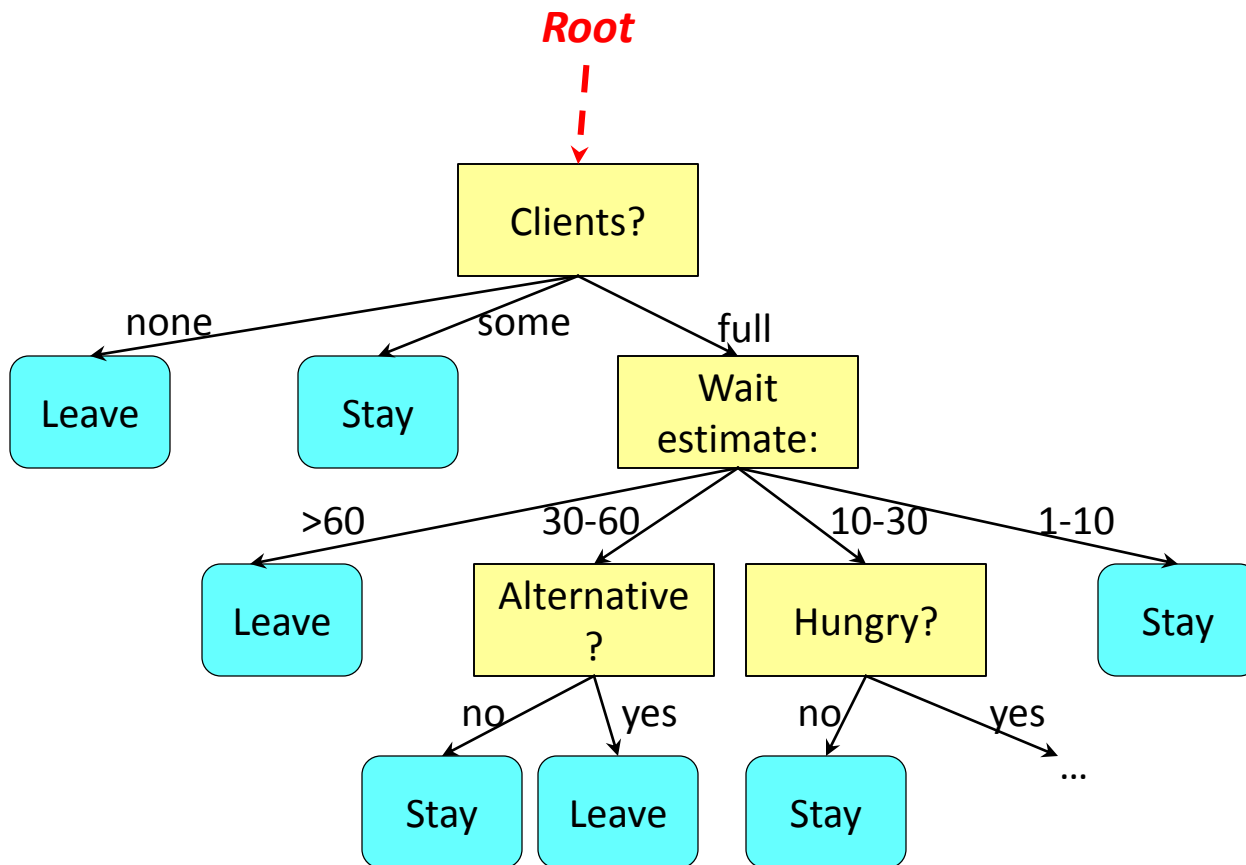
Decision tree – mental model

Decision trees
- Supervised learning
- Tree induction algorithm
- Algorithm design issues
- Applications of decision trees

▶ We have many such models in our brain

Decision tree – structure

Root

Clients?

none → Leave

some → Stay

full → Wait estimate:

>60 → Leave

30-60 → Alternative?
- no → Stay
- yes → Leave

10-30 → Hungry?
- no → Stay
- yes → …

1-10 → Stay

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Decision tree – structure

Attribute (internal node)

Clients?

none → Leave

some → Stay

full → Wait estimate:

- >60 → Leave
- 30-60 → Alternative?
  - no → Stay
  - yes → Leave
- 10-30 → Hungry?
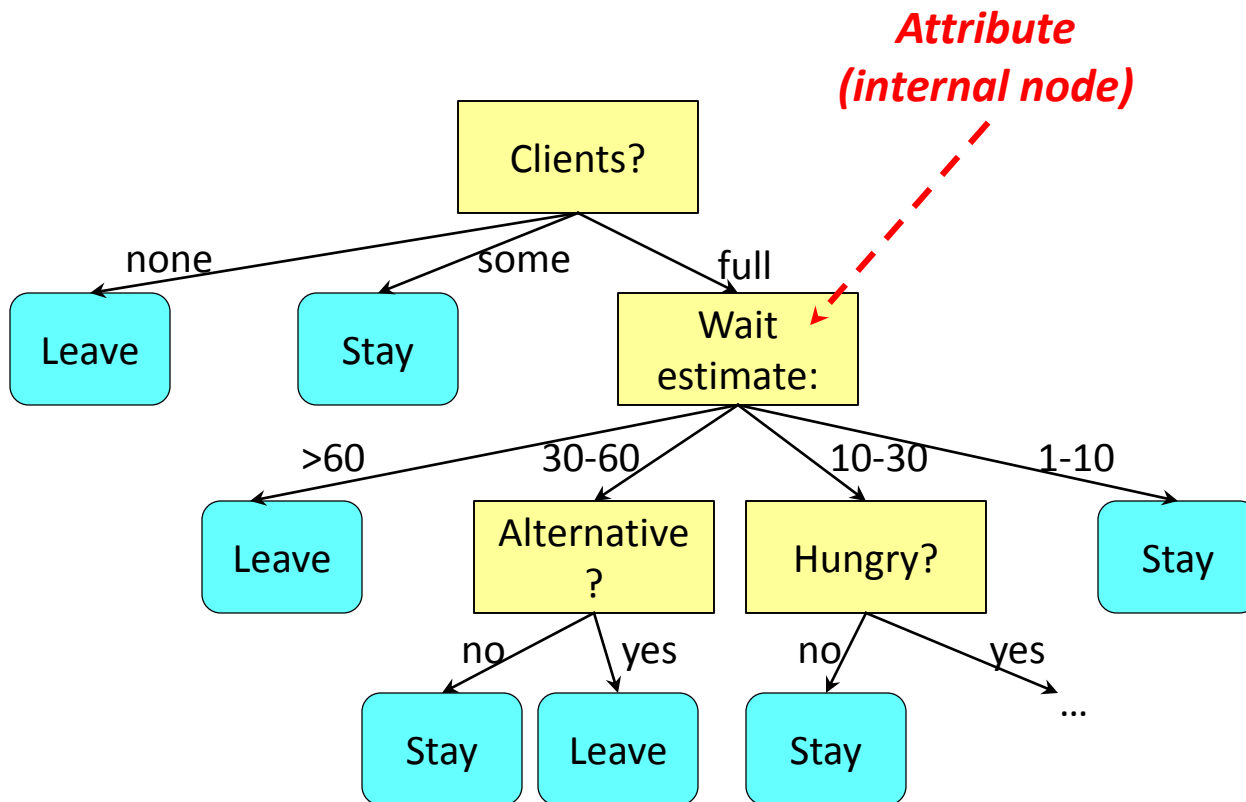 - no → Stay
  - yes → …
- 1-10 → Stay

Decision trees

- Supervised learning
- Tree induction algorithm
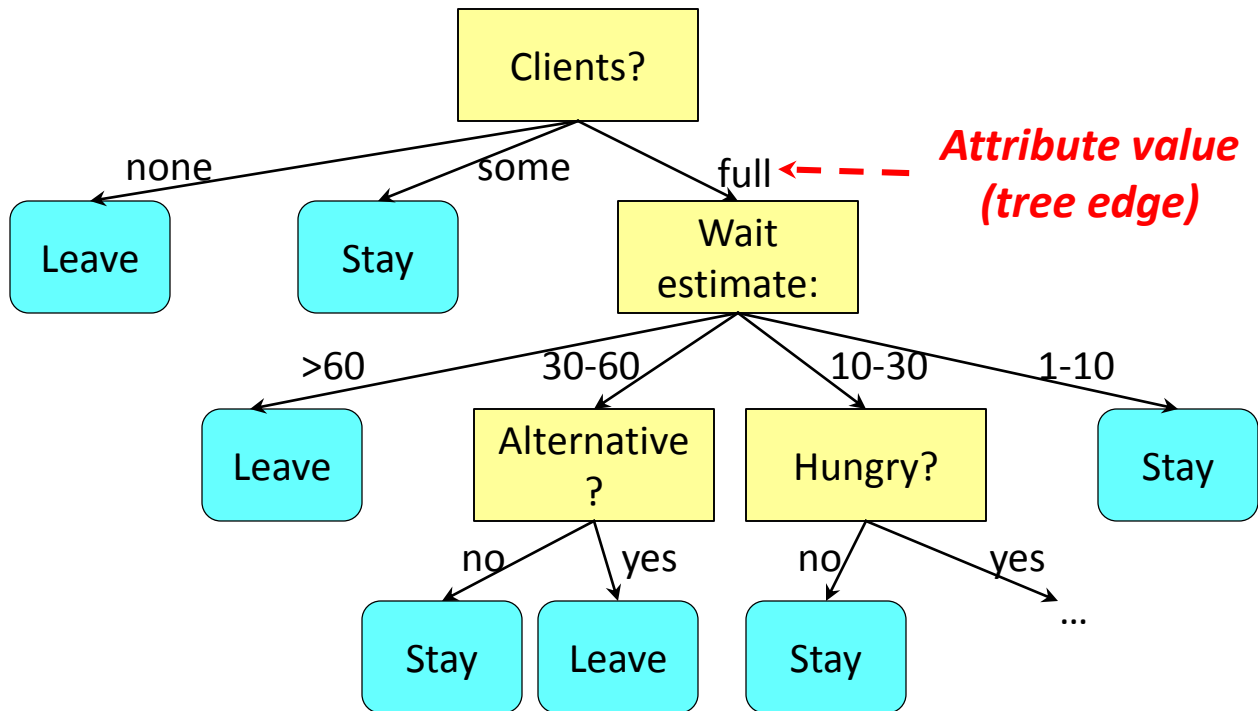- Algorithm design issues
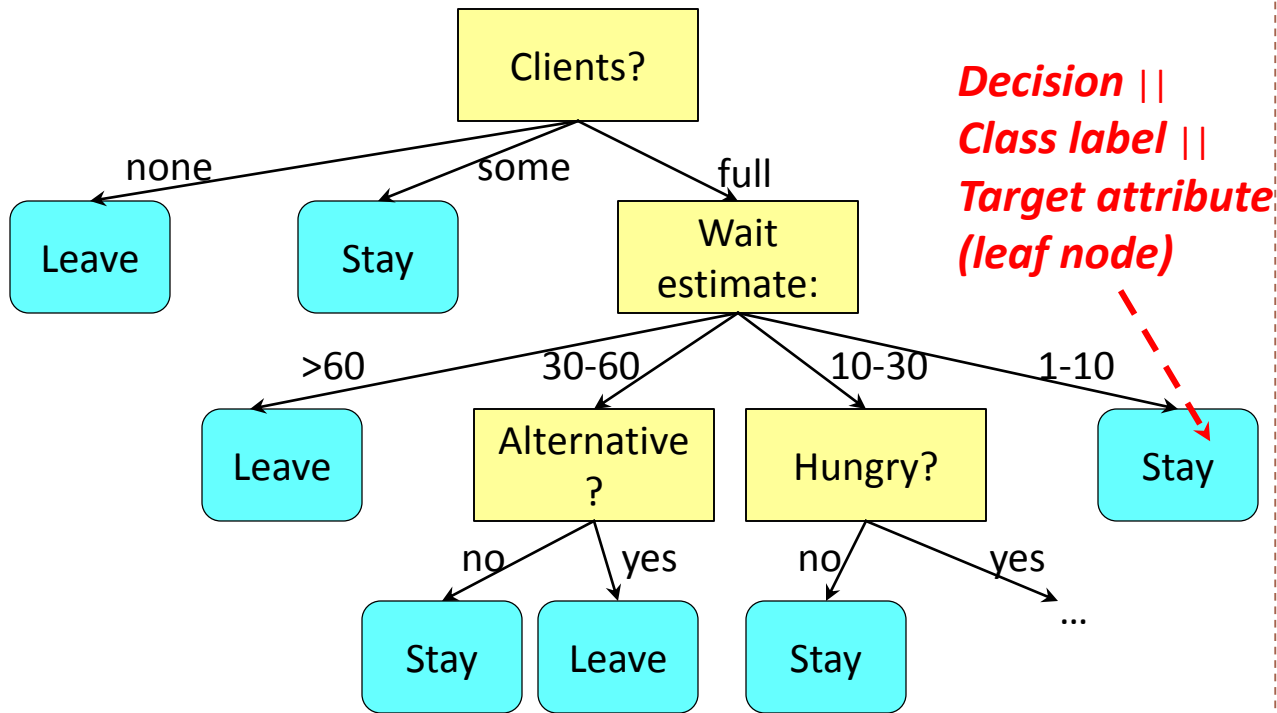- Applications of decision trees

Decision tree – structure

Decision trees
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Decision tree – structure

Clients?

- none → Leave
- some → Stay
- full → Wait estimate:
  - >60 → Leave
  - 30-60 → Alternative?
    - no → Stay
    - yes → Leave
  - 10-30 → Hungry?
    - no → Stay
    - yes → ...
  - 1-10 → Stay

Decision || Class label || Target attribute (leaf node)

Decision trees

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