Components of learning

Metaphor: Credit approval

Applicant information:
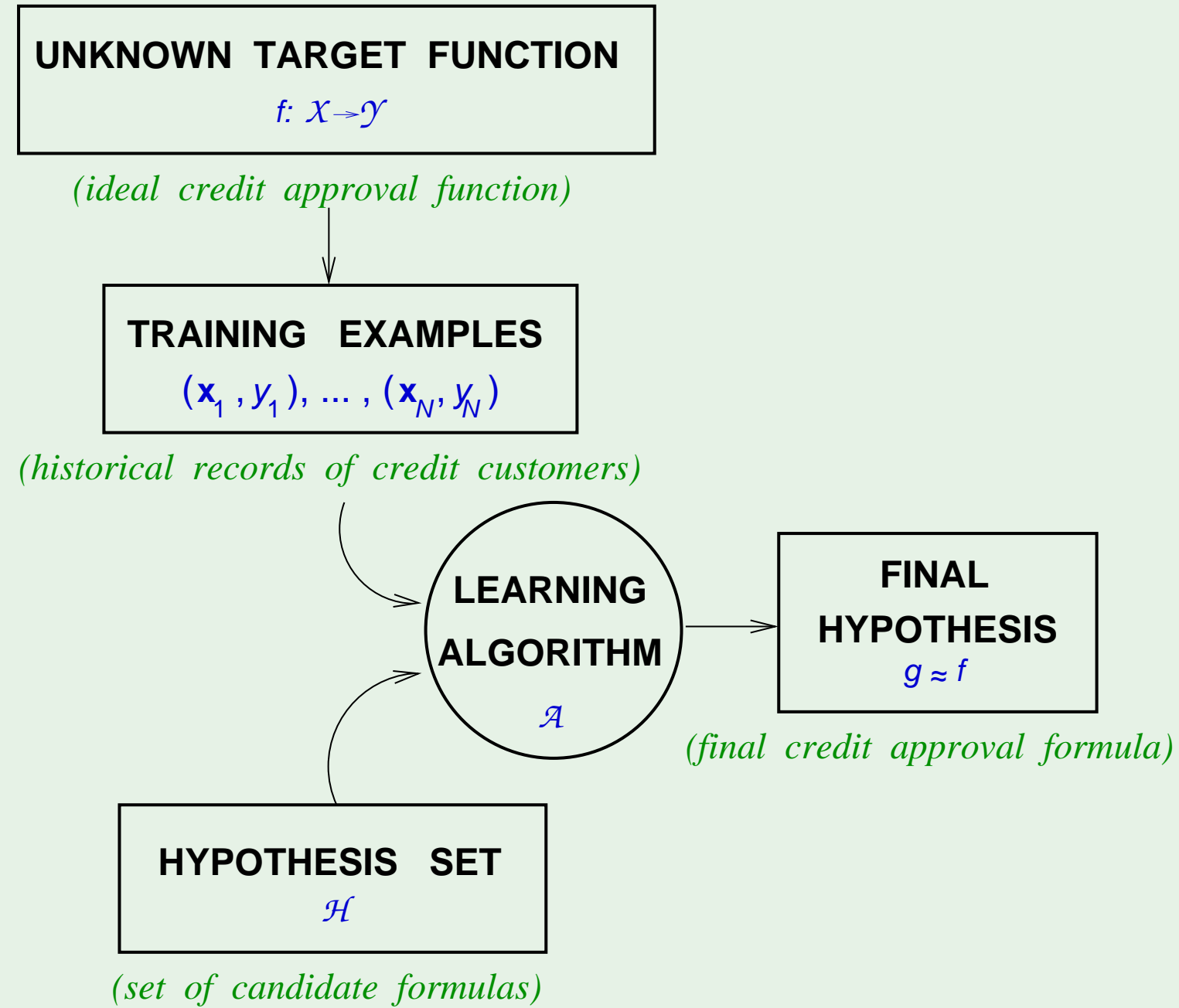
age	23 years
gender	male
annual salary	$30,000
years in residence	1 year
years in job	1 year
current debt	$15,000
. . .	. . .

Approve credit?

Components of learning

Formalization:

- Input: $\mathbf{x}$ *(customer application)*

- Output: y *(good/bad customer?)*

- Target function: $f : \mathcal{X} \to \mathcal{Y}$ *(ideal credit approval formula)*

- Data: $(\mathbf{x}_1, y_1), (\mathbf{x}_2, y_2), \cdots, (\mathbf{x}_N, y_N)$ *(historical records)*

       $\downarrow$ $\downarrow$ $\downarrow$

- Hypothesis: $g : \mathcal{X} \to \mathcal{Y}$ *(formula to be used)*

UNKNOWN TARGET FUNCTION
$f: \mathcal{X} \to \mathcal{Y}$

(ideal credit approval function)

TRAINING EXAMPLES
$(\mathbf{x}_1, y_1), \ldots, (\mathbf{x}_N, y_N)$

(historical records of credit customers)

LEARNING ALGORITHM
$\mathcal{A}$

FINAL HYPOTHESIS
$g \approx f$

(final credit approval formula)

HYPOTHESIS SET
$\mathcal{H}$

(set of candidate formulas)

Solution components

The 2 solution components of the learning problem:

- The Hypothesis Set

$$\mathcal{H} = \{h\} \qquad g \in \mathcal{H}$$

- The Learning Algorithm

Together, they are referred to as the *learning model*.

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(ideal credit approval function)

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