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SAT - 15th exam class

Last Class → Concept Learning

Most suitable: Inductive learning

General rule

"Multiple concepts on a data can be defined"

Boolean valued func. ← Concept

Concept Learning

↳ Inferring Bool. f(x) from training examples

Target Concept - func. / concept which has to be learned by the machine.

(c)

$$c : x \rightarrow \{0, 1\}$$

Goal → Find a hypothesis over dataset X

$$h(x) \approx c(x)$$

which is approx. = target concept.

"Choosing the best h(x) from a large possible h(x) space"

such that its approx. = target concept"

Simplest way to represent Hypothesis - Conjunction of constraints on instance attributes

'T' 'F' '?' 'O' → or 'ϕ'

→ Class examples.

Specific & general hypothesis

$h_1 = \langle T, F, ?, ? \rangle$

$h_2 = \langle T, F, ?, F \rangle$

n_1 T F T T ✓
n_2 T F F T ✓
n_3 T F T F ✓✓
n_4 T F F T ✓
n_5 T F F F ✓✓
n_6 F F F F ✗

h_1 is more generic & h_2 is more specific

"Most generic" $\langle ?, ?, ?, ? \rangle$ — "Most specific" any thing eg

Syntactically distinct hypothesis = $4 \times 4 \times 4 \times 1$
$= 256$

'Semantically' ? $\langle T, \phi, F, F \rangle$
$\langle T, F, \phi, F \rangle$

ϕ for any one : → semantically same

Semantically distinct $= 3 \times 3 \times 3 \times 3 + 1$

numerically distinct — or ? . . .

Find-S Algo. for Concept Learning

'h' → Hypothesis space

finding a maximally specific hypothesis

1.) Initialize h to most specific
$h = \langle \phi, \phi, \phi, \phi \rangle$

2.) For each +ve instance of x
For each constraint in h
if a_i is satisfied by h
do nothing
else
replace constraint a_i by the next most general constraint.

3.) Repeat 2