CANDIDATE ELIMINATION

↳ uses version space

↳ considers both +ve and -ve results.

↳ We have both specific and general hypothesis

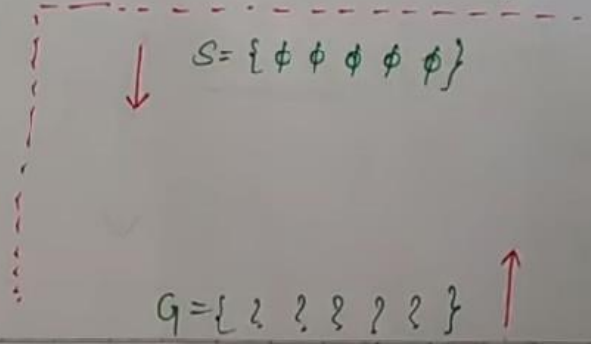
↳ for a +ve example:
we tend to generalize specific hypothesis

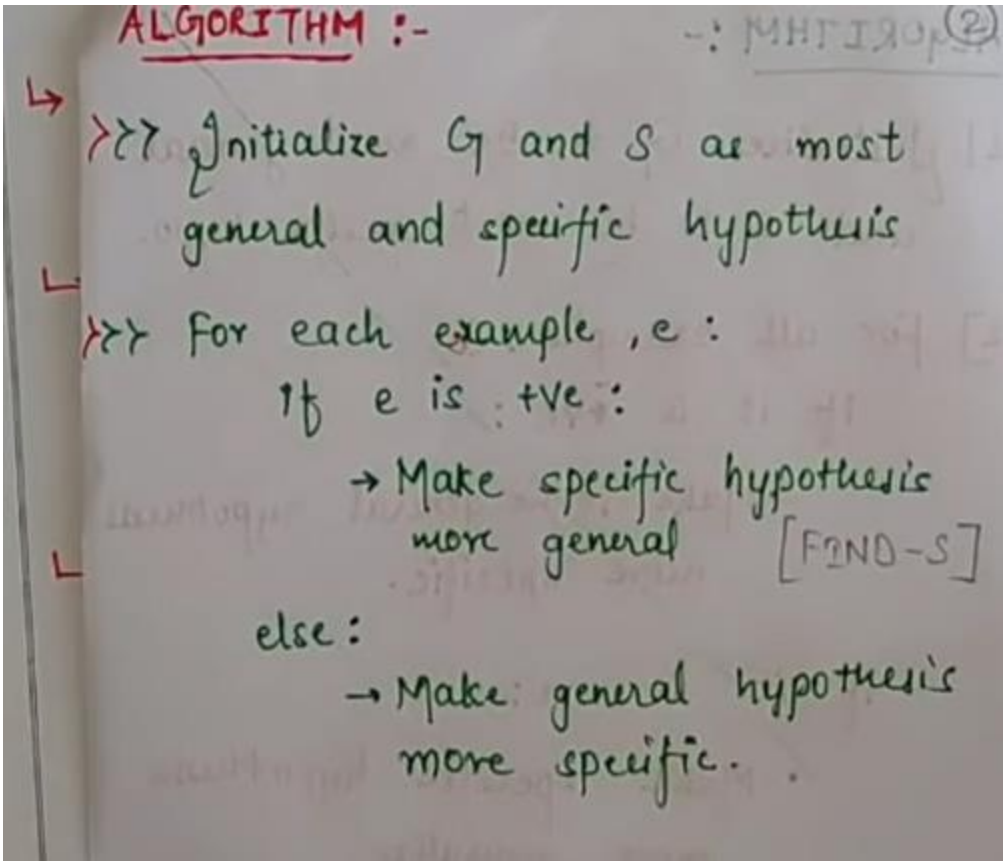
↳ for a -ve example:
We tend to make general hypothesis more specific.

↳ CONCEPT LEARNING
↳ General Hypothesis
↳ Specific Hypothesis
↳ Version Space.

$S = \{\phi, \phi, \phi \dots \phi\}$

$G = \{?, ?, ? \dots ?\}$





Concept: Days on which person enjoys sport

Data set

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

Candidate Elimination algorithm

$S_0 = \{\phi\ \phi\ \phi\ \phi\ \phi\ \phi\}$, $G_0 = \{\langle ?, ?, ?, ?, ?, ? \rangle\}$

I Training sample

$x_1 = \langle$Sunny, warm, Normal, strong, warm, same$\rangle$ +

$\downarrow$

$S_1 = \langle$ Sunny, warm, Normal, strong, warm, same $\rangle$

No change in G_0

$G_0 = \{\langle ?, ?, ?, ?, ?, ? \rangle\}$

II $x_2 = \langle$Sunny, warm, High, strong, warm, same$\rangle$ +

$\downarrow$

$S_2 = \langle$Sunny, warm, ?, strong, warm, same$\rangle$

No change in G_2

$G_2 = \langle ?, ?, ?, ?, ?, ? \rangle$

III $x_3 = \langle$Rainy, cold, High, strong, warm, change$\rangle$ (−)

Since x_3 is (−), start from bottom.

No change in S_3 (mismatch) (generalize) (mismatch)

$S_3 = \langle$Sunny, warm, ?, strong, warm, same$\rangle$

we make our general hypothesis more specific.

$\uparrow$ $G_3 = \{\langle$Sunny, ?, ?, ?, ?, ?$\rangle, \langle$?, warm, ?, ?, ?, ?$\rangle, \langle$?, ?, ?, ?, ?, same$\rangle\}$

[attribute by attribute

[Compare training sample x_3 with S_3. If

any mismatch, write the attribute in G_3 to G_4.

Remaining attributes in G_4 are '?'.

IV

$S_3 = \{ \langle sunny, ?, ?, ?, ?, ? \rangle, \langle ?, warm, ?, ?, ?, ? \rangle, \langle ?, ?, ?, ?, ?, same \rangle \}$

$x_4 = \langle sunny, warm, High, strong, cool, change \rangle$ +

$S_3 = \langle sunny, warm, ?, strong, warm, same \rangle$

$S_4 = \langle sunny, warm, ?, strong, ?, ? \rangle$ (same/change)

(Make any value) → ? → it can achieve any value

In G_3, $\langle ?, ?, ?, ?, ?, same \rangle$

↳ It accepts only same.

[There is a contradiction between these two. So we have to remove this from G_3]

Now $G_4 = \{ \langle sunny, ?, ?, ?, ?, ? \rangle, \langle ?, warm, ?, ?, ?, ? \rangle \}$

Final hypothesis

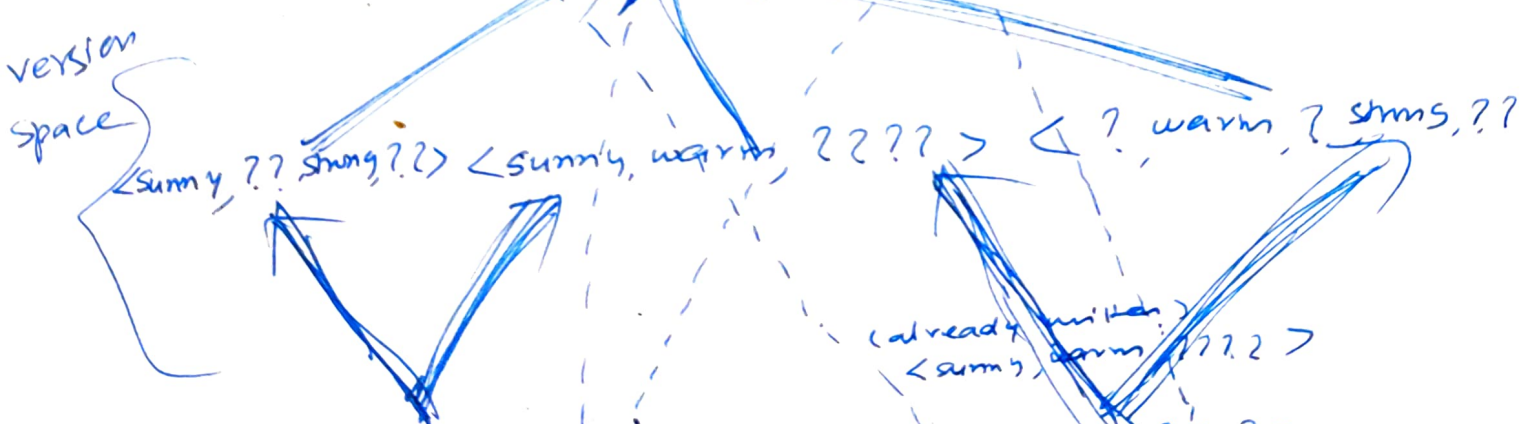
$S_4 = \langle sunny, warm, ?, strong, ?, ? \rangle$

$G_4 = \{ \langle sunny, ?, ?, ?, ?, ? \rangle, \langle ?, warm, ?, ?, ?, ? \rangle \}$

version space

[we have 6 consistent hypothesis]

$S_4 = \{ \langle sunny, warm, ?, strong, ?, ? \rangle \}$



$G_4 = \{ \langle sunny, ?, ?, ?, ?, ? \rangle, \langle ?, warm, ?, ?, ?, ? \rangle \}$

[compare G_4 with S_4 attribute by attribute. If any mismatch write that attribute]