Candidate Elimination Algorithm | ML LAB 2

Candidate Elimination Algorithm

- The candidate elimination algorithm incrementally builds the **version space** given a hypothesis space **H** and a set **E** of examples.
- The examples are added one by one; each example possibly shrinks the version space by removing the hypotheses that are inconsistent with the example

- The candidate elimination algorithm does this by updating the general and specific boundary for each new example.

Resemblance and contrast with Find S-Algorithm

- You can consider this as an extended form of Find-S algorithm.
- Consider both positive and negative examples.
- Actually, positive examples are used here as Find-S algorithm (basically they are generalizing from the specification).
- While the negative example is specified from generalize form.

Terms used

Concept learning: Concept learning is basically learning task of the machine (Learn by Train data)

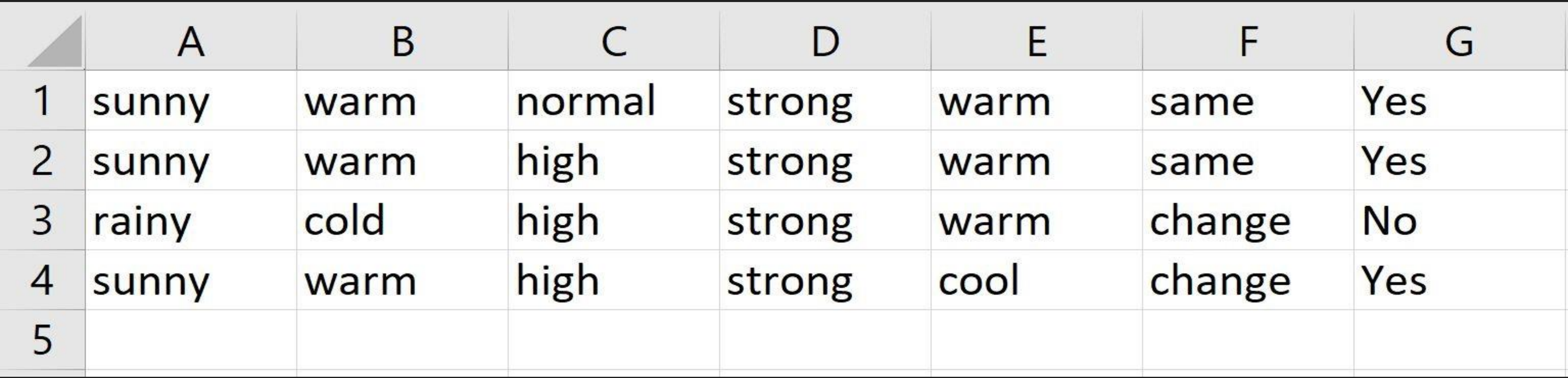
General Hypothesis: Not Specifying features to learn the machine.

G = {‘?’, ‘?’,’?’,’?’…}: Number of attributes

Specific Hypothesis: Specifying features to learn machine (Specific feature)

S= {‘pi’,’pi’,’pi’…}: Number of pi depends on number of attributes.

Version Space: It is intermediate of general hypothesis and Specific hypothesis. It not only just written one hypothesis but a set of all possible hypothesis based on training data-set.



	A	B	C	D	E	F	G
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
5							

Dataset

Steps for our dataset

Initially : **G = [[?, ?, ?, ?, ?, ?], [?, ?, ?, ?, ?, ?], [?, ?, ?, ?, ?, ?],**

[?, ?, ?, ?, ?, ?], [?, ?, ?, ?, ?, ?], [?, ?, ?, ?, ?, ?]]

S = [Null, Null, Null, Null, Null, Null]

For instance 1 : **<'sunny','warm','normal','strong','warm ','same'>** and **positive** output.

G1 = G

S1 = ['sunny','warm','normal','strong','warm ','same']

For instance 2 : **<'sunny','warm','high','strong','warm ','same'>** and **positive** output.

G2 = G

S2 = ['sunny','warm',?,'strong','warm ','same']

For instance 3 : **<'rainy','cold','high','strong','warm ','change'>** and **negative** output.

G3 = [['sunny', ?, ?, ?, ?, ?], [?, 'warm', ?, ?, ?, ?], [?, ?, ?, ?, ?, ?],

[?, ?, ?, ?, ?, ?], [?, ?, ?, ?, ?, ?], [?, ?, ?, ?, ?, 'same']]

S3 = S2

For instance 4 : **<'sunny','warm','high','strong','cool','change'>** and **positive** output.

G4 = G3

S4 = ['sunny','warm',?,'strong', ?, ?]

Output

G = [['sunny', ?, ?, ?, ?, ?], [?, 'warm', ?, ?, ?, ?]]

S = ['sunny','warm',?,'strong', ?, ?]

Candidate Elimination Algorithm

Step1: Load Data set

Step2: Initialize General Hypothesis and Specific Hypothesis.

Step3: For each training example **Step4:** If example

is positive example if **attribute_value ==**

hypothesis_value: **Do nothing**

else:

replace attribute value with '?' (basically generalizing it)

Step5: If **example is Negative** example

Make **generalize hypothesis more specific.**