Lecture 23

PCFG (Probabilistic CFG)-PART II

-Finding the best tree/structure for a sentence

How to convert CFG to PCFG

- **PCFG: Probabilistic CFG**
- Attach a probability value to each production such that the sum of probabilities of productions with the same LHS $\sum_{same\_LHS} P(productions)$ is equal to 1
- Utility: 1) Find the best tree for a sentence (for ambiguous grammar)

  2) Find the best output sentence (in case of multiple candidates)
- How to find the probability (tree) or probability (sentence)?
- Write the derivation for the test sentence/construct the tree
- Multiply the probabilities of all the productions used for making the tree

$$P(sentence) = \prod_{tree} P(productions)$$

- Best tree/Best sentence is the one with the maximum probability

PCFG (Probabilistic Context Free Grammar)

Test sentence: i saw a man with the telescope

- S→VP NP (0.2)
- S→NP VP (0.8)
- VP→V
- NP→Det Adj NP
- VP→V NP
- NP→Det N
- NP→Pronoun
- NP→NP PP
- PP→Preposition NP
- VP→V NP PP

- N→dog (0.2)
- N→man (0.6)
- N→cat (0.1)
- Det→the
- Det→a
- Adj→old
- Adj→small
- V→ate
- V→cried
- V→saw
- Pronoun→i
- Pronoun→she
- Preposition→with
- Preposition→to
- Preposition→on
- N→telescope (0.1)

❑ Complete all the probabilities (Assignment 1)

❑ Attempt Assignment 2 for finding the best tree