Unit 4 – Constituency-Based Parse Tree Activity

Title: Hybrid Agent Architectures

This unit has a live seminar. You will be able to see all the seminar times and dates in the menu on the left. View the Lecturecast(s) available and engage with the reading set for the specific unit prior to each seminar. To benefit from the seminar fully, please also **view the seminar content available for each seminar in the seminar booklet** and prepare answers to any questions posed.

This activity involved creating constituency-based parse trees to demonstrate how intelligent systems can interpret natural language structure.

The government raised interest rates.
(S
  (NP (Det The) (N government))
  (VP (V raised)
    (NP (N interest) (N rates))))

The internet gives everyone a voice.
(S
  (NP (Det The) (N internet))
  (VP (V gives)
    (NP (N everyone))
    (NP (Det a) (N voice))))

The man saw the dog with the telescope. [ambiguous]
(1)
(S
  (NP (Det The) (N man))
  (VP (V saw)
    (NP
      (NP (Det the) (N dog))
      (PP (P with) (NP (Det the) (N telescope))))))

(2)
(S
  (NP (Det The) (N man))
  (VP (V saw)
    (NP (Det the) (N dog))
    (PP (P with) (NP (Det the) (N telescope)))))

Overview:

One emerging application of deep learning is its use in diagnosing mental health conditions through voice analysis. AI-powered tools can now detect signs of depression, anxiety, or PTSD based on tone, pitch, speech patterns, and hesitation frequency during spoken conversations.

How It Works:

These systems use recurrent neural networks (RNNs) and transformers trained on labeled datasets containing speech samples from both healthy individuals and patients with diagnosed mental conditions. The models learn to identify subtle speech anomalies linked to specific mental states.

Socio-Technical Impact:

This technology has strong potential for early detection and intervention, particularly in underserved areas. However, it also raises critical concerns around privacy, consent, data sensitivity, and the potential for algorithmic bias. Ethically, there is a risk of over-reliance on machine judgment without proper clinical validation, and socially, it could impact how employers or insurers perceive individuals flagged by such systems.