MA410 Artificial Intelligence - Natural Language Reference

1 Applications

- database query languages

- machine-assisted translation

- information extraction e.g. financial reports

2 Parts of Speech (Lexical Categories)

Noun things, items

    proper countries, first names, etc. e.g. *Ireland, Mary*   **uncountable** e.g. *sand, water*

    abstract e.g. *philosophy, mathematics*   **countable** e.g. *apple, dog*

Verb denotes an action, occurrence or state of being

    intransitive takes no object, e.g. *to go, to be born*

    transitive takes an object, e.g. *to read, you read the book*.

    ditransitive takes direct and indirect objects, e.g. *give, he gave the book to him*.

Adjective word that describes a noun, e.g. *happy, good, bold*

Adverb word that describes a verb, e.g. *happily, well, boldly*

Determiner a noun modifier expressing the reference of a noun or noun phrase in the context.

    articles a, an, the   **demonstrative** *this, that, those, these*

    interrogative, relative e.g. *which, what*   **quantifiers** *all, few, many, several, some*

    cardinal e.g. *one, two, fifteen*   **others** *such, either, no, another, my, your*

Interjection exclamation of surprise, e.g. *oh! argh!*

Preposition connecting word that shows the relation of a noun or noun-substitute to some other word, e.g. *on, in, by*

Conjunction connects two words, phrases or clauses together

    co-ordinating join words, phrases and clauses, e.g. *but, and, because*

    subordinating introduce a dependent clause, e.g. *if, although, after*

    correlative (in pairs) consists of subordinates linked to adjective/adverb, e.g. *neither...nor*

Pro-form word standing in for another word, phrase, clause, sentence. e.g. pronoun, pro-adverb, etc.

    subjective pronoun e.g. *he, she, it*   **objective pronoun** e.g. *him, her*

    relative pronoun e.g. *whom, which, who, that*   **other pronouns** e.g. *these, each*

Auxiliary (also called "helper verb") verb functioning to give further semantic information about the main verb following it, e.g. *should, being, would, might, must*

Interrogative e.g. *which, when, why, where, whose, how, who, what.* Can be pro-forms or determiners.

3 Syntax - Phrasal Categories

Words fit together to make phrases and each category has a characteristic structure.

- noun phrases

- verbal phrases

- prepositional phrases

- adverbial phrases

- adjectival phrases

- sentences

4 Sentences

4.1 Forms

declarative e.g. *Fiona is listening.*

interrogative Yes/No question e.g. *Is Fiona listening?*   Wh-question: *When is Fiona listening?*

imperative e.g. *Listen, Fiona!*

subjunctive e.g. *If Fiona were listening, she might learn something.*

4.2 Types

simple composed of one independent clause.

compound composed of ≥ 2 independent clauses connected by a co-ordinating conjunction.

complex composed of one independent (main) clause and one or more dependent clauses.

compound-complex combines the two above.

5 Grammar Rules

The structure of a phrase can be described in terms of its sequence of parts of speech.

5.1 Breakdown

- Noun Phrase (**NP**) = $\begin{cases} \text{noun} \\ \text{pronoun} \\ \text{determiner + noun} \\ \text{determiner + adjective + noun} \\ \text{adjective + noun} \\ \text{NP (+, ..., NP) + and/or + NP} \\ \text{NP + relative clause (see below)} \end{cases}$

- Verb Phrase (**VP**) = $\begin{cases} \text{verb} \\ \text{verb + NP} \\ \text{VP + adjective} \\ \text{VP + adverb} \\ \text{VP + PP} \end{cases}$

- Prepositional Phrase(**PP**): prep + NP
- Relative Clause(**RC**): rel pronoun + VP

- Simple Sentence (**SS**): NP + VP

- Interrogative Sentences (**IS**) = $\begin{cases} \text{auxiliary verb + NP + VP (e.g. } \textit{Did you go?}) \\ \text{interrogative + auxiliary + NP + VP (e.g. } \textit{When did you go?}) \end{cases}$

- Other Sentence (**OS**) = $\begin{cases} \text{SS + co-ordinating conj + VP} \\ \text{SS + conjunction + SS} \\ \text{subordinating conj + SS + corresponding correlative conj + SS} \end{cases}$

Are there more possibilities?

5.2 Grammatical Cases

Word Classes singular -vs- plural, gender(male, female, neuter) (e.g. *blond/blonde, actor/actress*)

Nominative Subject of sentence. e.g. *student* in *"The student sent a letter to his parents by post."*

Accusative Direct object. e.g. *letter* in *"The student sent a letter to his parents by post."*

Genitive Ownership. e.g. *his* in *"The student sent a letter to his parents by post."*

Dative Indirect object e.g. *his parents* in *"The student sent a letter to his parents by post."*

Instrumental the means, method e.g. *by post* in *"The student sent a letter to his parents by post."*

Locative location e.g. *Ireland* as in *"The student sent a letter in Ireland to his parents by post."*

Vocative addressing someone e.g. *O parents* in *"O parents, did you get my letter?"*