Natural Language Parsing

Simple grammar checker
Building parse tree

Natural Language Parsing

- Given a simple grammar:
  sentence → Noun_phrase Verb_phrase
  Noun_phrase → Determinant Noun
  Verb_phrase → Verb Noun_phrase
- And a vocabulary:
  Determinant: a, the
  Noun: dog, cat
  Verb: chases, likes, kills
- Is the following sentence grammatically correct?
  The dog chases the cat.

Design, Grammar Checker

- How to represent a sentence?
  - Use list, e.g.
    ['The', dog, chases, the, cat]
  - 'The' is different from 'the'…
- What predicate to define?
  sentence(S)
  which should succeed if S is grammatically correct, fail otherwise

Simple Grammar Checker

```
sentence( Sentence ) :-
   append( NP, VP, Sentence ),
   noun_phrase( NP ), verb_phrase( VP ).
noun_phrase( NP ) :-
   append( Det, N, NP ),
   determiner( Det ), noun( N ).
verb_phrase( VP ) :-
   append( V, NP, VP ),
   verb( V ), noun_phrase( NP ).
```


Vocabulary

```
determiner( [a] ).
determiner( [the] ).
noun( [dog] ).
noun( [cat] ).
noun( [bird] ).
verb( [likes] ).
verb( [chases] ).
verb( [kills] ).
```

Query

```
?- sentence( [the, cat, kills, a, bird] ).
?- sentence( [the, dog, likes, the, dog] ).
```


Language Parsing

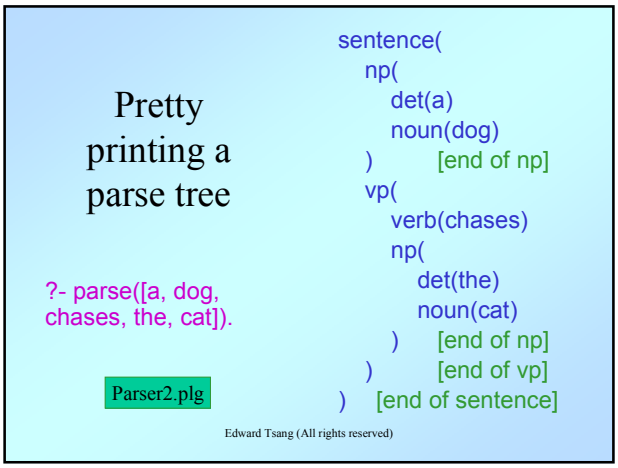
Given query:

```
?- sentence( [a, dog, chases, the, cat], ParseTree ).
```

One would like to get:

```
ParseTree = sentence(np(det(a), noun(dog)),
   vp(verb(chases), np(det(the), noun(cat))))
```

Program development (parser2.plg)


Pretty printing a parse tree
?- parse([a, dog, chases, the, cat]).
Parser2.plg
sentence(
np(
det(a)
noun(dog)
) [end of np]
vp(
verb(chases)
np(
det(the)
noun(cat)
) [end of np]
) [end of vp]
) [end of sentence]
Edward Tsang (All rights reserved)