

# MA410 Prolog Practical 4 - Lists and NLP

## 1 Lists

- (a) Download file `lab4lists.pl` and add the code:
- ```
del(X, [X|T], T).
del(X, [Y|T], [Y|T1]) :- del(X, T, T1).
```
- (b) Try to delete the element 'a' from the list `[a,b,c,d,a,e,f]` in Prolog by typing
- ```
?- del(a, [a, b, c, d, a, e, f], L).
```
- Press ';' to see another result.
- Notice that we can use the predicate `del` not only to delete elements, but also to insert them by trying e.g. `?- del(x, List, [a,b,c,d])`.
- (c) Try some examples with lists, e.g.
- `?- [H | T] = [a,b,c,d]`.
  - `?- [_,_,X] = [a,b,c]`.
  - `?- member(a, [a,b,c])`.
  - `?- append([a,b,c], [d,e,f], L)`.
- (d) Define the predicates:
- ```
insert(X, L, Y) use idea above.
longer(L1, L2) true if L1 is longer than L2.
delall(X, L, Y) deletes all X's in L to get Y.
```

## 2 Parsing with Difference Lists

*Parsing* is analysing an input stream.

*Difference lists* are pairs of lists used to represent the list of elements being parsed.

The actual list represented is the difference between the first and second list, e.g. `[the, dog]` might be represented by the two lists

```
- [the, dog, chases, the, cat],
- [chases, the, cat]
```

More generally, `[the, dog | X]` and `X`.

### 2.1 Creating Sentences

- (a) Download file `lab4diff.pl`.
- (b) You'll see in the file a definition for `sentence` and `subject` using difference lists:
- ```
sentence(L1, L4) :- subject(L1, L2),
                    verb(L2, L3),
                    obj(L3, L4).

subject(T1, T3) :- det(T1, T2),
                  noun(T2, T3).
```

Note how difference lists work. e.g. `subject` links to `verb` through the difference list `L2`, and `verb` to `object` by list `L3`.

- (c) Go into prolog and try: `?- listing(sentence)`.
- (d) Define `obj` (object) similar to `subject`.
- (e) Using the examples below:

```
det([the | X], X).
noun([student | X], X).
verb([carries | X], X).
```

define the following:

```
noun(s): dog, cat, mouse, horse, food
det(erminers): a, the
verb(s): chases, eats
```

Note, in each example, how the word is taken off the front of the first list, and the tail unified with the second list.

- (f) Experiment with the above predicates, e.g. try:

```
?- noun([dog, eats, food], X).
?- noun([chases, the, mouse], X).
?- subject([the, mouse, chases, the, cat], X).
?- verb([eats, the, food], X).
?- obj([the, horse], X).
?- sentence([a, dog, chases, the, cat], []).
?- sentence([chases, horse, the, dog], []).
```

- (g) Generate Difference Lists

We can also generate grammatically correct sentences from the given vocabulary.

```
?- noun(X, []).
?- subject(X, Y).
?- sentence(X, []).
?- subject(A,B), verb(B,C), obj(C, []).
```

- (h) Add the following predicates:

- `adj` (adjective) & create 3 different adjectives.
- `prep` (preposition) & create 2 prepositions.

Task: Create an additional definition for `subject` & `obj(ect)` to allow for adjectives. E-mail me on the code with subject heading "Diff List Lab - Adjectives". Mention one example.

- (i) Test out different sentences for legality.
- (j) Check for grammatically correct sentences.