

Natural Language Processing, Syntax Assignment

Wimal Perera, Index No: 09/10008

Please note that all programs related with this assignment were written and tested under SWI Prolog interpreter (version 5.8.0) for Windows which can be downloaded at <http://www.swi-prolog.org>

Question 1

Program

% Sample parser in DCG notation

s --> np, vp.

np --> name1.

np --> det, adj, noun.

np --> simplePronoun.

np --> det, noun.

vp --> simpleVerb.

vp --> complexVerb, object.

object --> det, adj, noun.

object --> det, noun.

object --> pronoun, det, noun.

object --> pronoun, complexVerb, pronoun.

name1 --> [john].

complexVerb --> [visited]; [chased]; [gave]; [thought]; [knew].

simpleVerb --> [jumped].

simplePronoun --> [i]; [she].

pronoun --> [you]; [him]; [me].

det --> [a]; [the].

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noun --> [boy]; [dog]; [man]; [cd]; [chic].

adj --> [tall]; [old]; [nasty].

Sample Output

% To test:

% ?- s([the,tall,boy,jumped],[]).

% true

% ?- s([john,visited,the,old,man],[]).

% true

% ?- s([a,nasty,dog,chased,the,chic],[]).

% true

% ?- s([she,gave,me,the,cd],[]).

% true

% ?- s([i,thought,you,knew,him],[]).

% true

% ?- s([the,boy,jumped,the,girl],[]).

% false

% ?- s([the,john,visited,the,man],[]).

% false

% ?- s([a,dog,chase,the,cat],[]).

% false

% ?- s([she,gave,me],[]).

% false

% ?- s([i,saw,two,dog],[]).

% false

Question 2

Program

% Sample parser in DCG notation

s(s(X,Y)) --> np(X), vp(Y).

np(np(X)) --> name1(X).

np(np(X, Y, Z)) --> det(X), adj(Y), noun(Z).

np(np(X)) --> simplePronoun(X).

np(np(X,Y)) --> det(X), noun(Y).

vp(vp(X)) --> simpleVerb(X).

vp(vp(X,Y)) --> complexVerb(X), object(Y).

object(object(X,Y,Z)) --> det(X), adj(Y), noun(Z).

object(object(X,Y)) --> det(X), noun(Y).

object(object(X,Y,Z)) --> pronoun(X), det(Y), noun(Z).

object(object(X,Y,Z)) --> pronoun(X), complexVerb(Y), pronoun(Z).

name1(name1(X)) --> [X], {name1(X)}.

name1(john).

complexVerb(complexVerb(X)) --> [X], {complexVerb(X)}.

complexVerb(visited).

complexVerb(chased).

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complexVerb(gave).

complexVerb(thought).

complexVerb(knew).

simpleVerb(simpleVerb(X)) --> [X], {simpleVerb(X)}.

simpleVerb(jumped).

simplePronoun(simplePronoun(X)) --> [X], {simplePronoun(X)}.

simplePronoun(i).

simplePronoun(she).

pronoun(pronoun(X)) --> [X], {pronoun(X)}.

pronoun(you).

pronoun(him).

pronoun(me).

det(det(X)) --> [X], {det(X)}.

det(a).

det(the).

noun(noun(X)) --> [X], {noun(X)}.

noun(boy).

noun(dog).

noun(man).

noun(cd).

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noun(chic).

adj(adj(X)) --> [X], {adj(X)}.

adj(tall).

adj(old).

adj(nasty).

Sample Output

For help, use ?- help(Topic). or ?- apropos(Word).

1 ?- s(Tree,[the,tall,boy,jumped],[]).

Tree = s(np(det(the), adj(tall), noun(boy)), vp(simpleVerb(jumped))) .

2 ?- s(Tree,[john,visited,the,old,man],[]).

Tree = s(np(name1(john)), vp(complexVerb(visited), object(det(the), adj(old), noun(man)))) .

3 ?- s(Tree,[a,nasty,dog,chased,the,chic],[]).

Tree = s(np(det(a), adj(nasty), noun(dog)), vp(complexVerb(chased), object(det(the), noun(chic)))) .

4 ?- s(Tree,[she,gave,me,the,cd],[]).

Tree = s(np(simplePronoun(she)), vp(complexVerb(gave), object(pronoun(me), det(the), noun(cd)))) .

5 ?- s(Tree,[i,thought,you,knew,him],[]).

Tree = s(np(simplePronoun(i)), vp(complexVerb(thought), object(pronoun(you), complexVerb(knew), pronoun(him)))) .

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6 ?- s(Tree,[the,boy,jumped,the,girl],[]).

false.

7 ?- s(Tree,[the,john,visited,the,man],[]).

false.

8 ?- s(Tree,[a,dog,chase,the,cat],[]).

false.

9 ?- s(Tree,[she,gave,me],[]).

false.

10 ?- s([i,saw,two,dog],[]).

ERROR: Undefined procedure: s/2

ERROR: However, there are definitions for:

ERROR: s/3

false.

11 ?- s(Tree,[i,saw,two,dog],[]).

false.

12 ?-

Question 3

Introduction

In Sinhala we have a concept called “**purusha bedhaya**”.

We do have;

1. Utthama purusha
2. Madyama purusha
3. Prathama purusha

Let’s consider some instances of “**Utthama purusha**” and “**Prathama purusha**”.

1. mama gedara giyemi
2. api gedara giyemu
3. goviya gedara giyeya
4. geviliya gedara giyaya
5. ohu gedara giyeya
6. eya gedara giyaya
7. ovuhu gedara giyaha

Program

% Sample parser in DCG notation

s(s(X,Y,Z)) --> subject(X, Purushaya, Number), object(Y), verb(Z, Purushaya, Number).

s(s(X,Y,Z)) --> subject(X, Purushaya, Number, Gender), object(Y), verb(Z, Purushaya, Number, Gender).

object(object(Y)) --> [Y], {object(Y)}.

object(gedara).

subject(subject(X), Purushaya, Number) --> [X], {subject(X, Purushaya, Number)}.

subject(mama, utthama, singular).

subject(api, utthama, plural).

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subject(ovuhu, prathama, plural).

subject(subject(X), Purushaya, Number, Gender) --> [X], {subject(X, Purushaya, Number, Gender)}.

subject(goviya, prathama, singular, male).

subject(geviliya, prathama, singular, female).

subject(ohu, prathama, singular, male).

subject(eya, prathama, singular, female).

verb(verb(Z), Purushaya, Number) --> [Z], {verb(Z, Purushaya, Number)}.

verb(giyemi, utthama, singular).

verb(giyemu, utthama, plural).

verb(giyaha, prathama, plural).

verb(verb(Z), Purushaya, Number, Gender) --> [Z], {verb(Z, Purushaya, Number, Gender)}.

verb(giyeya, prathama, singular, male).

verb(giyaya, prathama, singular, female).

Sample Output

For help, use ?- help(Topic). or ?- apropos(Word).

1 ?- s(Tree, [mama, gedara, giyemi], []).

Tree = s(subject(mama), object(gedara), verb(giyemi)) .

2 ?- s(Tree, [api, gedara, giyemu], []).

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Tree = s(subject(api), object(gedara), verb(giyemu)) .

3 ?- s(Tree, [ohu, gedara, giyeya], []).

Tree = s(subject(ohu), object(gedara), verb(giyeya)).

4 ?- s(Tree, [eya, gedara, giyaya]).

ERROR: Undefined procedure: s/2

ERROR: However, there are definitions for:

ERROR: s/3

false.

5 ?- s(Tree, [eya, gedara, giyaya], []).

Tree = s(subject(eya), object(gedara), verb(giyaya)).

6 ?- s(Tree, [goviya, gedara, giyeya]).

ERROR: Undefined procedure: s/2

ERROR: However, there are definitions for:

ERROR: s/3

false.

7 ?- s(Tree, [goviya, gedara, giyeya], []).

Tree = s(subject(goviya), object(gedara), verb(giyeya)).

8 ?- s(Tree, [geviliya, gedara, giyaya], []).

Tree = s(subject(geviliya), object(gedara), verb(giyaya)).

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9 ?- s(Tree, [ovuhu, gedara, giyaha], []).

Tree = s(subject(ovuhu), object(gedara), verb(giyaha)) .

10 ?- s(Tree, [api, gedara, giyemi], []).

false.

11 ?- s(Tree, [mama, gedara, giyaya], []).

false.

12 ?-