

This document include PCFGParser for sentences in dev.sen file. Every Sentences are divided into Previous PCFGParser , New Parser and finally their short description.

Normal sentences:

1. Arthur is the king .

A. Previous PCFGParser :

```
[PCFGParser] log prob = -17.69 sentence : Arthur is the king .  
[PCFGParser] best parse tree:  
(START  
  (S1  
    (@NP-VP  
      (NP  
        (Proper Arthur))  
      (VP  
        (VerbT is)  
        (NP  
          (Det the)  
          (Nbar  
            (Noun king)))))) .))
```

B. New PCFGParser :

Same as Previous

C. Description:

As default rules of S1.gr classified this sentence to S1. We are not doing anything.

2. Arthur rides the horse near the castle .

A. Previous PCFGParser :

```
[PCFGParser] log prob = -33.60 sentence : Arthur rides the horse near the castle .  
[PCFGParser] best parse tree:
```

```
(START
(S1
(@NP-VP
(NP
(Proper Arthur))
(VP
(VerbT rides)
(NP
(Det the)
(Nbar
(Nbar
(Noun horse))
(PP
(Prep near)
(NP
(Det the)
(Nbar
(Noun castle)))))) .))
```

B. New PCFGParser :

Same as Previous.

C. Description:

As default rules of S1.gr classified this sentence to S1. We are not doing anything.

3. Arthur rides the plodding horse near the castle .**A. Previous PCFGParser :**

[PCFGParser] log prob = -74.04 sentence : Arthur rides the plodding horse near the castle .

[PCFGParser] best parse tree:

```
(START
(S2
(_Proper
(Proper Arthur)
(_VerbT
(VerbT rides)
(_Det
(Det the)
(_Misc
```

```

(Misc plodding)
(_ Noun
  (Noun horse)
  (_ Prep
    (Prep near)
    (_ Det
      (Det the)
      (_ Noun
        (Noun castle)
        (_ Misc
          (Misc .))))))))))

```

B. New PCFGParser :

[PCFGParser] log prob = -51.78 sentence : Arthur rides the plodding horse near the castle .

[PCFGParser] best parse tree:

```

(START
  (S1
    (@NP-VP
      (NP
        (Proper Arthur))
      (VP
        (VerbT rides)
        (NP
          (Det the)
          (Nbar
            (Adj plodding)
            (Nbar
              (Nbar
                (Noun horse))
              (PP
                (Prep near)
                (NP
                  (Det the)
                  (Nbar
                    (Noun castle)))))))))) .))

```

C. Description:

As Plodding is not classified in sentence 3, so classified it as adjective and Then added new rule Nbar to Adj Nbar.

Vocab Changes	:	1	Adj	plodding
New Rule	:	1	Nbar	Adj Nbar

4. the Holy Grail is a chalice .

A. Previous PCFGParser :

[PCFGParser] log prob = -54.42 sentence : the Holy Grail is a chalice .

[PCFGParser] best parse tree:

```
(START
  (S2
    (_Det
      (Det the)
      (_Misc
        (Misc Holy) Grail)
      (_VerbT
        (VerbT is)
        (_Det
          (Det a)
          (_Noun
            (Noun chalice)
            (_Misc
              (Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -29.52 sentence : the Holy Grail is a chalice .

[PCFGParser] best parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Det the)
        (Nbar
          (ProperT Holy) Grail)))
      (VP
        (VerbT is)
        (NP
          (Det a)
          (Nbar
            (Noun chalice)))))) .))
```

C. Description:

As Holy Grail is not classified in sentence 4, so classified it as Proper Thing different then Proper People and Then added new rule Nbar to ProperT to s1.gr.

Vocab Changes	:	1	ProperT	Holy Grail
New Rule	:	1	Nbar	ProperT

5. the sensational Holy Grail is a sacred chalice .

A. Previous PCFGParser :

[PCFGParser] log prob = -75.07 sentence : the sensational Holy Grail is a sacred chalice .

[PCFGParser] best parse tree:

```
(START
  (S2
    (_Det
      (Det the)
      (_Misc
        (Misc sensational)
        (_Misc
          (Misc Holy) Grail)
          (_VerbT
            (VerbT is)
            (_Det
              (Det a)
              (_Misc
                (Misc sacred)
                (_Noun
                  (Noun chalice)
                  (_Misc
                    (Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -43.86 sentence : the sensational Holy Grail is a sacred chalice .

[PCFGParser] best parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Det the)
        (Nbar
          (Adj sensational)
          (Nbar
            (ProperT Holy) Grail))))
      (VP
        (VerbT is)
        (NP
          (Det a)
          (Nbar
            (Adj sacred)
            (Nbar
```

(Noun chalice)))))) .))

C. Description:

As Sensational and sacred are not classified in sentence 5, so classified both as Adjective. No need to add new rule. It uses rule from 3 and 4.

Vocab Changes	:	1	Adj	sensational
		1	Adj	sacred
New Rule	:	No new rule		

6. the Holy Grail was covered by a yellow fruit .

A. Previous PCFGParser :

[PCFGParser] log prob = -86.61 sentence : the Holy Grail was covered by a yellow fruit .

[PCFGParser] best parse tree:

```
(START
(S2
(_Det
(Det the)
(_Misc
(Misc Holy) Grail)
(_Misc
(Misc was)
(_Misc
(Misc covered)
(_Prep
(Prep by)
(_Det
(Det a)
(_Misc
(Misc yellow)
(_Noun
(Noun fruit)
(_Misc
(Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -48.37 sentence : the Holy Grail was covered by a yellow fruit .

[PCFGParser] best parse tree:

(START

(S1

(@NP-VP

(NP

(Det the)

(Nbar

(ProperT Holy) Grail)))

(VP

(VerbT was)

(VP

(VerbT covered)

(PP

(Prep by)

(NP

(Det a)

(Nbar

(Adj yellow)

(Nbar

(Noun fruit)))))))).))

C. Description:

As “was”, “yellow” and “covered” are not classified in sentence 6, so classified “was” and “covered” as VerbT Verb and “yellow” as adj . Then add two new rules, i.e., VP to VerbT VP and VP to VerbT PP.

Vocab Changes	:	1	VerbT	was
		1	VerbT	covered
		1	Adj	yellow
New Rule	:	1	VP	VerbT VP
		1	VP	VerbT PP

7. five strangers are at the Round Table .

A. Previous PCFGParser :

[PCFGParser] log prob = -73.44 sentence : five strangers are at the Round Table .

[PCFGParser] best parse tree:

```
(START
  (S2
    (_Misc
      (Misc five)
      (_Misc
        (Misc strangers)
        (_Misc
          (Misc are)
          (_Prep
            (Prep at)
            (_Det
              (Det the)
              (_Misc
                (Misc Round) Table)
              (_Misc
                (Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -34.48 sentence : five strangers are at the Round Table .

[PCFGParser] best parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Num five)
        (Nbar
          (Noun strangers)))
      (VP
        (VerbT are)
        (PP
          (Prep at)
          (NP
            (Det the)
            (Nbar
              (ProperT Round) Table)))))) .))
```

C. Description:

As “five” , “Strangers” , “are” and “Round table” are not classified in sentence 7, so classified “are” as VerbT , “five” as Num and “strangers” as noun and finally “Round Table” as Proper Thing(ProperT). Then add new rules , i.e., Nbar to Num Nbar

Vocab Changes	:	1	Num	five
		1	Noun	strangers
		1	VerbT	are
		1	ProperT	Round Table
New Rule	:	1	Nbar	Num Nbar

8. Sir Lancelot might have spoken .

A. Previous PCFGParser :

[PCFGParser] log prob = -56.33 sentence : Sir Lancelot might have spoken .

[PCFGParser] best parse tree:

```
(START
(S2
(_Proper
(Proper Sir) Lancelot)
(_Misc
(Misc might)
(_Misc
(Misc have)
(_Misc
(Misc spoken)
(_Misc
(Misc .))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -28.53 sentence : Sir Lancelot might have spoken .

[PCFGParser] best parse tree:

```
(START
(S1
(@NP-VP
(NP
(Proper Sir) Lancelot))
(VP
(Modal might)
(VP
(VerbT have)
(VP
```

(Verbl spoken)))) .))

C. Description:

As “might” , “have” and “spoken” are not classified in sentence 8, so classified “might” as Modal Verb , “have” as VerbT and “spoken” as non-transitive verb (Verbl) and . Then add new rules, i.e., VP to Modal VP and VP to Verbl.

Vocab Changes	:	1	Modal	might
		1	VerbT	have
		1	Verbl	spoken
New Rule	:	1	VP	Modal VP
		1	VP	Verbl

9. Guinevere should be riding with Patsy .

A. Previous PCFGParser :

[PCFGParser] log prob = -68.75 sentence : Guinevere should be riding with Patsy .

[PCFGParser] best parse tree:

```
(START
(S2
(_Proper
(Proper Guinevere)
(_Misc
(Misc should)
(_Misc
(Misc be)
(_Misc
(Misc riding)
(_Prep
(Prep with)
(_Proper
(Proper Patsy)
(_Misc
(Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -43.59 sentence : Guinevere should be riding with Patsy .

[PCFGParser] best parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Proper Guinevere))
      (VP
        (Modals should)
        (VP
          (VerbT be)
          (VP
            (VerbT riding)
            (PP
              (Prep with)
              (NP
                (Proper Patsy)))))) .))
```

C. Description:

As “be”, “should” and “riding” are not classified in sentence 9, so classified “be” as VerbT , “should” as Modal and “riding” as transitive verb (VerbT) and . Have not added any rule, handled by above mentioned rules.

Vocab Changes	:	1	Modal	should
		1	VerbT	be
		1	VerbT	riding

New Rule : No new rule

10. the Britons migrate frequently .**A. Previous PCFGParser :**

[PCFGParser] log prob = -56.50 sentence : the Britons migrate frequently .

[PCFGParser] best parse tree:

```
(START
  (S2
    (_Det
      (Det the)
    (_Misc
```

```
(Misc Britons)
(_ Misc
 (Misc migrate)
 (_ Misc
  (Misc frequently)
  (_ Misc
   (Misc .))))))
```

B. New PCFGParser :

```
[PCFGParser] log prob = -26.00 sentence : the Britons migrate frequently .
[PCFGParser] best parse tree:
(START
 (S1
  (@NP-VP
   (NP
    (Det the)
    (Proper Britons))
   (VP
    (VerbT migrate)
    (VP
     (Adv frequently)))) .))
```

C. Description:

As “Britons” , “migrate” and “frequently” are not classified in sentence 10, so classified “frequently” as Adverb(Adv) , “migrate” as VerbT and “Britons” as Proper Noun. Then added two new rules. i.e, VP goes to Adv and Nbar goes to Proper.

Vocab Changes	:	1	Proper	Britons
		1	VerbT	migrate
		1	Adv	frequently
New Rule	:	1	VP	Adv
		1	Nbar	Proper

11. Arthur and Guinevere ride frequently near the castle .**A. Previous PCFGParser :**

```
[PCFGParser] found invalid word: 'castle.' in sentence: Arthur and Guinevere ride frequently
near the castle.
```

[PCFGParser] log prob = -81.93 sentence : Arthur and Guinevere ride frequently near the castle .

[PCFGParser] best parse tree:

```
(START
(S2
(_Proper
(Proper Arthur)
(_Misc
(Misc and)
(_Proper
(Proper Guinevere)
(_Misc
(Misc ride)
(_Misc
(Misc frequently)
(_Prep
(Prep near)
(_Det
(Det the)
(_Noun
(Noun castle)
(_Misc
(Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -48.16 sentence : Arthur and Guinevere ride frequently near the castle .

[PCFGParser] best parse tree:

```
(START
(S1
(@NP-VP
(NP
(@NP-Conj
(NP
(Proper Arthur))
(Conj and))
(NP
(Proper Guinevere)))
(VP
(VerbT ride)
(VP
(Adv frequently)
(PP
(Prep near)
```

```
(NP
  (Det the)
  (Nbar
    (Noun castle)))))) .))
```

C. Description:

As “and” and “ride” are not classified in sentence 11, so classified “and” as Conjunction (conj) , “ride” as transitive verb (VerbT) . Then added two new rules. i.e, NP goes to Conj Np and VP goes Adv PP.

Vocab Changes	:	1	Conj	and
		1	VerbT	ride

New Rule	:	1	NP	Conj NP
		1	VP	Adv PP

12. riding to Camelot is hard .**A. Previous PCFGParser :**

[PCFGParser] log prob = -66.24 sentence : riding to Camelot is hard .

[PCFGParser] best parse tree:

```
(START
  (S2
    (_Misc
      (Misc riding)
      (_Misc
        (Misc to)
        (_Misc
          (Misc Camelot)
          (_VerbT
            (VerbT is)
            (_Misc
              (Misc hard)
              (_Misc
                (Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -32.91 sentence : riding to Camelot is hard .

[PCFGParser] best parse tree:

```
(START
```

```

(S1
  (VP
    (VerbT riding)
    (NP
      (TO to)
      (NP
        (ProperT Camelot)
        (VP
          (VerbT is)
          (Adj hard)))))) .))

```

C. Description:

As this sentence start with Verb so created new s4.gr file and used below rule. Plus, “Camelot”, “hard” and “to” are not classified in sentence 12, so classified “Camelot” as Proper Thing(ProperT) , “hard” as Adjective (Adj) and finally “to” as TO. Then added new file S4.gr with start senetence as “S1 VP . “ because this sentence starts with Verb rather than Subject.

```

Vocab Changes   :   1      ProperT      Camelot
                   1      Adj          hard
                   1      TO           to

```

```

New Rule       :
                 # Sentences
                 1      S1      VP .
                 # Verb phrases
                 1      VP      VerbT NP
                 1      VP      VerbT Adj
                 # Noun phrases
                 1      NP      TO NP
                 1      NP      ProperT VP

```

13. do coconuts speak ?

A. Previous PCFGParser :

```

[PCFGParser] log prob = -50.52   sentence : do coconuts speak ?
[PCFGParser] best parse tree:
(START
  (S2
    (_Misc
      (Misc do)
      (_Misc
        (Misc coconuts)

```

```
( _Misc
  (Misc speak)
  ( _Misc
    (Misc ?))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -29.94 sentence : do coconuts speak ?

[PCFGParser] best parse tree:

```
(START
  (S1
    (VP
      (DO do)
      (NP
        (Noun coconuts)
        (VP
          (VerbT speak)
          (Punc ?))))))
```

C. Description:

As “do”, “coconuts”, “speak” and “?” are not classified in sentence 13, so classified “do” as DO, “coconuts” as Noun, “?” as Punc and finally “Speak” as transitive verb (VerbT). Then added new file S3.gr with with above given rules.

Vocab Changes	:	1	VerbT	do
		1	Noun	coconuts
		1	VerbT	Speak
		1	Punc	?
New Rule	:			
		1	S1	VP
		1	VP	DO NP
		1	VP	VerbT Punc
		1	NP	Noun VP

Two challenge sentences:

14. Arthur knows Patsy , the trustworthy servant .

A. Previous PCFGParser :

[PCFGParser] log prob = -75.31 sentence : Arthur knows Patsy , the trustworthy servant .

[PCFGParser] best parse tree:

```
(START
  (S2
    (_Proper
      (Proper Arthur)
      (_Misc
        (Misc knows)
        (_Proper
          (Proper Patsy)
          (_Misc
            (Misc ,)
            (_Det
              (Det the)
              (_Misc
                (Misc trustworthy)
                (_Noun
                  (Noun servant)
                  (_Misc
                    (Misc .))))))))))
```

B. New PCFGParser :

[PCFGParser] log prob = -44.50 sentence : Arthur knows Patsy , the trustworthy servant .

[PCFGParser] best parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Proper Arthur))
      (VP
        (VerbT knows)
        (NP
          (@Proper-Punc
            (Proper Patsy)
            (Punc ,))
          (NP
```

```

(Det the)
(Nbar
  (Adj trusty)
  (Nbar
    (Noun servant)))))) .))

```

C. Description:

As “trusty”, “knows”, and “,” are not classified in sentence 14, so classified “trusty” as Adjective (Adj), “Knows” as VerbT, “,” as Punc. Then added new rule NP to Proper Punc NP in S1.gr file.

```

Vocab Changes :      1      Adj      trusty
                  1      VerbT     knows
                  1      Punc      ,

```

```

New Rule      :      1      NP      Proper Punc NP

```

15. do not speak !

A. Previous PCFGParser :

[PCFGParser] log prob = -50.52 sentence : do not speak !

[PCFGParser] best parse tree:

```

(START
  (S2
    (_Misc
      (Misc do)
      (_Misc
        (Misc not)
        (_Misc
          (Misc speak)
          (_Misc
            (Misc !)))))))

```

B. New PCFGParser :

[PCFGParser] log prob = -20.51 sentence : do not speak !

[PCFGParser] best parse tree:

```

(START
  (S1
    (VP
      (@VerbT-Not
        (DO do)
        (NOT not))
      (VP
        (VerbT speak)

```

(Punc !))))

C. Description:

As “do”, “not”, “speak” and “!” are not classified in above sentence, so classified “do” as DO, “not” as NOT, “!” as Punc and finally “Speak” as transitive verb (VerbT). Then added new rule VP goes to VerbT Not VP and VP goes to VerbT Punc in S4.gr.

Vocab Changes	:	1	DO	do
		1	NOT	not
		1	VerbT	Speak
		1	Punc	!
New Rule	:			
		1	VP	DO NOT VP
		1	VP	VerbT Punc