CS 626, Speech and NLP presentation on Assignments

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Metaphor Identification

Metaphor Identification - Approach

- Noun-Noun Metaphor

  1) Nouns in a sentence are identified using Stanford Consituency Parser.

  2) Using Stanford Dependency Parser, the nouns which are related by any dependency are filtered.

  3) From the remaining nouns set, each pair of nouns ni, nj are taken from each synset.

- The Resnik similarity between each pairs of synsets of ni and nj is taken. The highest among these scores is considered for detecting metaphor.

Metaphor Identification – Approach cont.

So considered one sense of all the synsets of words related by dependency parser.

- We used apis for resnik similarity available from ws4j.

Examples considered - their similarity scores

Sentence	Max Resnik Similarity	Between senses	Remarks
•She was fairly certain that life was a circus	1.7798		expected
All students of this class are boys	1.9033		expected
All students of this class are stars	1.9033	pupil and adept	Unexprected: Reason:pupil sense: a learner who is enrolled in an educational institution adept sense: someone who is dazzlingly skilled in any field

Examples considered - their similarity scores

•Words are the weapons with which we wound	0.0	expected
•Laughter is the music of the soul	5.0443	Unexpected: “the sound of laughing" with ----> an artistic form of auditory communication incorporating instrumental or vocal tones in a structured and continuous manner"

Examples considered-similarity score

•Jesus is a man	0.0
•Jesus is the doctor of soul	0.0
Jesus is a mountain of hope	0.0

Case study

- Many of the 50 sentences of http://www.ereadingworksheets.com/figurative-language/figurative-language-examples/metaphor-examples/ were not applicable because we are considering only Noun-Noun.
- Eg: The detectives listened to her with a wooden face,
- Her eyes were fireflies. Here Pos taggeroutput for fireflies was JJ so this will not be considered for metaphor identification.

Results

12 sentences were tried out

- There were 2 False positive

  1)All students of this class are stars

  2)Jesus is man

- There were 4 false negatives

  Laughter is the music of the soul and 3 more

12 examples were tried out (some from this site http://www.ereadingworksheets.com/figurative-language/figurative-language-examples/metaphor-examples/
)

Threshold was taken to be 2 for resnik similarity. The accuracy is 50% for detection of a metaphor for this small set of examples.

Pos Tagging

Pos Tagging - Approach

- BNC Cleaned corpus was used for training
- Unknown Word tagging was done with tag NN1 by default.
- Viterbi algorithm was implemented.

5 Fold Accuracy without special tag TO0 to “to”,PRP used for all the preposition

Fold 1 R: 0.8887074148782662
P: 0.9141950651116186
F: 0.886993236727703

Fold 2 R: 0.8510978999978358
P: 0.9075057489387605
F: 0.8904930356110755

Fold 3 R: 0.9196663176908072
P: 0.957665864348536 4
F: 0.9372366470293463

Fold 4 R: 0.8694557338334665
P: 0.9100364076257068
F: 0.8925407863217057

Fold 5 R: 0.8723479767010203
P: 0.9142551161054022
F: 0.876649641810107 3

5 Fold Accuracy without special tag TO0 to “to”, PRP used for all prepositions

average R: 0.8802550686202792

average P: 0.9207316404260049

average F: 0.8967826668890011

5 Fold Accuracy with TO0 used for infinitive form of “to”

Fold 1
R: 0.887644636893754
P: 0.9392784173301946
F: 0.9070722768632933

Fold 2
R: 0.866511022550145
P: 0.9259192306739054
F: 0.8909584513881526

Fold 3
R: 0.9194553543056695
P: 0.958811729568634 9
F: 0.937650021823438 8

Fold 4
R: 0.868809109892545
P: 0.929771537695573 7
F: 0.9080823685344012

Fold 5
R: 0.8711540779147404
P: 0.9350967116093959
F: 0.89430360293873 3

Average Accuracy with TO0 used for infinitive form of “to”

average R: 0.8827148403113707

average P: 0.937775525375541

average F: 0.9076133443096037

After unknown word tagging by using
- Smoothing

5 Fold Accuracy Without TO0, all prepositions tagged as PRP

Fold 1 R: 0.852081177839182
P: 0.913850888017929
F: 0.864916468737355

Fold 2 R: 0.833290125569076 2
P: 0.901388384250695 8
F: 0.87761859443827 5

Fold 3 R: 0.919643656488255 4
P: 0.957662226592064 3
F: 0.937224122447626 7

Fold 4 R: 0.841115074238113 2
P: 0.901699523249395 1
F: 0.874178570875681 1

Fold 5 R: 0.846958983069748 4
P: 0.906679602838926
F: 0.859765023410601 1

Average Accuracy without TO0, all prepositions tagged as PRP

average R: 0.858617803440875

average P: 0.9162469651465749

average F: 0.8827405559891839

5 Fold Accuracy with TO0 used for infinitive form of “to”

Fold 1 R: 0.8509441754286173
P: 0.938429627089955
F: 0.884817580724354 7

Fold 2 R: 0.848748370516630 8
P: 0.919791321237047 1
F: 0.878126405349586 1

Fold 3 R: 0.919430652507480 5
P: 0.958807639923352 6
F: 0.937636256645170 3

Fold 4 R: 0.840441601287783 1
P: 0.921507555131645 5
F: 0.889472293017592 5

Fold 5 R: 0.845902565513154 6
P: 0.927819474388892 8
F: 0.877712601712994 5

Average over all fold with TO0, used for infinitive form of “to”

average R: 0.8610934730507331

average P: 0.9332711235541786

average F: 0.8935530274899396

Observations from transitions probabilities

Few expected ones:
AT0 going to NN1 is maximum as expected and next highest is AJ0

Few unexpected ones:
NN0 going to PRP is highest

Observations from Confusion matrices

PRP is getting confused with AV0 for word Instead
Reason: Output probabilities for AV0 giving instead is more as count is more in corpus.
PRP is getting confused with AV0 for word rather
PNX is getting confused with AJ0 for word himself
Same reason.

Error Analysis

- Confusion with NN1 is more as there are so many NN1, every tag gets confused with NN1
- DT0 is getting confused with AV0
- more_DT0 with more_AV0 (present in corpus)
- all_AV0 with all_DT0
- confuse tafila_NP0 with tafila_NN1

Error Analysis Contd.

- NP0 confused with NN1.
- AJ0_international NN2_stakes PRP_at NN1_woodbine NN1_toronto PRP_on AT0_the NN1_day PRP_after NN1_nashwan VVZ_runs PRP_in AT0_the NN1_champion

Edit Distance based spell checking

Results of edit distance based spell checker

- Overall accuracy with single error 92.008
- Kernighan's approach :

Iteration : % accuracy obtained 5 fold cross validation

Run 1 : 91.073739

Run 2 : 91.027308

Run 3 : 89.487516

Run 4 : 91.766268

Run 5 : 87.968952

Average Crossvalidated accuracy in % = 90.264757

Analysis - Edit Distance based spell correction

Analysis of confusing letters:

- Substitution: a getting confued with e and viceversa. Eg., separate, maintanance, attendance, independence
- Deletion: s getting deleted after s – Eg: possess
- Insertion: L getting inserted after l – words like Fulfil, pavilion are commonly confusing
- Transposition: 'e' getting transposed with 'i' – i ane e come in most of the words like weird, receive, deceive, believe, so there is a chance that they could be transposed.

Reason for about 10% inaccuracy:

- In addition to the above, in the list of words taken, there is more than one correct spelling for an incorrect spelling. And this affects accuracy because of the way we are calculating it.

Alignment based Spell checking

Results: Spell Checking using Moses

correct matches =3045

mismatch count = 1429

total no of line = 4474

accuracy = 68.0599

Spell Checking

•We trained and tuned using the wiki word list by giving the parallel corpus and tested on the same training set.
•Accuracy was around 30%

•The phrase table was observed but the phase translations were not quite correctly aligned as per the output of the training.

•For eg, following are a few alignments observed from the phrase table after training

•a f t e r ||| e a f t e r ||| 1 0.370528 1 0.042111 ||| 0-0 0-1 1-2 2-3 3-4 4-5 ||| 1 1 1

•a f t e y ||| a f e t y

Spell checking cotnd

- a g e ||| g a g e ||| 0.333333 0.785712 0.0294118 0.00892629 ||| 0-1 1-2 2-3 ||| 3 34 1

- a g e ||| h a g e ||| 0.5 0.785712 0.0294118 0.0604243 ||| 0-1 1-2 2-3 ||| 2 34 1

- a g e ||| i a g e ||| 0.333333 0.404158 0.0294118 0.0227957 ||| 0-0 0-1 1-2 2-3 ||| 3 34 1

Thanks