Bake-off 1

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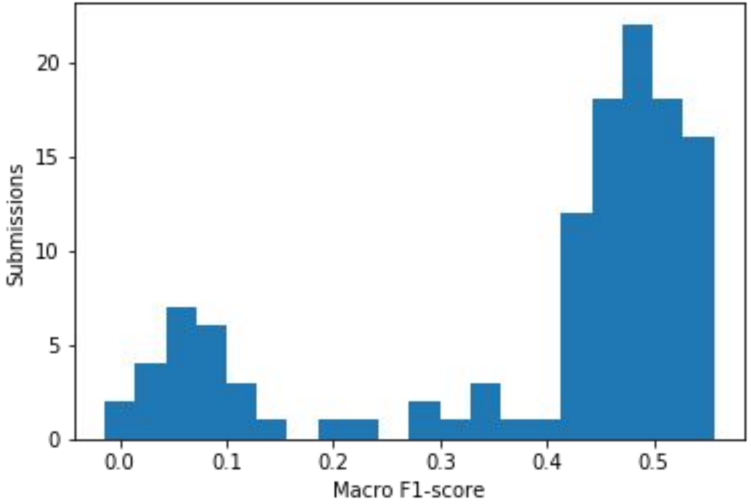
CS 224u

Task

Evaluate distributed representations using word similarity datasets.

- Similarity datasets have word pairs with an associated human-annotated similarity score
- Evaluation measures the distance between the word pairs in your chosen VSM

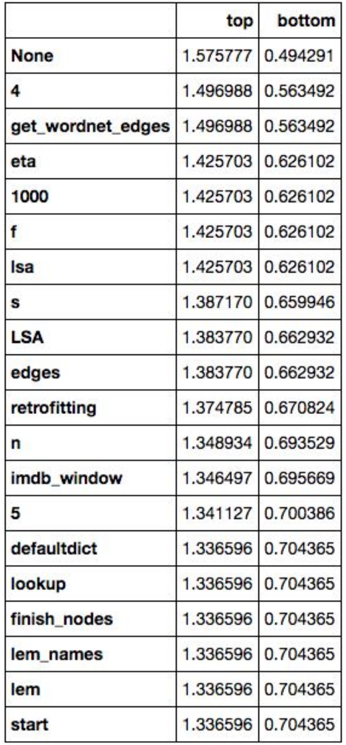
Histogram of scores



Thanks Chris for the idea!

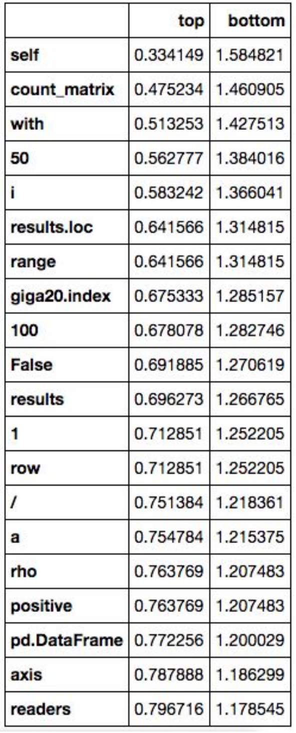
What distinguishes the high and low scorers?

High o/e for top scorers



	top	bottom
None	1.575777	0.494291
4	1.496988	0.563492
get_wordnet_edges	1.496988	0.563492
eta	1.425703	0.626102
1000	1.425703	0.626102
f	1.425703	0.626102
lsa	1.425703	0.626102
s	1.387170	0.659946
LSA	1.383770	0.662932
edges	1.383770	0.662932
retrofitting	1.374785	0.670824
n	1.348934	0.693529
imdb_window	1.346497	0.695669
5	1.341127	0.700386
defaultdict	1.336596	0.704365
lookup	1.336596	0.704365
finish_nodes	1.336596	0.704365
lem_names	1.336596	0.704365
lem	1.336596	0.704365
start	1.336596	0.704365

High o/e for low scorers

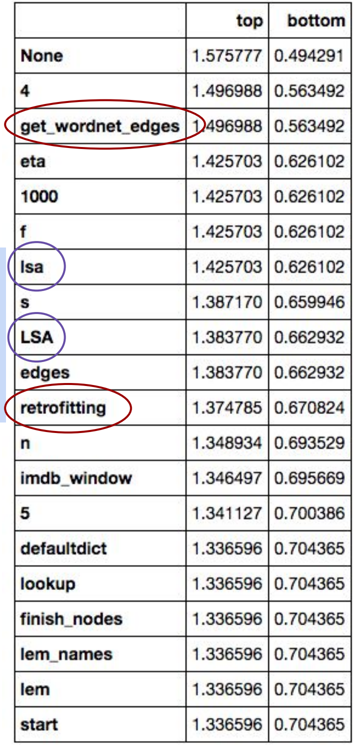


	top	bottom
self	0.334149	1.584821
count_matrix	0.475234	1.460905
with	0.513253	1.427513
50	0.562777	1.384016
i	0.583242	1.366041
results.loc	0.641566	1.314815
range	0.641566	1.314815
giga20.index	0.675333	1.285157
100	0.678078	1.282746
False	0.691885	1.270619
results	0.696273	1.266765
1	0.712851	1.252205
row	0.712851	1.252205
/	0.751384	1.218361
a	0.754784	1.215375
rho	0.763769	1.207483
positive	0.763769	1.207483
pd.DataFrame	0.772256	1.200029
axis	0.787888	1.186299
readers	0.796716	1.178545

Thanks Chris!

What distinguishes the high and low scorers?

High o/e for top scorers



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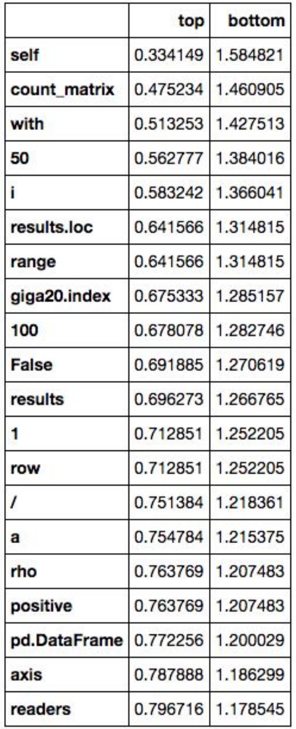
High o/e for low scorers



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It seems like retrofitting on WordNet and LSA are common ways to build better models.

Thanks Chris!

First place

1. PMI
2. T-test
3. Retrofitting on WordNet
4. Autoencoder

Group 80’s score: **0.556024**
Emma, Santosh, Mel

```
def myVSM11(X:pd.DataFrame):
    h1 = _ppmi(X)
    h2 = _ttest(h1)
    h3 = _retro(h2)
    h4 = _autoEncoder(h3, 1000)
    return h4

imdb5_myVSM = myVSM11(imdb5)
```

```
normalized,
max_iter=100,
hidden_dim=1000,
eta=0.001
```

Second place

PMI
+
Retrofitting w/
subword model

Jingying’s score: **0.552842**

```
def custom_model(df, readers=READERS):
    pmi_model = vsm.pmi(df)
    ngrams_model = vsm.ngram_vsm(pmi_model, n=4)
    ngrams_words = get_ngrams_matrix(pmi_model, ngrams_model, n=4)
    ngrams_norm = ngrams_words.apply(vsm.length_norm, axis = 1)
    wn_edges = get_wordnet_edges()
    wn_retro = Retrofitter()
    subword_model = ttest(ngrams_norm * 0.4 + pmi_model)
    wn_index_edges = convert_edges_to_indices(wn_edges, subword_model)
    X_retro = wn_retro.fit(subword_model, wn_index_edges)
    return X_retro
custom_model(imdb5)
```

Third place

Chaining:

1. PMI
2. T-test
3. LSA
4. Retrofitting

Aditya’s score: **0.552457**

```
def original_model(dataset_loc, k=5150):
    dataset = pd.read_csv(os.path.join(VSM_HOME, dataset_loc), index_col=0)
    dataset_pmi = vsm.pmi(dataset)
    dataset_ttest = ttest_reweight(dataset_pmi)
    dataset_pmi_ttest_lsa = vsm.lsa(dataset_ttest, k)
    results = full_word_similarity_evaluation(dataset_pmi_ttest_lsa)
    wn_edges = get_wordnet_edges()
    wn_index_edges = convert_edges_to_indices(wn_edges, dataset_pmi_ttest_lsa)
    wn_retro = Retrofitter(verbose=True)
    dataset_retro = wn_retro.fit(dataset_pmi_ttest_lsa, wn_index_edges)
    return dataset_retro
original_model('imdb_window5-scaled.csv.gz')
```

Last place

1. T-test
2. LSA
3. Jaccard distfunc

Score: **0.009926**

```
def my_model(data):
    data_result = reweighting(data)
    data_result = vsm.lsa(data_result, k = 200)
    return data_result
giga20_mymodel = my_model(giga20)
full_word_similarity_evaluation(giga20_mymodel, readers=BAKEOFF,
distfunc=vsm.jaccard)
```