Text segmentation with character-level text embeddings

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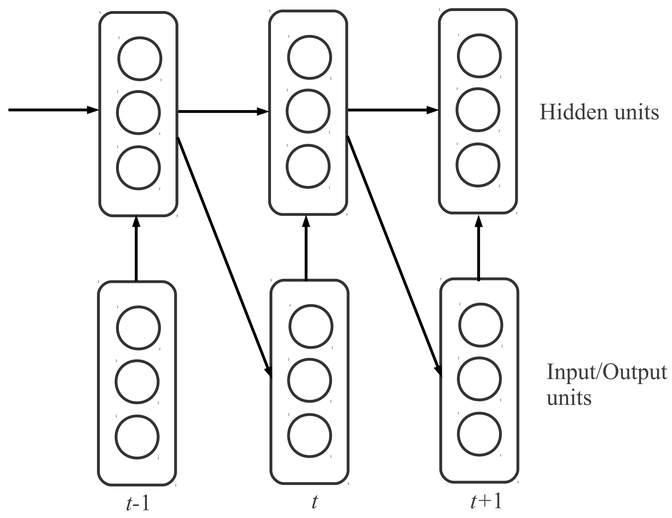
Introduction

- Most representations of text used in NLP are based on words.
- Distributional word classes or word embeddings successfully generalize over word forms.
- Words are not always available as units, and sometimes not the most appropriate level of granularity.
- Posts on a QA forum with segments of programming language example code embedded within the text.
- **Use activations of hidden layer of SRN as text embeddings.**

Simple Recurrent Networks



- Train 400-hidden unit SRNs on character sequences from Stackoverflow posts.

Example data

Java - Convert String to enum

Say I have an enum which is just

```
public enum Blah {
   A, B , C, D
}
```

319
60

and I would like to find the enum value of a string of for example "A" which would be `Blah.A`. How would it be possible to do this?
Is the `Enum.ValueOf()` the method I need? If so, how would I use this?

java enums

- Block and inline code fragments marked up with HTML tags.

Setup

- Collect questions from Stackoverflow.com between February and June 2011.
- Code blocks are delimited via HTML markup.
- Converted markup into labeled character sequences.
- Baseline: Trained CRF to predict labeling on raw text.
- Add SRN features on top of the baseline.

Baseline feature set

Unigram	t ¶ p u b
Bigram	¶p pu
Trigram	¶pu
Fourgram	t¶pu ¶pub
Fivegram	t¶pub

Augmented feature set

For each of the $K = 10$ most active units out of total $J = 400$ hidden units, is the activation > 0.5?

Nearest neighbors in embedding space

```
n-laptop": {"last_share": 130738
ierre-pc": {"last_share": 130744
d-laptop": {"last_share": 130744
laptop": {"last_share": 13074434
erre-pc": {"last_share": 1307441

 data table has integer values a
,2,3,4,5. For all these values I
ere i can add more connections s
eating lots of private methods a
or more different data sources c

e given URL.I'd like to change t
e = SqlPersist¶¶¶When I remove t
sources explaining how to save f
basic knowledge doesn't enable m
eDirectory, but I need to save t
```

Evaluation

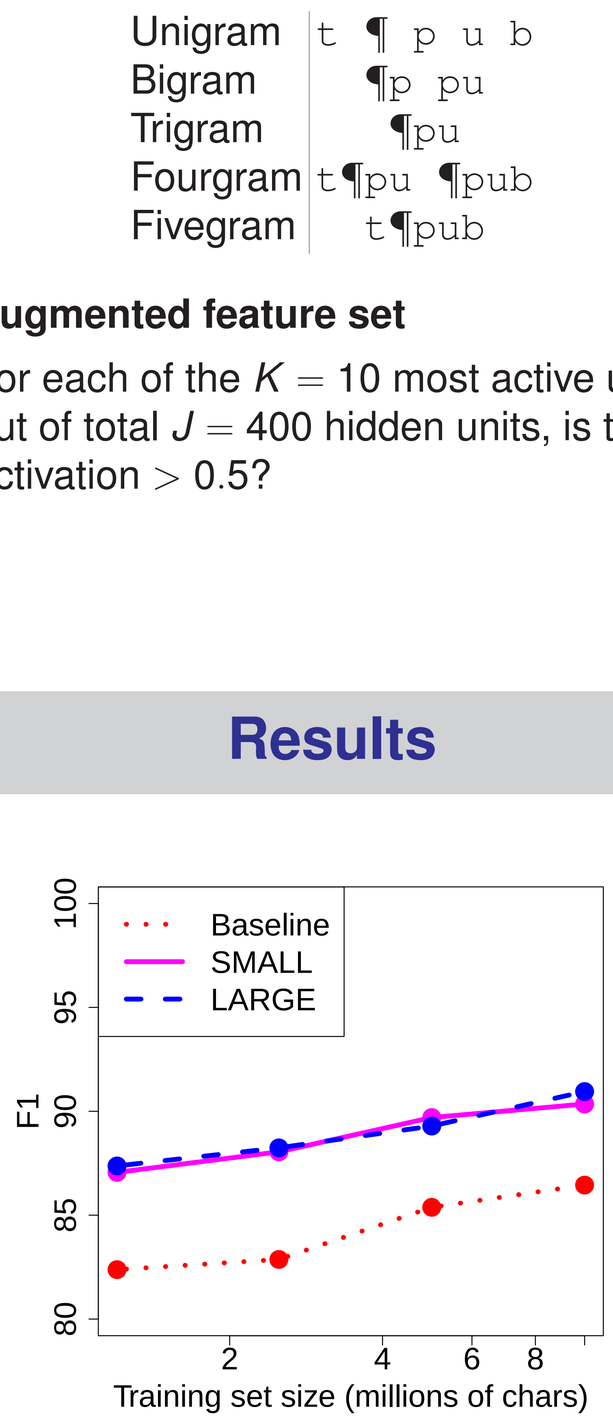
Embeddings trained on

- SMALL: 10 million characters
- LARGE: 456 million characters

Improvement from the SRN features largely due to their expressive power.

Embeddings boost performance as much as quadrupling the amount of labeled training examples does.

Results



Conclusion

- Created datasets and models for labeling code blocks in raw text.
- Showed that character-level text embeddings are useful representations for text segmentation.
- In future: joint model which learns to predict characters and their labels simultaneously.

References

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