Adapting Word Prediction to Subject Matter without Topic-labeled Data

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Problem

- alternative communication, slow communication rate

- word prediction speeds up communication rate
- evaluation: keystroke savings

$$KS = \frac{keys_{normal} - keys_{prediction}}{keys_{normal}} \times 100\%$$

How can we improve keystroke savings?

Why topic adaptation?

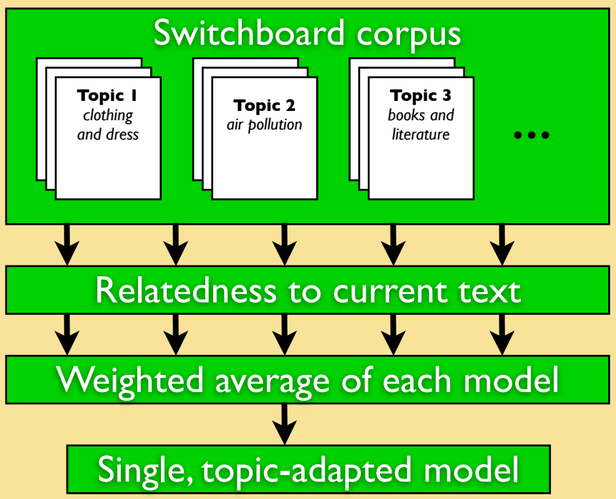
- topic can substantially affect word choice:

how long would it be in the

world
winter
city
area
United
future
mountains

- existing devices tend to use word prediction more for **fringe words**, which tend to be topical words

Previous work - labeled topic modeling



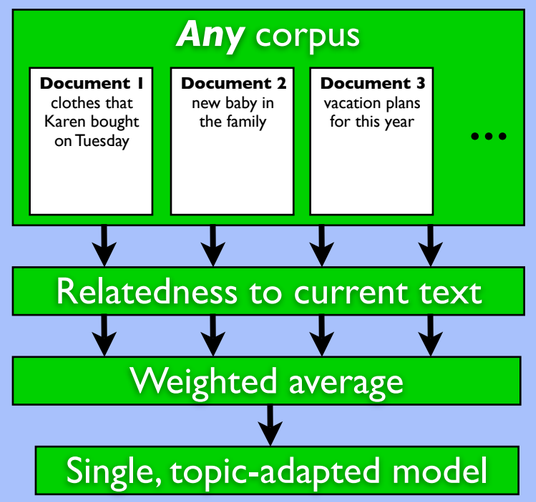
Testing corpus	Switchboard trigram	Switchboard topic
AAC Email	43.25%	**43.53%**
Callhome	49.33%	**49.52%**
Charlotte	49.64%	**50.07%**
SBCSAE	43.49%	**43.90%**
Micase	46.52%	**46.99%**
Switchboard	60.35%	**61.48%**

- compare each topic to current conversation
- weight based on similarity of keyword usage
- take a weighted average of all the topic models

Advantages compared to basic ngrams
- higher keystroke savings (even when tested on other corpora)
- predictions are appropriate for the overall topic (e.g., cooking)

Disadvantages compared to basic ngrams
- need training corpus with topic labels (limited to training on Switchboard)

Current work - unlabeled topics



- compare each ***document*** to current conversation
- weight based on similarity of keyword usage
- take a weighted average of all the document models

- each document is treated as if it were a very specific topic
- tested using a mixture of corpora for training data (below)

Testing corpus	Switchb. topic	Mixed trigram	Mixed topic
AAC Email	43.53%	52.18%	**53.14%**
Callhome	49.52%	52.14%	**53.39%**
Charlotte	50.07%	53.50%	**53.92%**
SBCSAE	43.90%	47.78%	**48.84%**
Micase	46.99%	51.46%	**53.13%**
Switchboard	**61.48%**	59.80%	61.17%

Advantages
- works with any kind of corpus
- can add more and more data (even general-purpose data) with little negative effect

Future work

- can use this method to integrate user text into the language model
  - difficult to perform controlled evaluations
- use the same methodology with a different similarity score
  - e.g., syntactic similarity
- improving the similarity score to provide guarantees that there will be no loss in keystroke savings by adding more training texts

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