

Topic Modeling in Fringe Word Prediction for AAC

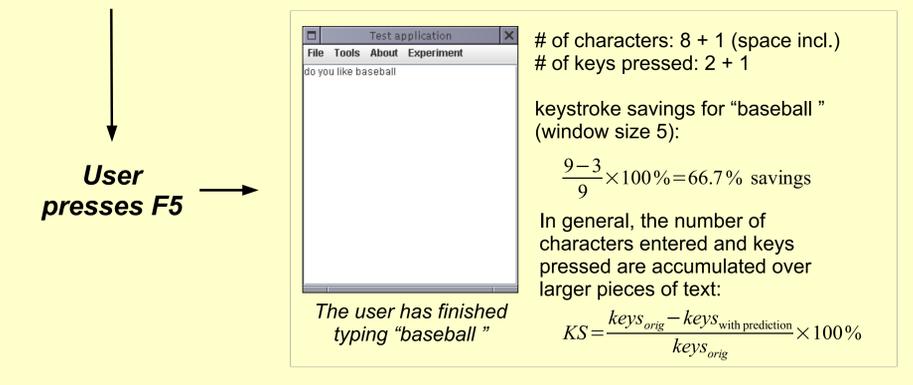
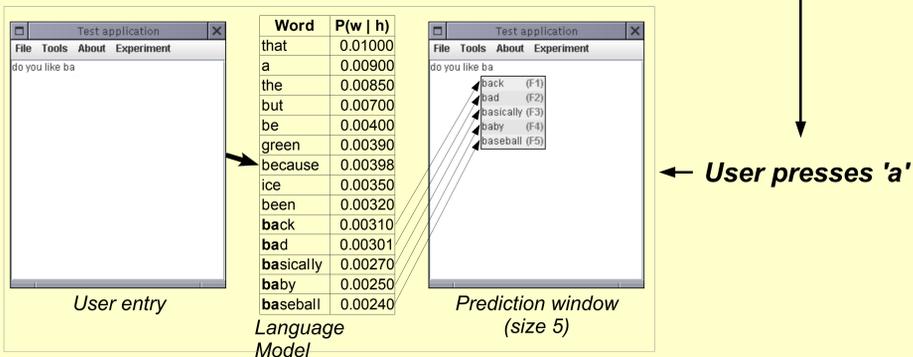
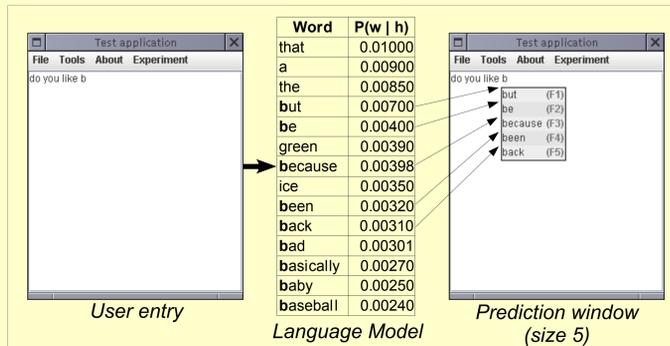
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Motivation

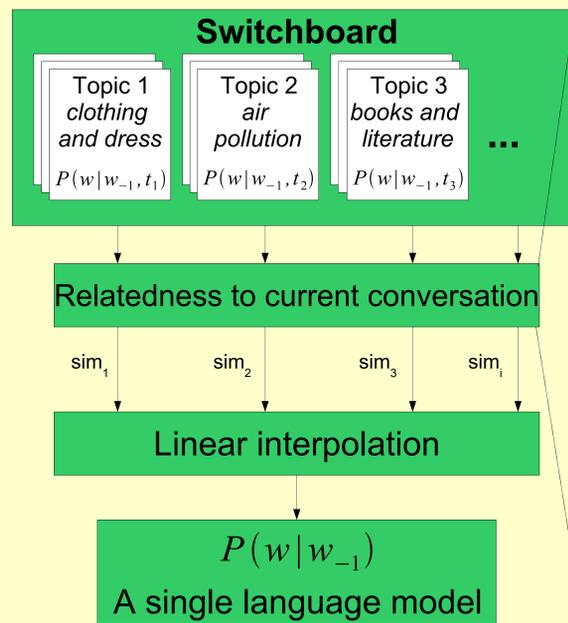
Many AAC devices try to optimize text entry by focusing on quick access to common words (*core vocabulary*). On the other hand, fringe words are often spelled out with the aid of word prediction. This work improves upon ngram-based fringe word prediction using topic modeling.

Suppose a user is asking a friend "do you like baseball games?"



Methods

A language model is constructed from each topic in a corpus. Throughout a conversation, what has been said is compared to each topic to determine the contribution of each topic to the final language model. This language model is then used for word prediction.



Conversation 3682 (in progress)

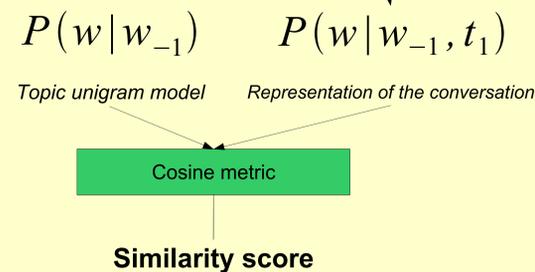
...
Shirley: hm now that would be good how long do you have to bake it

Jane: yeah
Jane: uh-huh let's see i think it was an hour i've done it in the microwave so often lately because it's really easy yeah

Shirley: i do microwave too a

Jane: but i think it's about an hour or maybe it's only half hour hm

Important keywords underlined



Example similarity scores for above conversation

cooking	restaurants	gardening	movies	taxes
23.4	4.42	1.43	0.47	0.33

Results

Window size	Trigrams	Topic	Diff	t-score	p-value
1	42.3	43.1	0.8	9.45	<0.005
3	55.1	56.4	1.3	16.97	<0.005
5	58.8	60.2	1.4	21.29	<0.005
6	60.0	61.4	1.4	21.37	<0.005
7	60.8	62.2	1.4	22.84	<0.005

Topic Modeling in Practice

Example 1 - cooking

Conversation in progress

Shirley: hm now that would be good how long do you have to bake it

Jane: yeah
Jane: uh-huh let's see i think it was an hour i've done it in the microwave so often lately because it's really easy yeah

Shirley: i do microwave too a

Jane: but i think it's about an hour or maybe it's only half hour hm

Shirley: how long would it be in the ...

Basic ngram word prediction

in the world
winter
city
area
United
future
mountains

in the mi
military
mid
microwave
midwest
midst
minority
minimum

in the m
mountains
military
mail
mornings
movie
market
mood

Shirley says:
how long would it be
in the **microwave**

Topic modeling

in the oven
kitchen
microwave
mountains
summertime
world
winter

Shirley says:
how long would it be
in the **microwave**

Example 2 - public education

Conversation in progress

Sally: partitions or just to face the children different directions or to do something

Linda: just yeah

Sally: i know last year my son had to eat in the classroom because there was no cafeteria at his school so he spent all day in this one large open area

Linda: oh goodness

Sally: so i didn't really care for that it seems like the ...

Basic ngram word prediction

seems like the i
kids
news
Cowboys
older
guy
Dallas

seems like the sc
schools
science
scene
scout
score
scribes
schooling

seems like the s
second
sport
stuff
system
state
spice
sports

Sally:
so i didn't really
care for that
it seems like
the **schools**

Topic modeling

seems like the kids
schools
computer
nation
administration
police
person

Sally:
so i didn't really care for that
it seems like the **schools**

Example 3 - recycling

Conversation in progress

Sherry: we're setting up curbside recycling bins for the city home owners and several of our local businesses also have recycling stations set up in their parking lots

Kitty: um-hum

Sherry: and how about in your area

Kitty: well in our i live in a very small community and we're just getting started as a matter of fact this last week we got a notice in the mail from City Hall and they've informed us that we'd be getting more instructions in the mail in a week or two but we're going to start a separation of our refuse and separating the ...

Basic ngram word prediction

separating the kids
things
problem
news
world
government
ones

separating the ca
cat
cars
cans
cats
cable
carpet
cash

separating the c
city
computer
crime
cost
credit
cat
community

Kitty:
... we're going to
start a separation
of our refuse and
separating the **cans**

Topic modeling

separating the city
recycling
plastic
trash
garbage
cans
newspaper

Kitty:
... we're going to start a
separation of our refuse
and separating the **cans**