Ranking answers and web passages for non-factoid question answering

Emory IR Lab @ TREC LiveQA 2015

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Observations
Many questions are similar to previously posted questions.
How to make vinyl stickers stay permanently?
( I already asked this question but I forgot to add details) I made a sticker with a vinyl cutter and put it on my plastic binder. I really like the way it looks and am scared it's going to peel...
3 Answers • Do It Yourself (DIY)

What is a vinyl sticker?
Today I bought 3 one direction vinyl stickers for my sister, they're quite small, but what are they for? Are they normal stickers? And do they peel off if you want?
2 Answers • Do It Yourself (DIY)

How to make vinyl stickers stay permanently?
3 Answers • Do It Yourself (DIY)

Window vinyl sticker decal didn't work?
I bought a new window decal for my truck and yes I know how to put them on. I have done it before and it worked fine. I bought one from a store and tried putting it on my truck but for some reason...
1 Answer • Do It Yourself (DIY)

What type of adhesive will make vinyl wall stickers stay put on textured walls?
Walls have the "orange peel" texture and some of the wall decals are not sticking. Sticky-tac looks like it will work but can I find it in the store or will I need to order it online? I s...
1 Answer • Decorating & Remodeling

Resuse vinyl wall stickers?
I have bought some amazing vinyl wall stickers for my daughters room but there is a chance we may move in a year and I wondered if you can reuse them. I read on the website a warm hair dryer can rem...
5 Answers • Decorating & Remodeling

How to remove t cut polish from vinyl stickers?
i used t cut polish on my vw beetle which is covered in black vinyl stickers and the polish has left a white residue all round the vinyl edges, can anyone help with how to remove it, i have washed...
1 Answer • Maintenance & Repairs
Most questions are based on a "user story"
Some questions are unique or it is hard to find similar questions
Why doesn't my 10 wk old French Bulldog bark?

4 Answers • Dogs

Didn't find what you are looking for? Ask a question:

How can I get my French Bulldog to bark/speak on command?
I have a Frenchie that is just about 9 months and has only barked maybe three times. Every now and then she will bark in her sleep. She has barked twice when people have been outside the house, Lat...
1 Answer • Dogs

French bulldogs... Barking & snorting?
Does anyone know what their different types of barks & snorting means? I know the different types they do is there way of talking to u but how do u know what's what?
1 Answer • Dogs

French Bulldogs?
I got answers on English Bulldogs, but I am wondering about French Bulldogs. They are smaller, but I have heard that they don't have as many health problems as the English Bulldogs. I don't know if t...
3 Answers • Dogs

Why can't French bulldogs bark normally?
weird bark
2 Answers • Dogs

Am I right for a French Bulldog?
I really wanna dog. I am only 13, but am a very responsible guy. I intend on getting a French bulldog. Would I be able to play tackle, or wrestle (I'll take it way easy of course) or other pla...
6 Answers • Dogs
System Architecture
System overview
Query generation strategies

- **Yahoo! Answers**
  1. question title (with and without stopwords)
  2. question title & body
  3. question title (w/ body) & question category
  4. top 5 tf-idf terms from title (w/ body)

- **Web search**
  1. question title
  2. question title & body
Candidate Ranking

• candidates are ranked using linear logistic regression model
• the model is trained on WebScope collection of Yahoo! Answers pairs with pairwise ranking objective
• no distinction between candidates from different sources
Features

- answer statistics (length in chars, tokens, sents, etc)
- BM25 scores (using title or title + body as query)
- term matches features (number of matches, maximum spans of matched terms, etc.)
- question and retrieved question categories match
- bag of word pairs from question and candidate answer
- statistics of NPMI between question and answer terms
- score computed by an LSTM neural network model
Normalized PMI

\[ npmi(q_i; a_j) = \frac{pmi(q_i; a_j)}{-\log p(q_i, a_j)} \]

\[ pmi(q_i; a_j) = \log \frac{p(a_j|q_i)}{p(a_j)} \]

- computed on WebScope Yahoo! Answers collection
# NPMI scores: diabetes

<table>
<thead>
<tr>
<th>term</th>
<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td>diabetes</td>
<td>0.70858</td>
</tr>
<tr>
<td>insulin</td>
<td>0.62824</td>
</tr>
<tr>
<td>glucose</td>
<td>0.55582</td>
</tr>
<tr>
<td>niddm</td>
<td>0.55183</td>
</tr>
<tr>
<td>hyperglycemia</td>
<td>0.54767</td>
</tr>
<tr>
<td>mellitus</td>
<td>0.54400</td>
</tr>
<tr>
<td>insulin-dependent</td>
<td>0.54332</td>
</tr>
<tr>
<td>pancreas</td>
<td>0.54290</td>
</tr>
</tbody>
</table>
NPMI scores: install

<table>
<thead>
<tr>
<th>term</th>
<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td>install</td>
<td>0.52456</td>
</tr>
<tr>
<td>setup.exe</td>
<td>0.44842</td>
</tr>
<tr>
<td>partition</td>
<td>0.40844</td>
</tr>
<tr>
<td>xp</td>
<td>0.39632</td>
</tr>
<tr>
<td>ubuntu</td>
<td>0.38734</td>
</tr>
<tr>
<td>bootable</td>
<td>0.37943</td>
</tr>
<tr>
<td>distros</td>
<td>0.36809</td>
</tr>
<tr>
<td>windows</td>
<td>0.35734</td>
</tr>
</tbody>
</table>
LSTM model

- Simple NN to produce a joint representation of QnA pair
- This representation is used to predict how likely the candidate answers the question
Training
LSTM network training
LSTM network training

- Implemented using Keras library
- Trained using stochastic gradient descent with Adam optimization technique
- Embedding and hidden layer of size 128
- Vocabulary of 1M words
- Total of 10K QnA pairs, batch size of 200 for 100 epochs
Logistic regression training
Evaluation
## Answer candidates

<table>
<thead>
<tr>
<th></th>
<th>Yahoo!Answers</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average # of candidates</td>
<td>33.63</td>
<td>67.50</td>
</tr>
<tr>
<td>Average model score</td>
<td>-15.18</td>
<td>-20.50</td>
</tr>
<tr>
<td>How often no candidates</td>
<td>0.14</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Histogram of ranks

- Green: Yahoo! Answers
- Red: Web search
Avg number of candidates: Y!A

Average number of candidates

- title
- title w/o stopwords
- title w/ body
- title w/body w/o stopwords
- title + w/o stopwords + category name
- title + body + w/o stopwords + category
- top 5 tf-idf from title
- top 5 tf-idf from title w/body

Number of candidates

0 1 2 3 4 5 6 7 8
Rank of the best candidate: Y!A
How often the candidate was selected: Y!A
Fraction of questions without candidates: Y!A

Fraction of questions with no candidates

- title
- title w/o stopwords
- title w/ body
- title w/body w/o stopwords
- title + w/o stopwords + category name
- title + body + w/o stopwords + category
- top 5 tf-idf from title
- top 5 tf-idf from title w/body
Query generation statistics for web

Average number of candidates
- title
- title + body

Average rank of the best candidate
- title
- title + body

Fraction of questions with no candidates
- title
- title + body
Feature importance

Weights of top features of ranking logistic regression model

- category match
- page title matches
- BM25 score (title)
- number of matched verbs (title)
- % of matched terms
- length of maximum matches span
- LSTM score
- total matches
- average npmi score

*category match feature is overfitted as in training category always match*
## Evaluation run statistics

*1087 questions were judged*

<table>
<thead>
<tr>
<th>score</th>
<th>explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>fully answers the question</td>
</tr>
<tr>
<td>3</td>
<td>partially answers the question</td>
</tr>
<tr>
<td>2</td>
<td>marginally useful information</td>
</tr>
<tr>
<td>1</td>
<td>contains no useful information for the question</td>
</tr>
<tr>
<td>-2</td>
<td>the answer is unreadable</td>
</tr>
</tbody>
</table>
**Scores**

*Emory system and average performance metrics*

- `avg-score(0-3)` - average score over all queries
- `succ@i+` - fraction of questions with i+ score
- `prec@i+` - fraction of answers with i+ score
Majority of answers came from Yahoo! Answers

- Yahoo! Answers: 47.19%
- Web search: 31.28%
- No answer: 21.53%

Answer source statistics
For some categories web search was more useful
Many other CQA website domains

Most frequent domains for answers

- answers.yahoo.com
- www.youtube.com
- www.livestrong.com
- www.amazon.com
- www.wikihow.com
- www.answers.com
- www.ehow.com
- www.justanswer.com
- www.quora.com
- ask.metafilter.com

Number of answers (log10)
Quality of answers from Y!A is better

Normalized histogram of scores for answer source types

- Green: Yahoo! Answers
- Red: Web passages

Score

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Examples
Similar questions

I'm addicted to smelling liquid and powder detergent. Is this bad? Please help!

I'm addicted to smelling laundry detergent...is this bad?

I don't eat it or anything...I just like to smell it. It's the powder kind. I think it smells really good. And I'm always happy to do laundry because I get to smell the detergent.

Best Answer: I don't see a problem with laundry detergent, it could be something much worse but to break yourself I would buy the liquid or buy the kind with no smell. I don't know any long term affects of smelling detergent but I would want to know how to stop.

Source(s):
retired paramedic

Medicine Woman · 6 years ago
Non-similar questions

I want to start going gym. I'm a male who wants to build muscle and get a bigger body but I have no idea where to start.

Why didn't Elliot Rodger, the mass shooter guy, just go to the gym & build big muscles so pretty girls would like him?
Non-similar questions

Is there a section for the subject of writing?

Update: I mean specifically..

I can't write in the To: Cc: Subject: section?

Best Answer: try downloading google chrome, maybe the problem is internet explorer

Candy Cream · 6 years ago
Not-useful answer
Answer from the web

Scatter feeding my hamster?

I always leave 1/4th to 1/2 of her bowl filled with food, so she has something to do. Underneath the toys, inside her cage. Is she eating it later? Her bowl is never empty.

Follow 2 answers

Hamster Hideout Forum

Should I Scatter Feed My Hamsters (When I get them :D)

Started by iceable, Jul 14 2015 12:04 AM

Hamsters & supplies

Ok, so I might possibly get a dwarf hamster. My question is: Do I buy all the supplies with the hamster at once, or do I prepare the cage and bedding and food, and then bring it to the store to bring home?

2 Answers

Is it okay to feed my Hamster cabbage?

I've tried feeding my hamster carrots, cabbage, and cucumber, but the only one he likes is cabbage. He doesn't just "like" it, he loves it. I rip tiny pieces but is it okay to feed...

6 Answers

Hamsters? Need information! Help!


8 Answers
Conclusions

• answers to previously posted similar questions can be effectively reused to answer new questions
• query generation strategies for CQA and web search are important as LiveQA questions are long
• term matches-based features are the most useful in our model. It will most likely benefit from “better” text similarity features: translation models, n-grams, tree kernels, etc.
• there is a huge room for improvement: only ~20% of questions were answered fully or partially

Thank you! Questions?