Scoring of response based on suitability of dialogue-act and content similarity

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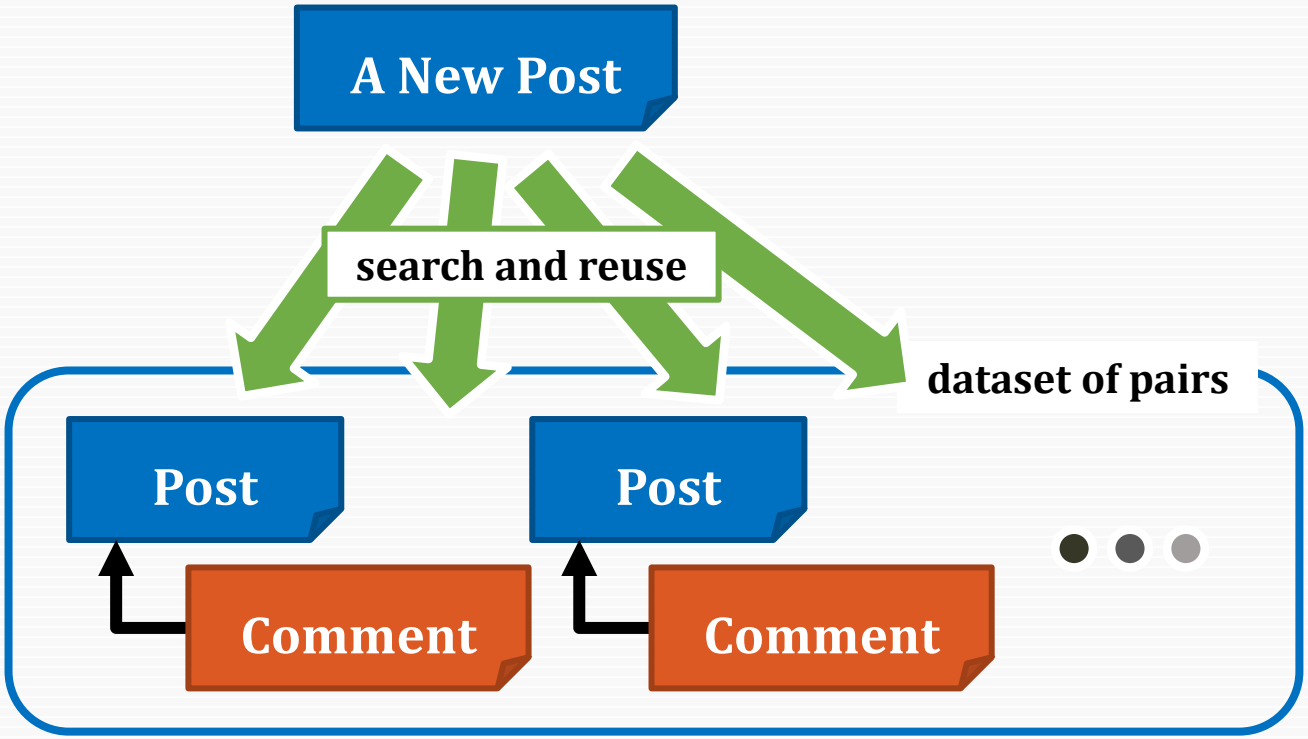
Short Text Conversation

- Repository of pairs consisting of a post and a comment to it
- When an utterance is given, we search for the appropriate utterances as the response in there



Approach

Score the utterances of the repository in following 2 items

- **Interactive Functional Suitability**

  Suitability in function of conversation as response to the input utterance

- **Content Similarity**

  Similarity of topics between utterances

  e.g. soccer, movie, lecture of university, etc.

$$Score(p, t_a) = ifs(p, t_a) * csim(p, t_a)$$

Interactive Functional Suitability

Dialogue-act

- The function of utterance in conversation

  e.g. greeting, question, desire, etc.

- To design it for the domain automatically, we use the **Chinese Restaurant Process**（**CRP**）
  - ✓ one of the unsupervised classification method
  - ✓ So, the names of dialogue-acts are those that we named classified clusters later

Interactive Functional Suitability

- Learn the tendency of dialogue-acts used in pairs of the repository as weight table

$$W[i][j] = \frac{count(i,j)}{N}$$

- Using weight table, it's possible to determine the suitability of utterances in the repository

$$ifs(p, t_a) = W[dae(p)][dae(t_a)]$$

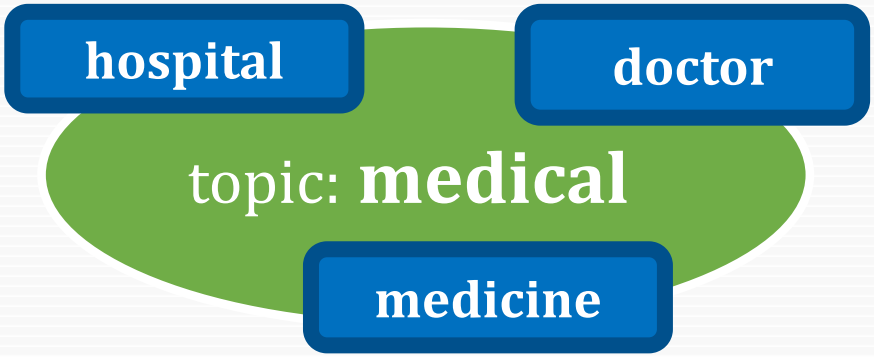
$dae(*)$ is dialogue-act estimator

Content Similarity

Latent Dirichlet Allocation（LDA）

estimate the potential topics to which the document belongs

These words belong to the same topic



Inverse Document Frequency（IDF）

search documents with common words having high informativeness

$$csim(p, t_a) = \alpha * lsim(p, t_a) + (1 - \alpha) * isim(p, t_a)$$

Experiments

Data

We used the posts to Twitter in training and testing

- Training data： **822,254 posts（411,127 pairs）**
- Testing data：**202 posts**

Experimental procedures

Training of models

- **CRP**
  - ✓ The feature is bag-of-words whose words with a frequency of appearance of more than 1,000 times
- **LDA**
  - ✓ To train the topic model we used articles of the free web encyclopedia "**Hatena Keyword**"

  - ✓ The feature is bag-of-words for the noun

Experimental procedures

■ Evaluations

- Three-degree evaluation of 0-2 according to the appropriateness of the response
- Calculate evaluation values in 4 types from “Case X-Y” that is a combination of the two conditions of X and Y
  - ✓ X is a set of evaluation values to determine that the response is appropriate（2 or 12）
  - ✓ Y is the lowest rank number of the candidates evaluated in each utterance（1 or 5）
- Finally the mean values of the evaluation values for each utterance were calculated

Results

Clustering of Dialogue-act

- Training data were classified into **41** dialogue-acts
- About half of the data belonged to one cluster
- About 70% of data belonged to the clusters mainly focusing case particles that are not related to the function of conversation

- In this experiment, IFS had the function as a filtering special representation
- As an exception, the cluster that seems to be greeting worked well because it had strong bias of using

Evaluation Results

- α is the parameter for adjusting the ratio of LDA and IDF in content similarity
- Higher evaluation in the case of not using the LDA

α	case 2-1	case 2-5	case 12-1	case 12-5
0.0	0.2297	0.2050	0.5589	0.5380
0.4	0.1817	0.1743	0.4748	0.4535
0.5	0.1812	0.1660	0.4614	0.4317
1.0	0.0787	0.0787	0.2114	0.2130

Consideration and Future works

- Including case particles to factor of classification is one of reason that inhibited performance in Interactive Functional Suitability
- We will improve it by filtering those

- We found that the filtering of words other than the noun didn't work well by inadequate performance of the morphological analysis
- By correcting them and increasing the number of dimensions of the topic vector, we will improve the ability to respond to the topic

Thank you