Building a Conversational Model from Two-Tweets

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Goal
- Build a dialogue system capable of casual conversation on a wide range of topics

Idea
- Need a dialogue model (e.g., state diagram, HMM) that can cope with many topics
- Need a lot of dialogue data in order to train such a model
- Can we use Twitter data? They are conversational and are in abundance

Problem
- Only 2.6% of Twitter data are conversational (connected by an in-reply-to relationship)
- Within conversations, 91% are two-tweets (one-shot interactions)
- Scarcity in long conversations needed for creating a dialogue model

Approach
- Build a dialogue model for long conversations by only using two-tweets
- Cluster utterances within two-tweets to create pseudo long conversations

Procedure
- Train a dialogue model from two-tweets
- Evaluate the model by how it explains long conversations

Dialogue model
- Infinite HMM (number of states determined by data)
- Features: bag-of-words of top 5000 words

Data
- Training data: two-tweet conversations on food and sports for training two-tweet models
- Test data: Long-tweet conversations (having three or more tweets) on food and sports (each containing 5043 and 3178 conversations)
- Test data split in half:
  1. One for training a long-tweet open model
  2. The other for testing and for training a closed model

Evaluation measures
- Likelihood
- Kendall’s tau (evaluates the order of tweets)

Results
- Negative log likelihood
- Kendall’s tau
- Possible structural changes to cope with long tweets
- Equivalent to the number reported in previous work (Ritter et al., 2010) that uses only long tweets

Visualization
- A trained HMM (food)
- Validates our approach to build a conversational model from two-tweets

Graphs
- Food-Set (long-tweet closed) vs. Food-Set (long-tweet open)
- Food-Set (long-tweet closed) vs. Food-Set (short-tweet closed)
- Food-Set (long-tweet closed) vs. Food-Set (short-tweet open)

Sports-Set (long-tweet closed) vs. Sports-Set (long-tweet open)
- Sports-Set (long-tweet closed) vs. Sports-Set (short-tweet closed)
- Sports-Set (long-tweet closed) vs. Sports-Set (short-tweet open)

Table
- Training data size (number of conversations):
  - LL (long-tweet closed)
  - LL (long-tweet open)
  - tau (long-tweet closed)
  - tau (long-tweet open)
  - tau (short-tweet closed)
  - tau (short-tweet open)

- Negative log likelihood:
  - Food-Set (long-tweet closed)
  - Food-Set (long-tweet open)
  - Food-Set (short-tweet closed)
  - Food-Set (short-tweet open)

- Kendall’s tau:
  - Food-Set (long-tweet closed)
  - Food-Set (long-tweet open)
  - Food-Set (short-tweet closed)
  - Food-Set (short-tweet open)

Graphs
- Number of states vs. Training data size (number of conversations)
  - Food
  - Sports

- Kendall’s tau vs. Training data size (number of conversations)
  - Food
  - Sports

- Number of exchanges vs. Training data size (number of conversations)
  - Food
  - Sports