Building a Conversational Model from Two-Tweets

Ryuichiro Higashinaka[1], Noriaki Kawamae[2], Kugatsu Sadamitsu[1], Yasuhiro Minami[3], Toyomi Meguro[3], Kohji Dohsaka[3], and Hirohito Inagaki[1]

[1]NTT Cyber Space Laboratories, [2]NTT Comware Coporation, [3]NTT Communication Science Laboratories

NTT

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
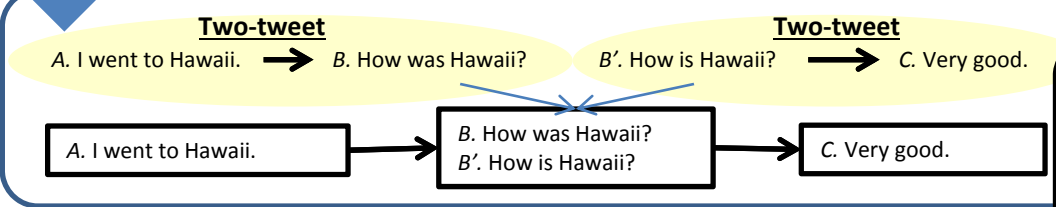- **Can we use Twitter data?** They are conversational and are in abundance

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)
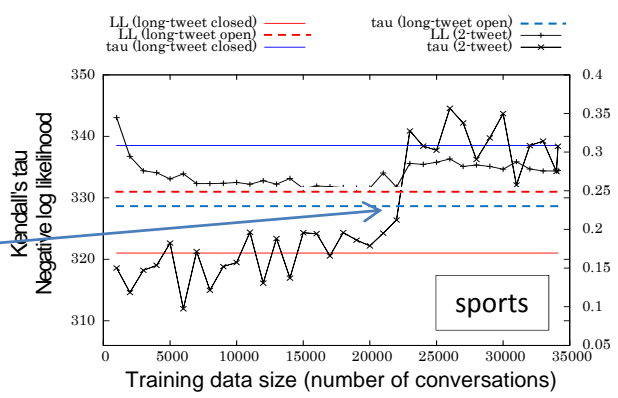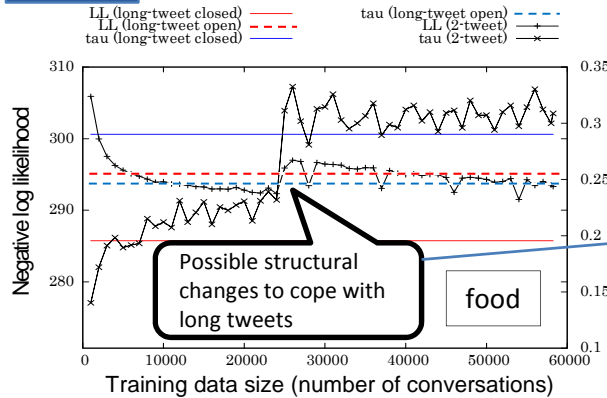- Scarcity in long conversations needed for creating a dialogue model

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

Two-tweet
A. I went to Hawaii. → *B.* How was Hawaii?

Two-tweet
B'. How is Hawaii? → *C.* Very good.

A. I went to Hawaii. → *B.* How was Hawaii? / *B'.* How is Hawaii? → *C.* Very good.

Experiment

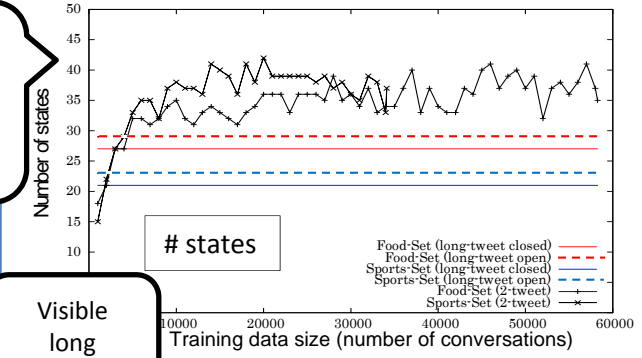| Procedure	● Train a dialogue model from two-tweets ● Evaluate the model by how it explains long conversations
Dialogue model	● **Infinite HMM** (number of states determined by data) ● Features: bag-of-words of top 5000 words
Data	● **Training data**: two-tweet conversations on **food** and **sports** 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)

Equivalent to the number reported in previous work (Ritter et al., 2010) that uses only long tweets

Results

LL (long-tweet closed) —
LL (long-tweet open) ----
tau (long-tweet closed) —
tau (long-tweet open) ----
LL (2-tweet) —+—
tau (2-tweet) —×—

Possible structural changes to cope with long tweets

food

sports

Visible long exchanges

states

Food-Set (long-tweet closed) —
Food-Set (long-tweet open) —
Sports-Set (long-tweet closed) —
Sports-Set (long-tweet open) ----
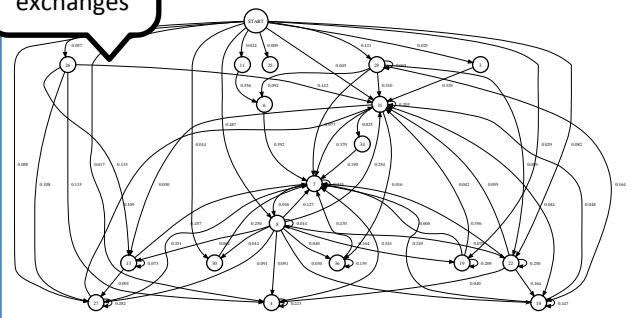Food-Set (2-tweet) —+—
Sports-Set (2-tweet) —×—

- Likelihood approaches the open model
- Kendall's tau reaches the closed model

→ **Validates our approach to build a conversational model from two-tweets**

Visualization of a trained HMM (food)