**Discourse in Customer Service Dialogues**

_Svetlana Stoyanchev and Srinivas Bangalore_

_Interactive Corporation, New York, NY_

**Motivation**
Joint discourse analysis of:
- Topic transitions
- Rhetorical discourse relation
- Dialogue acts
Address a question: What makes a dialogue coherent?

**Domain:** Customer service dialogues
**Task:** Product recommendation
**Modality:** Typed chats

**Utility**
- Analytics: examine styles of dialogues; pair agents and customers; determine personal characteristics from dialog style;
- Dialogue/interaction management: online chatbot agent for retailer: Statistical policy decisions in problem solving dialogue system

**Observed Topic Sequences**
1: ICRPRE
2: ICPCRE
3: ICRPCPCPRPE
4: ICRPRE
5: ICPRPCRE
6: IPCRE
7: IPCRE
8: ICPR
9: IPRCE
10: IPCPCCPCE

**Annotated 10 typed customer service dialogues**
1) Segment utterances into clauses
2) Annotate each clause with
3) Ontology Topic
4) Dialogue Act (according to DIT)
5) Discourse relation (PDTB)

**Annotated Dialogue Excerpt**

<table>
<thead>
<tr>
<th>Spkr</th>
<th>Utterance</th>
<th>Topic</th>
<th>DIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>What kind of software program would you be running on your new COMPUTER?</td>
<td>C_U_SOFT</td>
<td>Question-Set</td>
</tr>
<tr>
<td>C</td>
<td>I would probably be mainly running Photoshop and Illustrator</td>
<td>C_U_SOFT</td>
<td>Inform-Answer</td>
</tr>
<tr>
<td>A</td>
<td>Ok great.</td>
<td>C_U_SOFTWARE</td>
<td>Auto-Positive</td>
</tr>
<tr>
<td>A</td>
<td>Would you be purchasing for a business?</td>
<td>C_U_SOFTWARE</td>
<td>Question-Prop</td>
</tr>
</tbody>
</table>

**Topic Ontology**

- Topic ontology is a discretization of a continuous topic space
- View discourse as traversal of an ontology structure (or a topic space)
- Topic switch is associated with a distance that can be measured in an ontology or using lexical/semantic similarity between utterances

**R – General Recommendation discussion:** “Cool, in this case I would recommend you to purchase…”

**I – Intro E - End**

**Topic Switches**

- Agent switches in 23% of segments
- Client switches 18% of segments

**Transitions Between Topics**

- Agent switches in 23% of segments
- Client switches 18% of segments

**Discourse Relation: Result (segment-independent)**

- UP-to-UP
- UP-to-SWITCH
- SWITCH-to-UP
- SWITCH-to-SWITCH
- SWITCH-to-IDTO
- IDTO-to-SWITCH
- IDTO-to-IDTO
- SWITCH-to-NEIGHBOR
- NEIGHBOR-to-DISTANCE

---

**Dialogue Act Statistics**
10 dialogues; 315 Turns; manually segmented
Total DA segments: Agent 315; Client 237

**DIT general purpose communicative function**

**DIT domain-specific communicative function**

**Dialogue Acts of Topic Transitions**

- Topic switch on **Question**: 53 (44% of Question DA)
- Topic switch on **Inform**: 32 (15% of Inform DA)
- Topic switch on **Action**: 8 (36% of Action DA)

**Discourse Relation (PDTB)**

- Intra-turn (not annotated)
- Between turns
- Segment-independent discourse (not linked to a specific segment)

Most frequent are Segment-independent Discourse relations:
- Result, Justification on Inform DA

**Future work**
- Analyze how topic switching affects dialogue coherence
- Describe discourse style based on its discourse
- Infer the topic ontology from human-human conversations
- Use topic switching feature for
  - success of interaction
  - pair up dialogue partners based on past dialogue styles
  - recommendation selection
  - predicting situational power