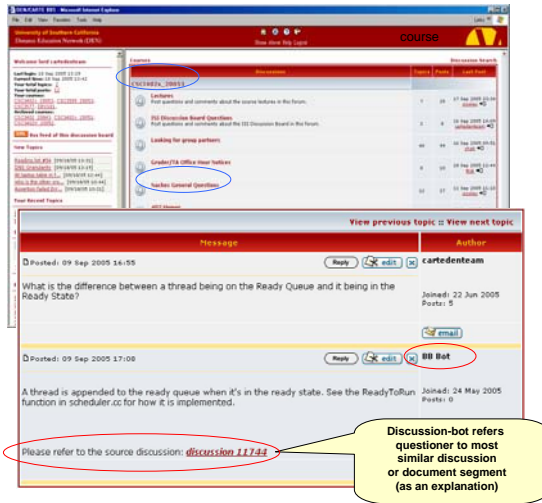


# An Intelligent Discussion-Bot for Guiding Student Interactions in Threaded Discussions

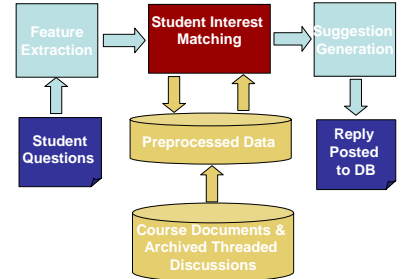
<http://ai.isi.edu/discourse>

Jihie Kim, Erin Shaw, Grace Chern, Donghui Feng  
University of Southern California/ Information Sciences Institute

- Courses Involved**
  - Undergraduate CS Operating System, USC
  - Graduate CS Advanced OS, USC
  - Psychology of Women course at the Univ. Massachusetts
  - Engineering Negotiation for Collaborative Product Development, USC
  - Graduate Security Systems, USC
  - Formal Languages and Automata, UC Irvine
  - Undergraduate CS Operating System, Michigan Technological Univ.
- ~500 past students
- ~150 current student
- Over 7000 messages

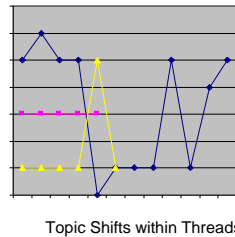


## Generating Suggestions to Users (IUI 2006, HLT/NAACL 2006)

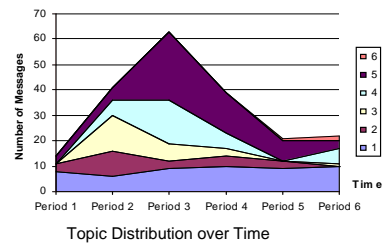


## Modeling User Interactions in Discussions

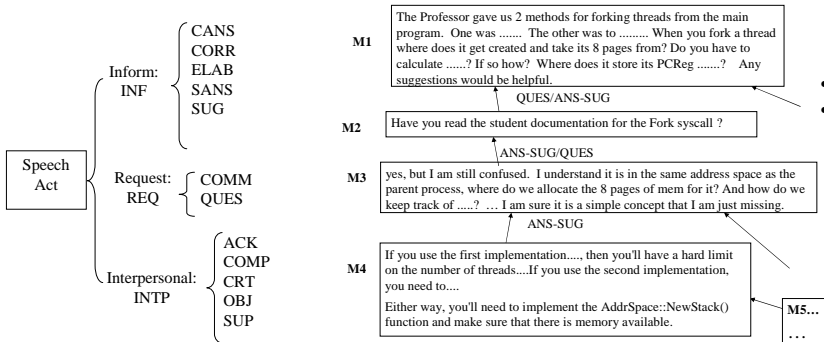
- Interaction patterns in threads**
  - e.g. threads that reach an agreement on a topic versus threads that have unanswered queries
- Topic Modeling**
  - Topic of the discussion, topic coherence
  - Quality of the content (e.g. use of technical terms)
- Role of each participant and his/her contribution**
  - e.g. person who asks many questions on a particular topic
- Interaction changes over time**
  - e.g. topic changes over a semester



## Topic Modeling (AAAI 2006)



## Modeling Interaction Patterns with Speech Acts (SA)

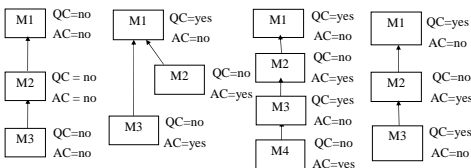


## Automatic SA Classifiers (AIED 2007)

- Cleaning/preprocessing/transformation of raw data
- N-gram features and Linear SVM
- Accuracy: QC (Question Classifier) – 88%
- AC (Answer Classifier) – 73%

Category	1-gram	2-grams	3-grams	4-grams
Question Classifier	? [categ_w h] will do confused	do [categ_person] [tech_term] ? can [categ_person] is there ? thanks	[categ_wh] should [categ_person] [categ_person] was	do [categ_person] have to do [categ_person] need to [tech_term] [tech_term] ? [tech...] ? is there a better does this mean that
Answer Classifier	yes am helps but depends	look at [or/and] do seems like in [tech_term] stated in	look at the for example . [categ_person] should let [me/him/her/us] know not seem to	[categ_person] am a [tech_term] do [categ_person] have to look at the [tech_term] in the same [tech_term]

## Thread Modeling with SA Classifiers



- whether the given thread contains questions
  - whether the questions were answered or not.
- 70-75% of the predictions from the system were consistent with human answers

**Pattern Group A: short information exchange on non-controversial issues**  
16 QUES <P1> ANS <P2>  
1 ANNO <P1> ACK <P2>

**Pattern Group B: Discussion on somewhat complex issues, answers may have been found.**  
1 QUES <P1> ANS <P2> CORR <P3>  
1 QUES <P1> ELAB <P2> ANS <P2>  
1 QUES <P1> QUES <P2> ANS <P1>  
1 ANS <P1> CORR <P2>  
1 QUES <P1> ANS <P2> ANS <P1>  
1 QUES <P1> ANS <P1> QUES <P2> ANS <P3>  
1 QUES <P1> ELAB <P2> ELAB <P3> ACK <P4> QUES <P2> ANS <P4>

**Pattern Group C: collaborative discussion on complex issues, followed by agreeable conclusion**  
1 QUES <P1> ANS <P2> QUES <P3> ANS <P2> CORR <P3> ACK <P2>

**Pattern Group D: Students may have unresolved issues.**  
1 QUES <P1> CORR <P2>  
1 QUES <P1> ACK <P2>  
1 QUES <P1> ANS <P2> CORR <P1> ANS <P2> ANS <P3> QUES <P2>  
3 QUES <P1> ELAB <P1>