

Automatic Generation of Questions

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Abstract:

Questions play a central role as functional contexts for language use. As such they are relevant in a number of contexts: Questions support the interpretation of answers in a concrete language-based context. They make it possible to test knowledge, to verify whether someone has read a given text, or to explore the interpretations drawn from a given text. Questions can foster learning and they are central to assessment. In computational linguistics, the automatic generation of questions is an attractive challenge given the mix of function, meaning and grammatical characteristics that it involves. In this seminar, we survey different techniques for generating questions and their use cases.

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- *Office:* Room 1.28, Blochbau (Wilhelmstr. 19)
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- *Office hours:* Wednesdays 10:00–12:00 (arrange a slot by email beforehand)

Course meets:

- Wednesdays, 8:15–9:45, in Neua Aula, Hörsaal 04
- Fridays, 8:15–9:45, in Blochbau (Wilhelmstr. 19), Hörsaal 0.02

Credit Points: 6 CP or 9 CP (with term paper)

- active participation in class: 4SWS * 15 = 60h (2 CP)
- reading and posing of questions: 60h (2 CP)
 - Note: Posting meaningful questions to the forum **before** the class discussing the topic is a crucial component of the seminar. Doing so for less than 60% of the topics automatically means failing the class.
- preparing and holding class presentation: 60h (2 CP)
- optional: term paper 90h (3 CP)

Syllabus (this file):

- html-Version (<http://purl.org/dm/17/ws/hs>)
- pdf-Version (<http://purl.org/dm/17/ws/hs/syllabus.pdf>)

Moodle page:

- <https://moodle02.zdv.uni-tuebingen.de/course/view.php?id=2009>

Nature of course and our expectations: This is a research-oriented Hauptseminar, in which we jointly explore perspectives and approaches on complexity in linguistics, psycholinguistics, and computational linguistics. You are expected to

1. regularly and actively participate in class, read the papers assigned by any of the presenters and post a meaningful question on Moodle to the “Reading Discussion Forum” on each reading *at the latest on the day before it is discussed* in class.
2. explore and present a topic:
 - select one of the sub-topics by the end of October
 - thoroughly research the topic, taking our literature pointers *as a starting point*
 - prepare the presentation with slides, send them to me by email and discuss them with me in a half hour slot during my office hour *at least a week before the presentation*
 - start a new Moodle thread on the “Reading Discussion Forum” specifying what every course participant should read to prepare for your presentation *a week before your presentation*
 - present and discuss the topic in class
3. if you pursue the 9 CP option, work out a project term paper
 - *before January 28, 2018* select a topic and submit a one-page abstract (and a revised version by February 10, 2018)
 - *by March 30, 2018, i.e. before the beginning of the next semester* email the term paper in pdf format to the instructor.
 - Note for Computational Linguistics students: The term paper must be produced in LaTeX using the ACL conference format or the Computational Linguistics journal format; BibTeX must be used for the bibliography.

Academic conduct and misconduct: Research is driven by discussion and free exchange of ideas, motivations, and perspectives. So you are encouraged to work in groups, discuss, and exchange ideas. At the same time, the foundation of the free exchange of ideas is that everyone is open about where they obtained which information. Concretely, this means you are expected to always make explicit when you’ve worked on something as a team – and keep in mind that being part of a team always means sharing the work.

For text you write, you always have to provide explicit references for any ideas or passages you reuse from somewhere else. Note that this includes text “found” on the web, where you should cite the url of the web site in case no more official publication is available.

Class etiquette: Please do not read or work on materials for other classes in our seminar. All portable electronic devices such as cell phones and laptops should be switched off for the entire length of the flight, oops, class.

Topics

- What is the goal of generating questions?
 - in the context of reading a text
 - * ensuring texts are read, testing recall
 - * fostering and testing comprehension (content)
 - * supporting language acquisition (vocabulary, forms)
 - in the context of analyzing a text
 - * making discourse structure of a text explicit
 - in the context of exploring a topic
 - in the context of a dialogue system
 - * system initiated dialogue moves or clarification requests
 - Which types of questions exist and which can be generated?
- What are the steps needed for question generation? (selection of targets, question generation methods, answer-related processing)
- How is the material to be asked about selected? (texts, sentences, contents or linguistic forms)
- How can questions be generated? (transformation-based, template-based, statistical approaches)
- How can answers to the generated questions be handled?
 - Distractor generation for multiple-choice answers
 - Automatic short answer analysis
- How can which parts of question generation systems be evaluated? (internal evaluation, externally-validated evaluation)

Scheduling

Note that the following session plan is subject to change; it only constitutes the current state of our planning as the semester unfolds.

1. Wednesday, October 25: Kick-off [[DETMAR MEURERS]]
 2. Friday, October 27: Overview based on Piwek & Boyer (2012) [[KORDULA DE KUTHY]]
 3. Wednesday, November 1: *no class (holiday)*
 4. Friday, November 3: Introduction [[MARIA CHINKINA]]
 5. Wednesday, November 8: Template-Based approaches to QG
- **Topic 1.** Manually created syntactic patterns [PATRICIA FISCHER, ALEXANDER HARTMANN, NEELE WITTE]
 - Liu et al. (2010, 2012), Wyse & Piwek (2009), Kalady et al. (2010)

6. Friday, November 10: (cont.)
 - **Topic 2.** Lexical, semantic patterns [DANIEL NAGEL, TOBIAS PÜTZ, LUKAS STEIN]
 - Curto et al. (2011), Mazidi & Nielsen (2015) Mazidi & Nielsen (2014a), Lindberg et al. (2013)
7. Wednesday, November 15: (cont.)
 - **Topic 3.** Generating patterns: [REBECCA LONG, IRIS PERKMANN, TESLIN ROYS]
 - Labutov et al. (2015), Curto et al. (2012), Becker et al. (2012), Ravichandran & Hovy (2002)
8. Friday, November 17: Transformation-Based approaches to QG
 - **Topic 4.** Shallow syntax-based transformations [EKATERINA LAZARUK, NIKA STREM]
 - Kunichika et al. (2004), Varga & Ha (2010), Pal et al. (2010); Mitkov et al. (2006) (only the generation part, not the evaluation)
9. Wednesday, November 22: (cont.)
 - **Topic 5.** Linguistically informed syntactic transformations for English [MARIA BORISOVA ILIEVA, MARIA CHINKINA]
 - Heilman (2011), Heilman & Smith (2010a), Heilman & Smith (2010b); Mazidi & Tarau (2016)
10. Friday, November 24: (cont.)
 - **Topic 6.** Linguistically informed syntactic transformations for German [CHIH-CHUN CHANG, MIHAI MANOLESCU]
 - (Kolditz 2015; Gütl et al. 2011)
11. Wednesday, November 29: (cont.)
 - **Topic 7.** Linguistically informed syntactic transformations [ANNA BRÓDY, FABIAN LANG]
 - French (Bernhard et al. 2012)
 - Basque (Aldabe et al. 2006, 2011)
 - Chinese (Liu et al. 2017)
 - Punjabi: (Garg & Bedi 2013; Goyal et al. 2013)
 - Hindi: (Kaur & Bathla 2015)
12. Friday, December 1: Approaches integrating semantic representations
 - **Topic 8.** Integrating meaning [SOPHIE HORNUFF, TOBIAS SCHERER]
 - Concept maps Olney et al. (2011, 2012)
 - Vocabulary assessment Brown et al. (2005)
13. Wednesday, December 6: Approaches integrating semantic representations

- **Topic 9.** shallow semantic representations [CHEE-KUI CHEUNG, MAXIMILIAN SCHMIDT, BRIAN WIRTH]
 - (Yao & Zhang 2010; Mannem et al. 2010; Yao et al. 2012a)

14. Friday, December 8:

- **Topic 10.** deep semantic representations [ALINA BARANOVA, THERESA BERTELE, TOBIAS KONRAD ELSSNER]
 - Araki et al. (2016), Jouault & Seta (2013), Jouault & Seta (2014), Jouault et al. (2015)

15. Wednesday, December 13: (cont.)

- **Topic 11.** discourse, e.g., employing discourse cues [OLAJIDE ISHOLA, NIDHAL MEKKI]
 - (Agarwal et al. 2011; Piwek & Stoyanchev 2010a,b)

16. Friday, December 15: (cont.)

- **Topic 12.** Topic-based approaches [MARTA BERARDI, NORA STEFANOVA KUMPIKOVA, ELVIRA VYLEGZHANINA]
 - (Chali & Hasan 2012, 2015; Kumar et al. 2015), (Yao et al. 2012b)

17. Wednesday, December 20: hands-on session [MARIA CHINKINA]

18. Friday, December 22:

- **Topic 13.** Neural network-based approaches [KATHERINE MUNRO, LE DUYEN SANDRA VU]
 - (Serban et al. 2016; Asghar et al. 2017)

19. Wednesday, January 10:

- **Topic 14.** cont. [SAMANTHA JASMIN LINK, JULIAN PETRUCK]
 - (Reddy et al. 2017; Zhou et al. 2017; Du et al. 2017)

20. Friday, January 12:

- **Topic 15.** cont. [RYAN CALLIHAN, SARAH TAYLOR]
 - Hoshino & Nakagawa (2005), Mostafazadeh et al. (2016a), Mostafazadeh et al. (2016b)

21. Wednesday, January 17:

- **Topic 16.** Applications: [MIRIAM MARTHALER, EKATERINA PANFILOVA]
 - Kunichika et al. (2004), Mostow & Chen (2009), Susanti et al. (2015)

22. Friday, January 19: Making discourse explicit through Questions-under-Discussion [KORDULA DE KUTHY]

23. Wednesday, January 24:

- **Topic 17.** Evaluation of QG approaches [JULIA DOBCZYNSKA]
 - (Rus et al. 2010, 2012; Becker et al. 2009)
24. Friday, January 26:
- **Topic 18.** Evaluation (cont.) [ROJA IRANDOOST, NAZANIN KHAZAEI FARID]
 - Skalban et al. (2012), Mitkov et al. (2006), Le & Pinkwart (2015), Mazidi & Nielsen (2014b)
25. Wednesday, January 31: Discussion of Term Paper Ideas
26. Friday, February 2: Generating and Evaluating Questions for English [MARIA CHINKINA]
27. Wednesday, February 7: Presentation of Term Paper Ideas
28. Friday, February 9: Presentation of Term Paper Ideas

References

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