

Combining Answers from Heterogeneous Web Documents for Question Answering

Christian M. Meyer



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Master Thesis, Ubiquitous Knowledge Processing Lab, Fachbereich Informatik, Technische Universität Darmstadt, April 2009. Betreut von: Dr. Delphine Bernhard, Kateryna Ignatova, Prof. Dr. Iryna Gurevych.

Vortrag im Rahmen der Jahrestagung der Gesellschaft für Sprachtechnologie und Computerlinguistik, Hamburg, 28.–30. September 2011.

Motivation

Warum Question Answering? – Situation Heute



TECHNISCHE
UNIVERSITÄT
DARMSTADT

*Was ist
die GSCL?*



gscL

Internet Mehr▼

ALLE ERGEBNISSE 1-10 von 20.600 Ergebnissen · [Erweitert](#)

[GSCL - Startseite](#)
Portal der GSCL ... Die Gesellschaft für Sprachtechnologie und Computerlinguistik e.V. (GSCL) ist der wissenschaftliche Fachverband für maschinelle Sprachverarbeitung in Forschung ... [gscL.org](#)

[Germersheimer Seglerclub e.V.](#)
Am Wochenende vom 2-4.10.09 beteiligten sich die Mitglieder der SG – Stern Germersheim und Wörth mit ca. 60 Personen von denen 13 Segler ebenfalls dem GSCL angehören sind am ... [www.gscL.de](#)

[GSCL - Über uns](#)
Portal der GSCL ... Tagungen. Die Fachtagungen der GSCL befördern den Erfahrungsaustausch auf hohem Niveau durch die Vorstellung computerlinguistischer Grundlagenforschung sowie ... [gscL.org/tagung.html](#)

[The domain name GSCL.COM.](#) [Diese Seite übersetzen](#)
GSCL.COM is available for sale. ... Get On The Web Limited registered for its own websites, portals and client projects a number of generic domain names (including ... [www.gscL.com](#)

[Germersheimer Seglerclub e.V.](#) [Diese Seite übersetzen](#)
GSCL ... Warning: Unknown: Your script possibly relies on a session side-effect which existed ... [www.gscL.de/index.php?id=bilder&sid=bilder&name=Deutschland%20Pokal%202007&path=IMG/...](#)

[GSCL Arbeitskreis Maschinelle Übersetzung](#)
Wir sind umgezogen! Sie finden die Seite des Arbeitskreises Maschinelle Übersetzung der Gesellschaft für Sprachtechnologie und Computerlinguistik nun unter der Domain [gldvakmt.blogspot.com](#)

Motivation

Warum Question Answering? – Vision



TECHNISCHE
UNIVERSITÄT
DARMSTADT

*Was ist
die GSCL?*



Was ist die GSCL?



Internet

Mehr▼

Die **Gesellschaft für Sprachtechnologie und Computerlinguistik e.V. (GSCL)** ist der wissenschaftliche Fachverband für maschinelle Sprachverarbeitung in Forschung, Lehre und Beruf. Sie ist aktiv um Verbindungen zwischen Hochschulen und Industrie bemüht und unterstützt die Zusammenarbeit mit Nachbardisziplinen wie z.B. Linguistik und Semiotik, Informatik und Mathematik, Psychologie und Kognitionswissenschaft, Informations- und Dokumentationswissenschaft und unterhält Kontakte zu den entsprechenden Fachverbänden.

Weitere Informationen: [...]

Zielsetzung

Einordnung der Thesis

„Gut“ erforschte Trends im Question Answering:

- Fakten- und Listenfragen (TReC-Konferenzen, Hirschman&Gaizauskas, 2000)
- QA in eingegrenzten Domänen (vgl. u.a. Mollá&Vicedo, 2004)

Mein Ansatz:

- Einbeziehung heterogener Datenquellen
- Angelegt als *open domain* QA-Lösung
- Fokus auf Definitionsfragen; Beispiel: „*What is flash media?*“

Teil des DFG-/Emmy-Noether-Projekts QA-EL
„*Mining Lexical-Semantic Knowledge from
Dynamic and Linguistic Sources and Integration
into Question Answering for Discourse-Based
Knowledge Acquisition in eLearning*“



Zielsetzung

Heterogene Datenquellen



- „Social Q&A“-Plattform
- 52,1 Mio. gestellte Fragen [11/2008]
- <http://answers.yahoo.com/>



- Enzyklopädie
- 1,6 Mio. Artikel [06/2007]
- <http://en.wikipedia.org/>



- Expertenwissen (Jijkoun&de Rijke, 2005)
- 2,8 Mio. Fragen-/Antwortpaare
- Web Mining: <http://www.google.com/search?q=inurl:faq>

Weitere Datenquellen können angebunden werden.

Zielsetzung

Daten



TECHNISCHE
UNIVERSITÄT
DARMSTADT

- Nur wenige Daten frei verfügbar
- Eigenes Korpus auf Basis von UKP-Vorarbeiten erstellt
- 20 Definitionsfragen von Answerbag (Kategorie: „Computers“)
- Referenzantworten zur Evaluation
 - Originalantwort von Answerbag
 - Manuell gewählte Antwort von Ask.com

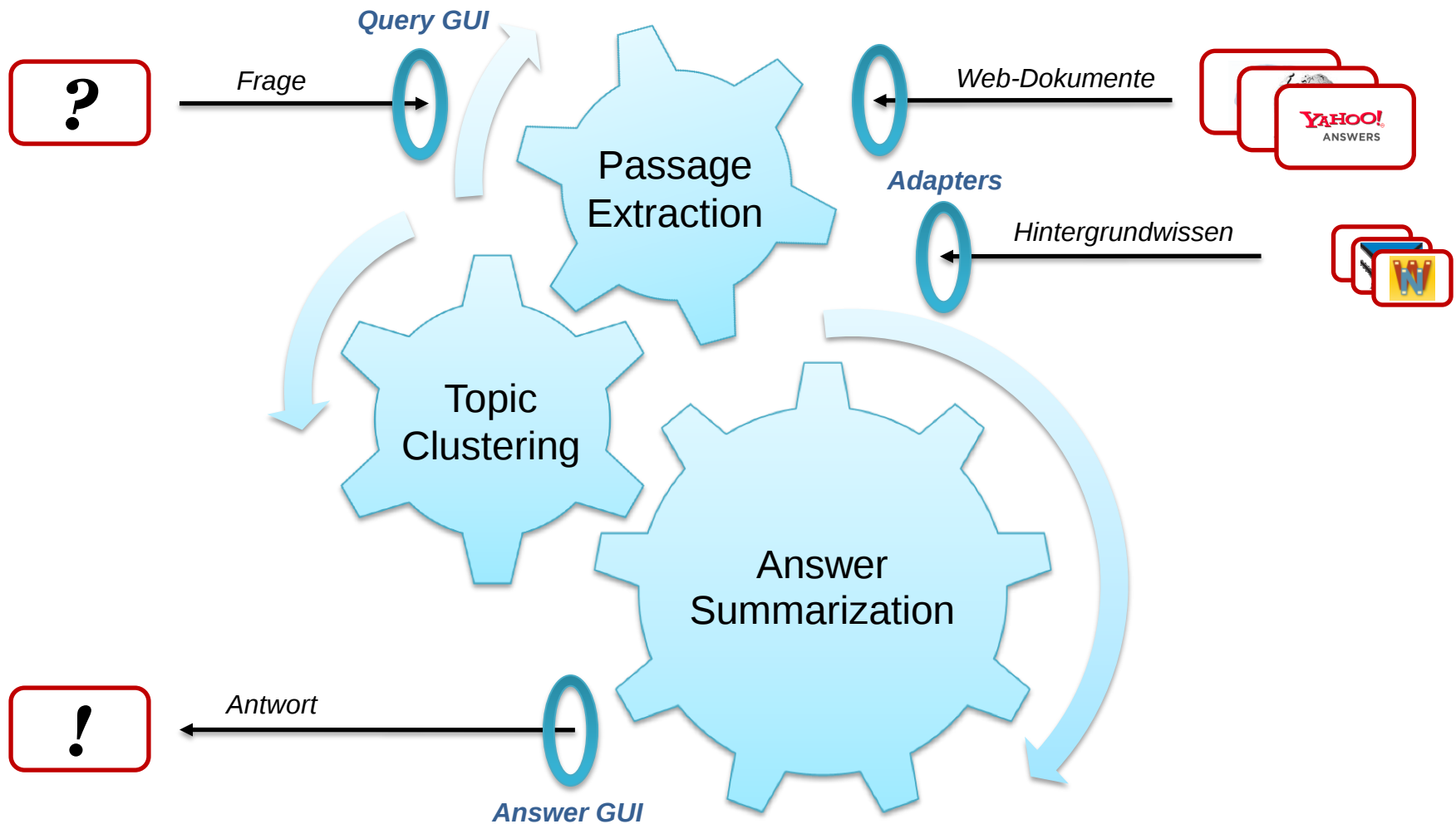


- Jeweils 20 Dokumente aus heterogenen Datenquellen
 - Yahoo! Answers
 - Wikipedia
 - FAQ-Kollektion
 - Information-Retrieval mittels Lucene
- Annotationen zur Evaluation der Teilschritte (*dazu später mehr*)



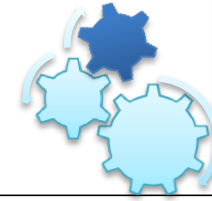
Zielsetzung

Teilschritte

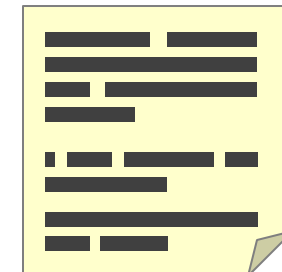
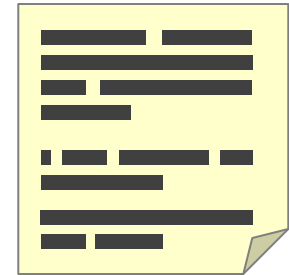
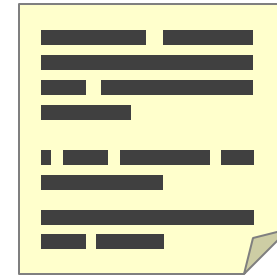
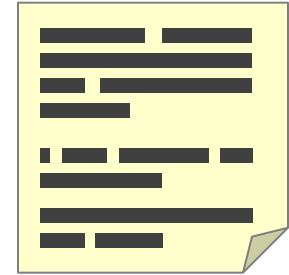
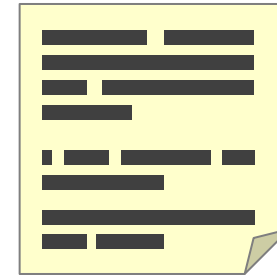


Passage Extraction

Relevante Textstellen finden: Methoden

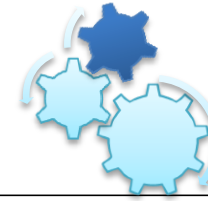


TECHNISCHE
UNIVERSITÄT
DARMSTADT



Passage Extraction

Relevante Textstellen finden: Methoden

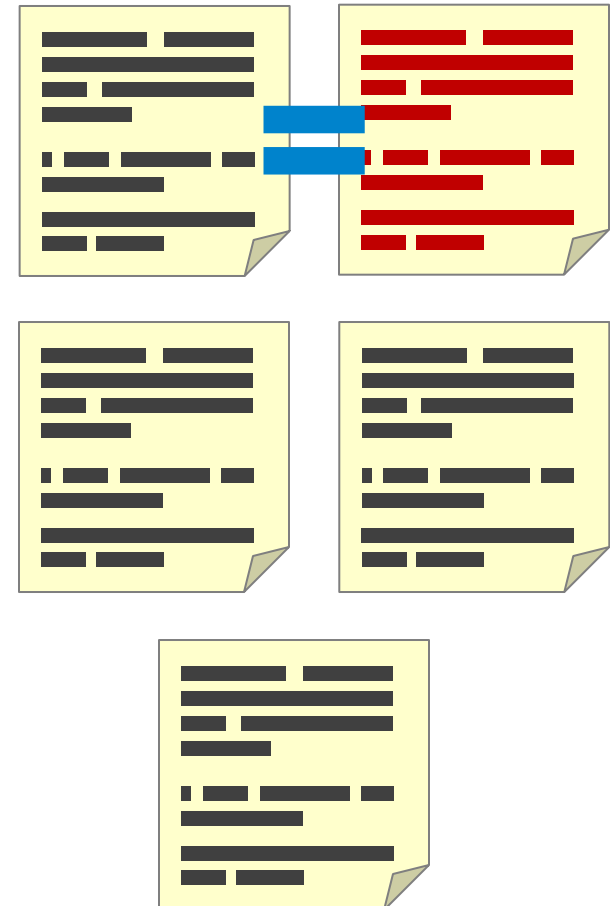


TECHNISCHE
UNIVERSITÄT
DARMSTADT

1) Duplicate Document Remover

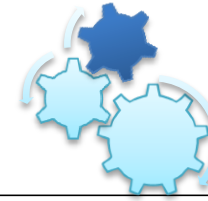
Identische Dokumente entfernen, z.B. kodierte FAQs

► MD5-hash



Passage Extraction

Relevante Textstellen finden: Methoden

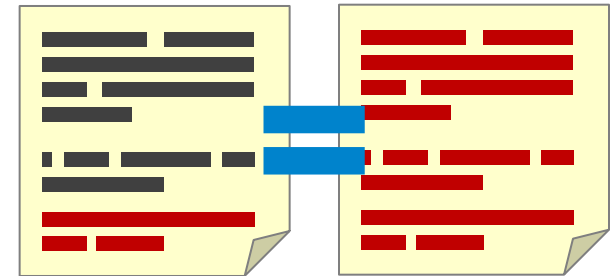


TECHNISCHE
UNIVERSITÄT
DARMSTADT

1) Duplicate Document Remover

Identische Dokumente entfernen, z.B. kodierte FAQs

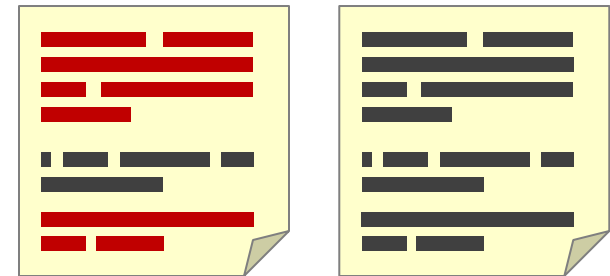
- ▶ MD5-hash



2) Paragraph Filter

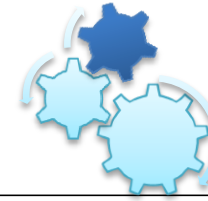
Irrelevante Absätze entfernen

- ▶ Corpus- and Knowledge-based Text Similarity (Mihalcea et al., 2006)



Passage Extraction

Relevante Textstellen finden: Methoden



TECHNISCHE
UNIVERSITÄT
DARMSTADT

1) Duplicate Document Remover

Identische Dokumente entfernen, z.B. kodierte FAQs

- ▶ MD5-hash

2) Paragraph Filter

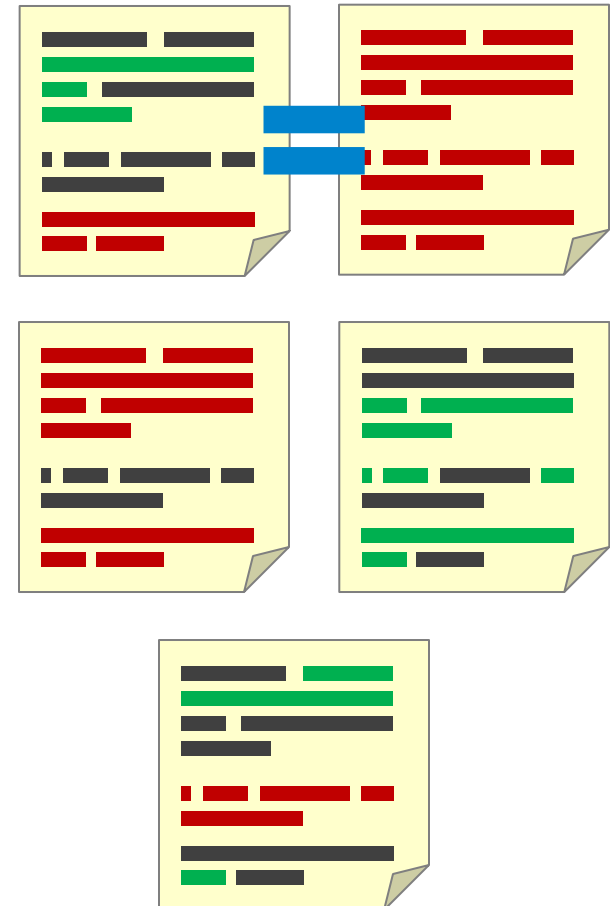
Irrelevante Absätze entfernen

- ▶ Corpus- and Knowledge-based Text Similarity (Mihalcea et al., 2006)

3) Sentence Selector

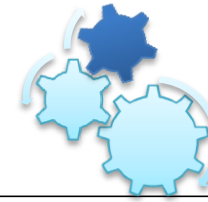
Relevante Sätze finden

- ▶ AltaVista-based PMI (Turney, 2001)
- ▶ Wikipedia-based ESA (Gabrilovich&Markovich, 2007)



Passage Extraction

Relevante Textstellen finden: Methoden



TECHNISCHE
UNIVERSITÄT
DARMSTADT

1) Duplicate Document Remover

Identische Dokumente entfernen, z.B. kopierte FAQs

- ▶ MD5-hash

2) Paragraph Filter

Irrelevante Absätze entfernen

- ▶ Corpus- and Knowledge-based Text Similarity (Mihalcea et al., 2006)

3) Sentence Selector

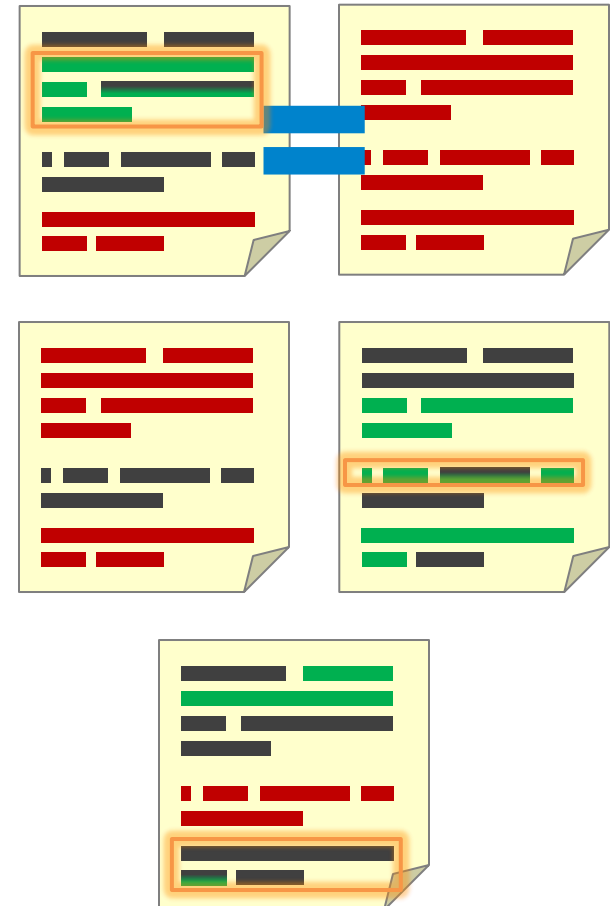
Relevante Sätze finden

- ▶ AltaVista-based PMI (Turney, 2001)
- ▶ Wikipedia-based ESA (Gabrilovich&Markovich, 2007)

4) Passage Extent Determination

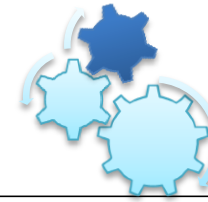
Finde „natürliche“ Grenzen zwischen relevanten und irrelevanten Sätzen

- ▶ Hidden Markov Model (He et al., 2004)



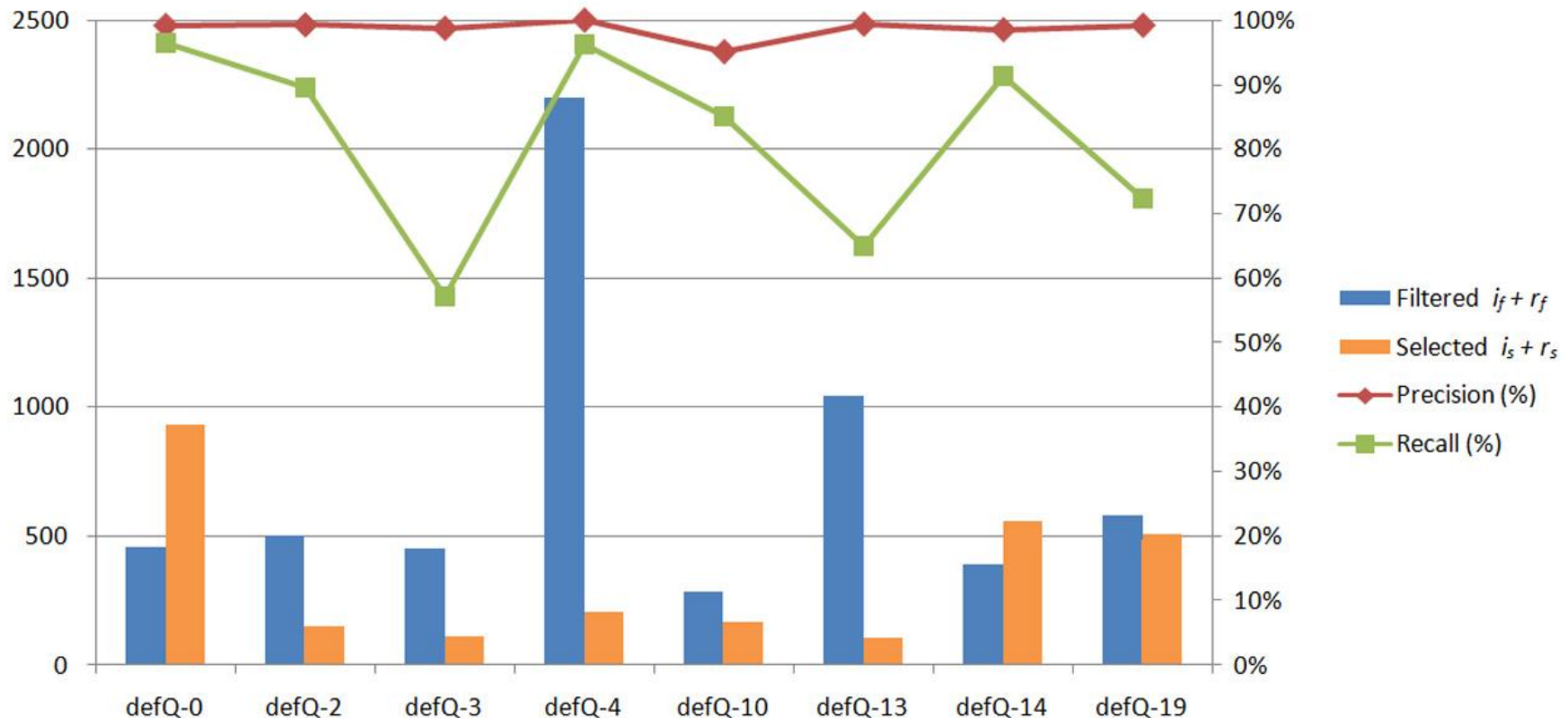
Passage Extraction

Relevante Textstellen finden: Evaluation



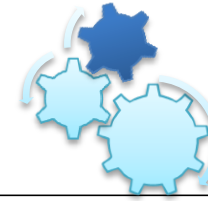
TECHNISCHE
UNIVERSITÄT
DARMSTADT

- Teilschritt-Evaluation: manuell annotierte “Relevanz” für ~8.800 Sätze.
- $\emptyset$ -Precision = 98,6%, $\emptyset$ -Recall = 81,5%



Passage Extraction

Relevante Textstellen finden: Evaluation



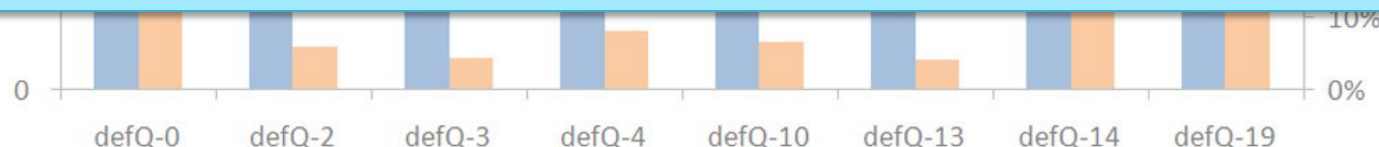
TECHNISCHE
UNIVERSITÄT
DARMSTADT

- Teilschritt-Evaluation: manuell annotierte “Relevanz” für ~8.800 Sätze.
- $\emptyset$ -Precision = 98,6%, $\emptyset$ -Recall = 81,5%

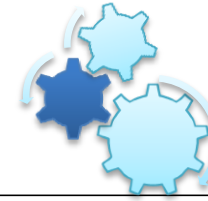


98% davon sind irrelevant

81% der relevanten Sätze verbleiben in der Auswahl



Mehrdeutige Fragen, z.B. „What is flash media?“



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Flash (photography)



In photography, a flash is a device that produces an instantaneous flash of light (typically around 1/1000 of a second) at a Color temperature of about 5500K to help illuminate a scene. While flashes can be used for a variety of reasons (e.g. capturing quickly moving objects, creating a different temperature light than the ambient light) they are mostly used to illuminate subjects that do not have enough available light to be properly exposed in a photograph. The term flash can either refer to the flash unit or as a colloquialism for the flash unit which discharges the flash of light. The vast majority of flash units today are electronic, having evolved from single-use flash-bulbs and flammable powders.

In lower-end commercial photography, flash units are commonly built directly into the camera, while higher-end cameras allow separate flash units to be mounted via a standardized accessory mount bracket. In professional studio photography, flashes often take the form of large, standalone units, or studio strobes, that are powered by special battery packs and synchronized with the camera from either a flash synchronization cable, radio transmitter, or are light-triggered, meaning that only one flash unit needs to be synchronized with the camera, which in turn triggers the other units. [...]

when i go to some sites on pc its says i need to download media flash player ive tired this and still noting?

Go here to download the Flash Player: http://www.adobe.com/flashplayer/download.cgi?P1_Prod_Version=FlashPlayer_32bit. Once you have it installed correctly, you should see a Flash image saying "Adobe Flash Player Successfully Installed".



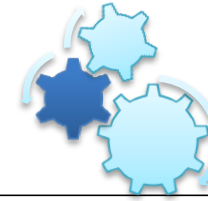
Q1. How is Memory Stick superior to other flash memory media?

A1. Memory Stick is designed to be a network media that enables off-line connection of a variety of different devices. Compatible with MagicGate copyright protection technology, it also provides a secure environment for enjoying copyright-protected digital contents. Memory Stick makes it possible to use digital contents, such as digital photos, digital music, and digital movies, on a wide range of applications, from digital cameras, digital camcorders, mobile phones, car AV devices and other products, and will stimulate the development of many more attractive products in the future.



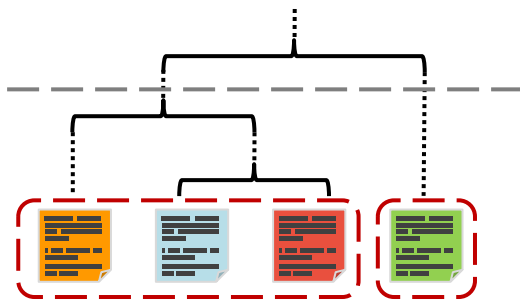
Topic Clustering

Gruppieren ähnlicher Dokumente: Methoden

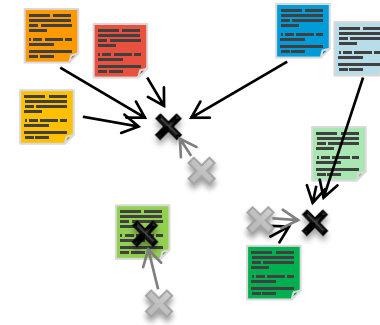


TECHNISCHE
UNIVERSITÄT
DARMSTADT

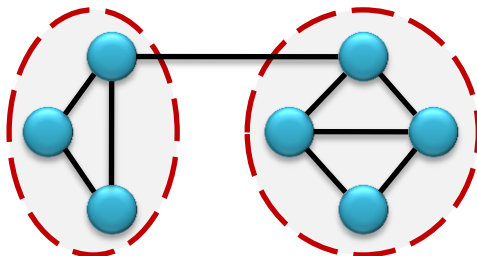
Hierarchical Agglomerative Clustering (HAC)



k-means Clustering



Newman's Community Clustering



(Newman&Girvan, 2004)

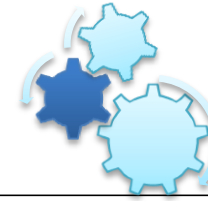
Merged Clustering

$$C_1 \times C_2$$



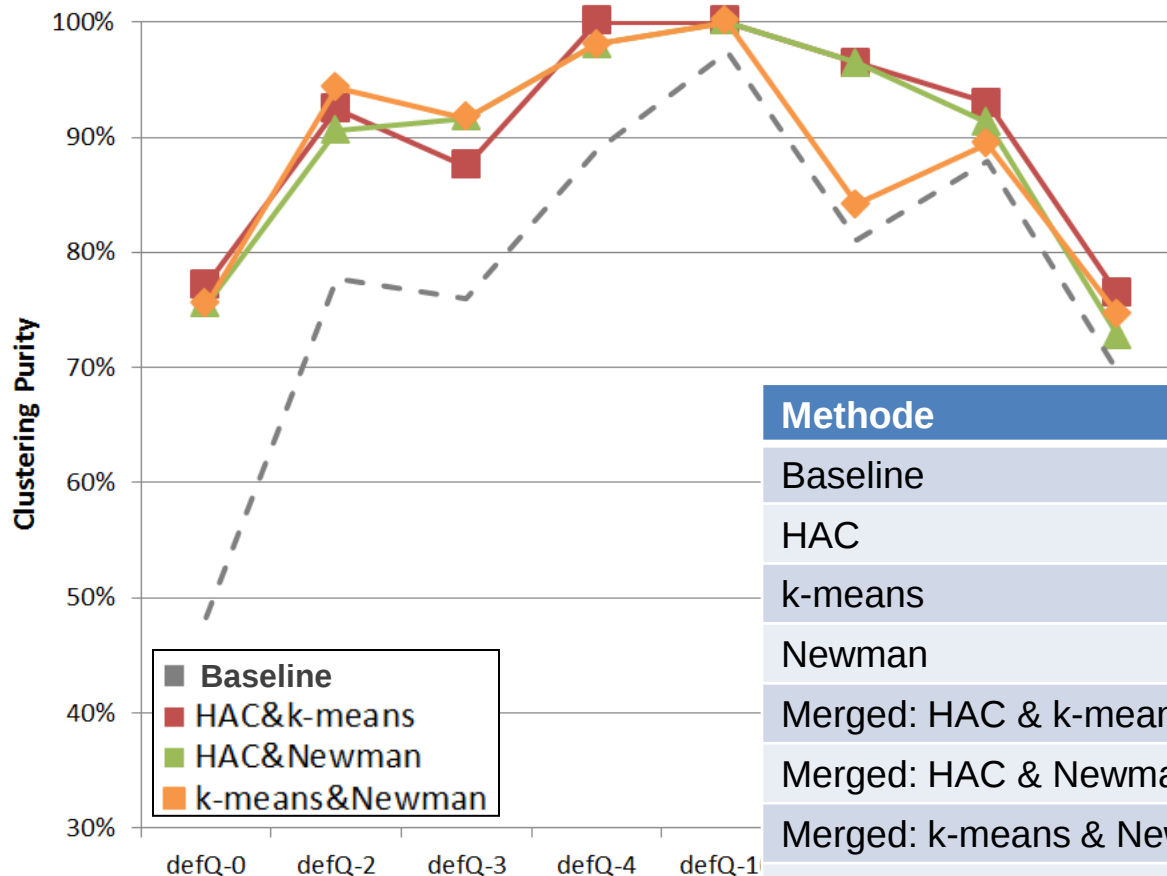
Topic Clustering

Gruppieren ähnlicher Dokumente: Evaluation



TECHNISCHE
UNIVERSITÄT
DARMSTADT

- Teilschritt-Evaluation: manuell annotiertes Thema für 427 Dokumente.

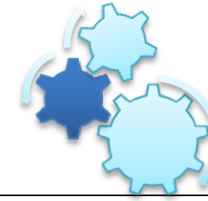


*Baseline: ein Cluster
pro Datenquelle.*

Methode	Ø-Cluster	Ø-Purity
Baseline	3	78,4%
HAC	11	87,0%
k-means	4	81,1%
Newman	4	82,3%
Merged: HAC & k-means	16	90,3%
Merged: HAC & Newman	13	89,5%
Merged: k-means & Newman	9	88,4%
Gold-Standard	3	100,0%

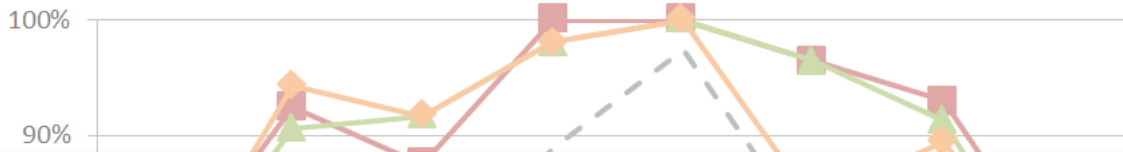
Topic Clustering

Gruppieren ähnlicher Dokumente: Evaluation



TECHNISCHE
UNIVERSITÄT
DARMSTADT

- Teilschritt-Evaluation: manuell annotiertes Thema für 427 Dokumente.



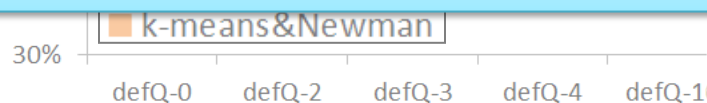
Getestete Verfahren sind besser als die Baseline

Merged Clusterings besser als einzelne Algorithmen

Anzahl der Cluster beachten → intuitive Bedienung

Bestes Ergebnis: k-means & Newman

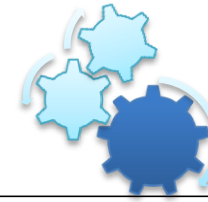
(10%-Pkte. besser als Baseline, 6%-Pkte. besser als einzelne Algorithmen)



Merged: k-means & Newman	9	88,4%
Gold-Standard	3	100,0%

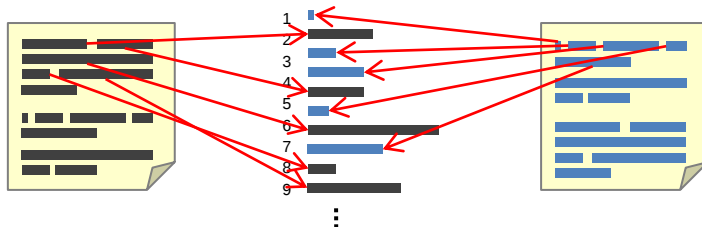
Answer Summarization

Ranking der relevanten Sätze: Methoden

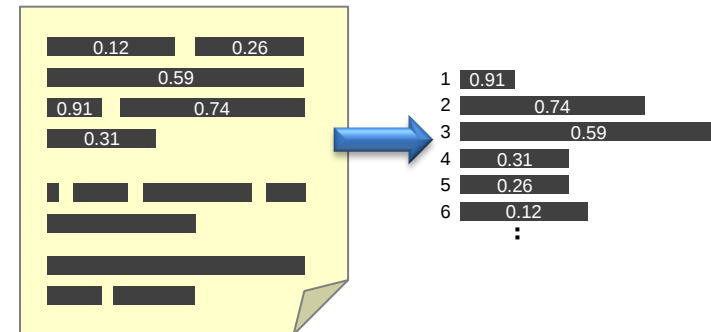


TECHNISCHE
UNIVERSITÄT
DARMSTADT

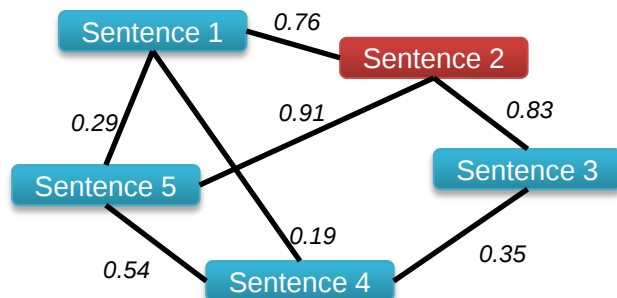
Position Rank



Similarity Rank



Biased LexRank



(Otterbacher et al., 2009)

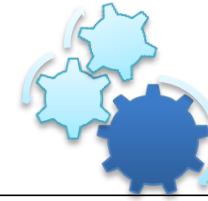
Merged Rank

$$\frac{r_p + r_s + r_l}{3}$$



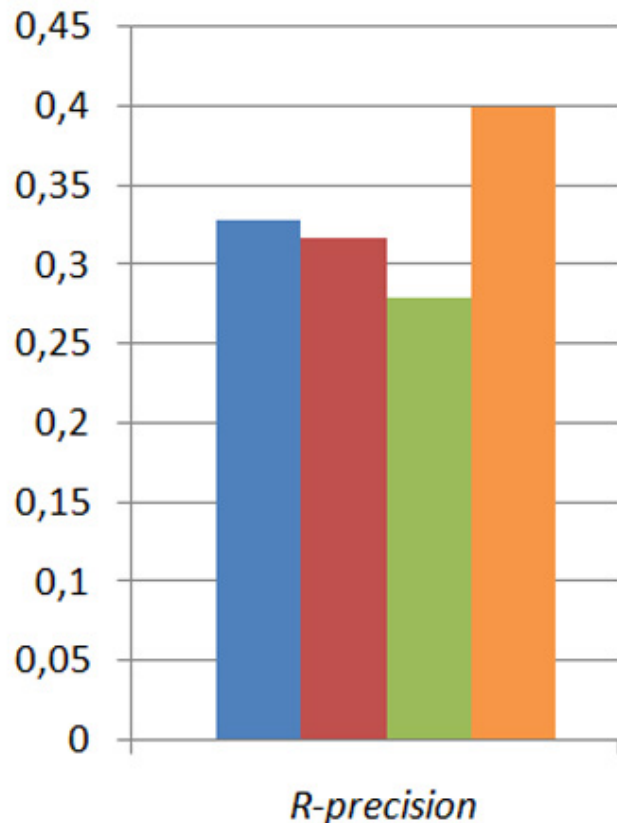
Answer Summarization

Ranking der relevanten Sätze: Evaluation



TECHNISCHE
UNIVERSITÄT
DARMSTADT

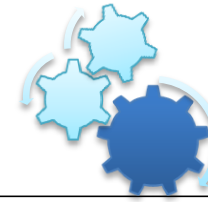
- Teilschritt-Evaluation: R-precision (Relevante Sätze mit hohem Ranking)



Methode	Ø R-precision
Position Rank	32,8%
Similarity Rank	31,7%
Biased LexRank	27,9%
Merged Rank	40,0%

Answer Summarization

Ranking der relevanten Sätze: Evaluation



TECHNISCHE
UNIVERSITÄT
DARMSTADT

- Teilschritt-Evaluation: R-precision (Relevante Sätze mit hohem Ranking)



Position Rank liefert gute Ergebnisse



Komplexe Methode „Biased LexRank“ ist schlechter



Bestes Ergebnis: Merged Rank
(7–12%-Pkte. besser als einzelne Algorithmen)



Combining Answers from heterogeneous Web Documents for Question Answering



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Question:

Ask!

Examples:

- *What is flash media?*
- *What is a dvd ripper?*
- *What is a 'mashup'?*
- *What is the c++ language*
- *What is DHCP?*
- *What is flip flop?*
- *What is a relational database?*
- *What is mac operating system?*

Master Thesis by Christian M. Meyer at Ubiquitous Knowledge Processing Lab,
Computer Science Department, Darmstadt University of Technology, 2008/2009



Combining Answers from heterogeneous Web Documents for Question Answering



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Question: What is flash media?

Please wait while the answer is retrieved.



Composing final summary...

[CANCEL](#)

http://localhost:8080/answer.jsp

Google

Question Answering System

Seite Extras

Combining Answers from heterogeneous Web Documents for Question Answering



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Question: What is flash media?

Answer about: Flash, player, web.

FLASH is a language that was originally developed as a way to get animations onto the internet with very small file sizes. More information about the Flash format and Flash players can be found at www.macromedia.com . If u want one coded using Flash, u must need the Swf file. if u know flash, u can get tutorials on how to dsgin one. Most web ads requires flash player because they were developed with Macromedia Flash or it developed in flash format

... Macromedia has been bought be Adobe. Most web ads requires flash player because they were developed with Macromedia Flash or it developed in flash format for more info bisit <http://macromedia.com> ...

Topic: Flash, player, web

Data Source: Yahoo! Answers <http://answers.yahoo.com/question/?qid=1006052331239>

Entire web sites can be created in Flash, or Flash animations can be added to a standard web page. Flash animations will look the same in all browsers. Look for information on the FLASH FORWARD SCHEDULE PAGE on this site! Do u need a player that plays flash files ? This only takes a couple of minutes on a standard connection. Flash was known as FutureSplash until 1997, when Macromedia Inc. bought the company that developed it.

[HOME]

Views

Text View

List View

Link View

Topics

Flash, mob, http

Flash, player, web

flash, drives, memory

flashes, http, system

storage, media, devices

windows, delete, XP

website, free, media

download, player, flash

[ALL] [NONE]

Data Sources

Yahoo! Answers

FAQs

Wikipedia

[ALL] [NONE]

Computer | Geschützter Modus: Inaktiv

100%

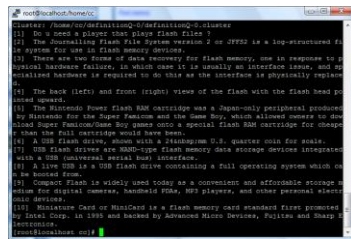
Evaluation

Verwandte Lösungen

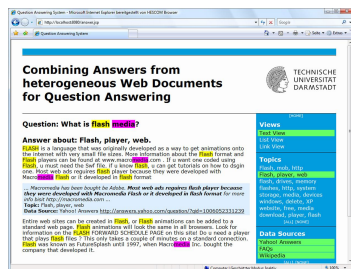


START (Katz et al., 2002)
Question Answering System
<http://start.csail.mit.edu/>

Vergleich mit
Referenzkorpus



MEAD (Radev et al., 2004)
Multi-document summarizer
Gleiche Eingaben wie QA-System
<http://www.summarization.com/mead/>

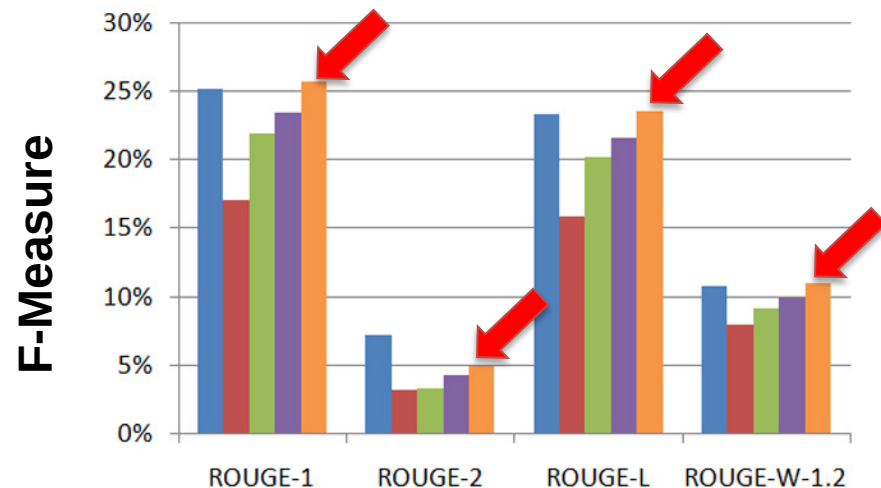
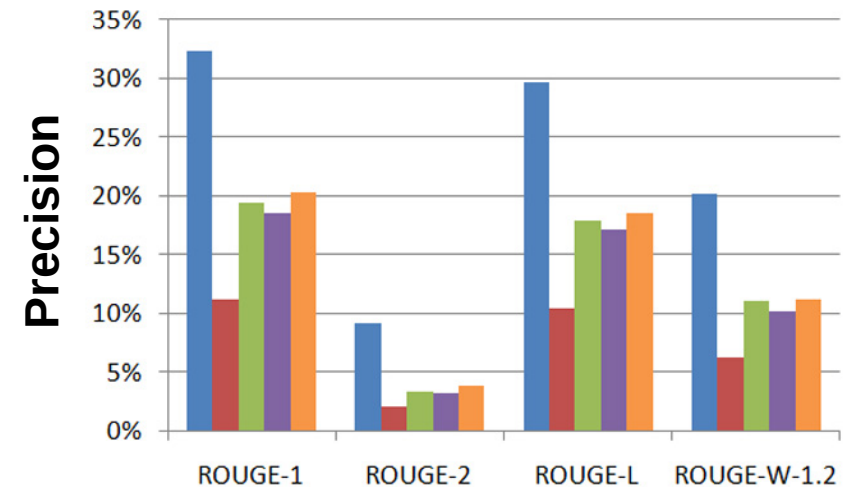
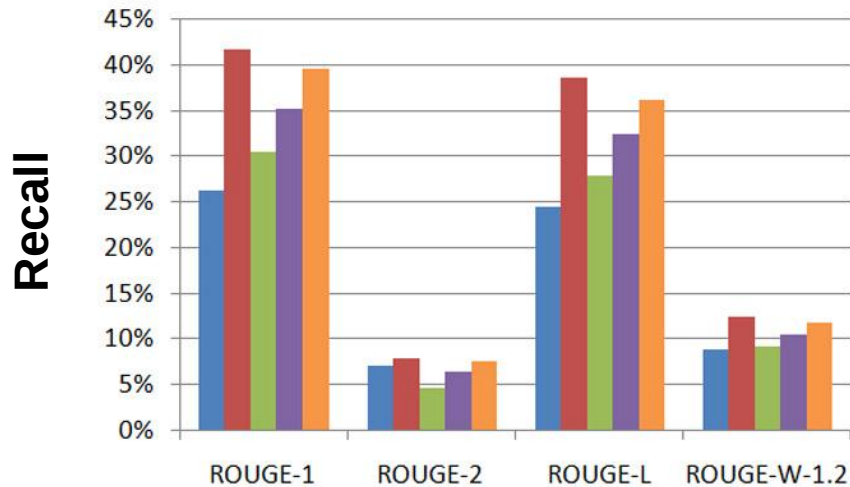


Hier vorgestelltes System
QA = alle Topics
QA-first = nur erstes Topic
QA-best = Bestes Topic

Evaluationsmaß: ROUGE (Lin, 2004), SOTA für Zusammenfassungen, z.B. DUC/TAC

Evaluation

Ergebnisse



*Durchschnittswerte
für Referenzkorpus
(20 Fragen)*

Evaluation

Beispiele – “What is DHCP?”



MEAD: DHCP (Dynamic Host Configuration Protocol) is a communications protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses in an organization's network. DHCP is short form of dynamic host configuration protocol. This protocol is used by ISP (internet service provider) or companies whose network is very vast its function is to provide ip address to the client automatically. If you are using DHCP the you dont need to give ip address to the clients it will automatically give the ip address to its clients with in the particular range and this makes the administrators job more easy as he need not go to each and every system in the network and [..]

START: Dynamic Host Configuration Protocol (DHCP) is a protocol used by networked devices (clients) to obtain various parameters necessary for the clients to operate in an Internet Protocol (IP) network. By using this protocol, system administration workload greatly decreases, and devices can be added to the network with minimal or no manual configurations.

QA-first: Through the DHCP server, you can control the assignment of addresses and the configuration of other TCP/IP protocol parameters in whatever way is appropriate for your network and your organization. The DHCP server can be setup to hand out or "lease" an IP number to a client for a specific amount of time. DHCP (Dynamic Host Configuration Protocol) is a way to automatically configure TCP/IP on client computers on a network. DHCP just determines how your devices will receive an IP address. Thus, the DHCP server acts as the network administrator's agent for managing the configurations of DHCP clients. DHCP is short form of dynamic host configuration protocol. [..]

Reference: DHCP stands for Dynamic Host Control Protocol. In order to configure a computer to access the Internet, you need about five numbers, including its IP address. You can set these all up by hand, which is a real pain unless you are a serious Geek. DHCP is a simple way for the computer to send out a call asking any machine listening to send it those numbers so that it can configure itself without bothering the user (who probably wouldn't know what to do anyway). It is the way almost all "end user" machines are configured on the Internet.

Evaluation

Beispiele – “What is a ‘mashup’?”



TECHNISCHE
UNIVERSITÄT
DARMSTADT

MEAD: "Red Red Wine" is a song originally written by Neil Diamond that was then covered by Tony Tribe and more famously by UB40 in later years. Inside Out was a Hardcore and/or Metalcore band from Orange County, California - notable for being the first band fronted by Zack de la Rocha, later of Rage Against the Machine. :Mother Nature's Son is also the title of an episode of Only Fools and Horses "Mother Nature's Son" is a Lennon/McCartney song, released by The Beatles on the White Album. The Anti-Hit List is a weekly music column by Canadian music critic John Sakamoto. Electronic civil disobedience, also known as ECD or cyber civil disobedience, can refer to any type of civil disobedience in which the participants [..]

QA-best: This is also known as a mashup. In practice, since Web 2.0 is a title given by web designers it is more to do with the underlying technology. Without getting too technical, web services can 'talk' to each other. AJAX is just a fancy way of saying that information is passed to and from the web browser using Javascript rather than HTML. Finally, Web 2.0 is considered by some to be the way in which these individual services and data stores can now interact with each other. The theory here is that each individual web service becomes much more useful when combined with others. This would be a job for a Google maps mashup, which combines Google maps and other data. <http://www.themolu.com> - Molu search spider [..]

START: Mashup may refer to:

- Mashup (digital), a digital media file containing any or all of text, graphics, audio, video, and animation, which recombines and modifies existing digital works to create derivative work.
- Mashup (music), the musical genre encompassing songs which consist entirely of parts of other songs
- Mashup (video), a video that is edited from more than one source to appear as one
- Mashup (web application hybrid), a web application that combines data and/or functionality from more than one source

Reference: The Wikipedia defines a mashup as 'a website or application that combines content from more than one source into an integrated experience'. This is a useful basic definition but a more complete enterprise-relevant description would be: A mashup is a user-driven micro-integration of Web-accessible data. While short, this definition contains a number of important points worth considering: "User-driven" - Mashups are executed for the user, not the by black-box back-end integration systems such as ESB, BPM, BPEL, etc. In this sense, a mashup [..]

Evaluation

Beispiele – “What does the abbreviation IDK stand for?”

MEAD: There are two legends you can use with the maps: the original key and a black and white key, which was developed specifically for use with black and white copies of Sanborn maps. Below are some of the most commonly used abbreviations for personal ads and what they mean: TLA is a three-lettered abbreviation for Three-Letter Abbreviation or Three-Letter Acronym. MOS is a standard motion picture jargon abbreviation, used in production reports to indicate an associated film segment has no synchronous audio track. * MOS may stand for "Minus Optical Stripe," a note from a production sound mixer, notifying recipients that he or she did not expose an optical sound track for a particular scene or take [..]

QA-first: Many words and abbreviations have been in general use, but are not commonly used as of 2006: These abbreviations have no relationship to letters in postal codes, which are assigned by Canada Post on a different basis than these abbreviations. These abbreviations allow automated sorting. The use of X as an abbreviation for "cross" in modern abbreviated writing (e.g. This abbreviation is most commonly used in notations for mathematics or qualifications. "... is an abbreviation for ", et cetera" or ", etc." when it is used at the end of a sentence, as in: The most common Latin words and abbreviations still in use are: [..]

START: *<no result>*

QA (2nd topic): IDK means, I Don't Know

Reference:

Acronym	Definition
IDK	I Don't Know
IDK	I Didn't Know
IDK	Interface Development Kit
IDK	I Dont Kare
IDK	Internal Derangement of the Knee
IDK	In Da Kitchen
IDK	Individual Decontamination Kit

Fazit

Take-Home Messages

Zielstellung:

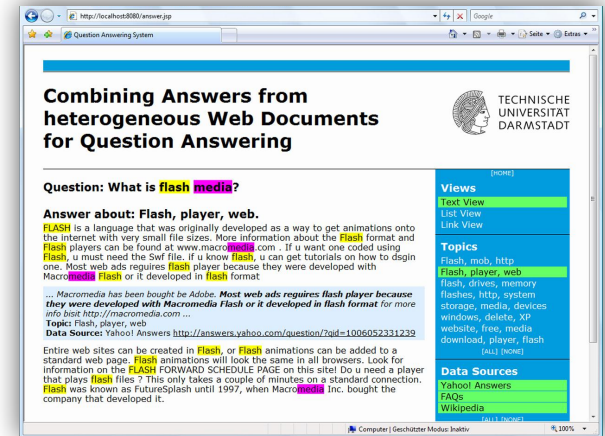
- Definitionsfragen (bisher wenig erforscht)
- Ansatz auf open domain QA ausgerichtet
- Heterogene Datenquellen, inkl. „Social Q&A“

QA-Lösung:

- Passage Extraction
- Topic Clustering
- Answer Summarization

Evaluation:

- Auswahl der besten Methoden in den drei Teilschritten
- Bessere F1-Werte des Gesamtsystems im Vergleich mit MEAD und START
- Vielfältigkeit: Enzyklopädische, Experten- und benutzergenerierte Inhalte
- Lesbarkeit der Zusammenfassungen noch verbesserungswürdig



Fazit

Aktueller Stand und Ausblick



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Weiterentwicklung am UKP Lab:

- Bestandteil der intelligenten Wiki-basierten Plattform *Wikulu* (Bär et al., 2011)
- Meinungsbehaftete Fragen (*Opinion QA*)
- Weitere Datenquellen
- Semantische Rollen

Article Discussion Read Edit View histo

WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia

Wikulu
Suggest Links
Highlight Keyphrases
Suggest Sections
Summarize
Add Content...

QA Demo

How long can polar bears live? What is mashup? What is dvd ripper?

Who is Aristotle?

Question: answer

Parameters:

Data sets: Yahoo ☐ Answerbag ☐ FAQ ☐ Wikipedia ☐ PPT ☐

Search fields: Question/Title ☐ Answer/Document ☐

Number of Answers: 1

Output intermediate results: ☐

Vielen Dank für die Aufmerksamkeit!

Referenzen und Demo



TECHNISCHE
UNIVERSITÄT
DARMSTADT

- D. Bär, N. Erbs, T. Zesch & I. Gurevych: *Wikulu: An Extensible Architecture for Integrating Natural Language Processing Techniques with Wikis*. In: Proc. of ACL System Demonstrations, S. 74–79, Portland, OR, USA, 2011.
- E. Gabrilovich & S. Markovitch: *Computing Semantic Relatedness using Wikipedia-based Explicit Semantic Analysis*. In: Proc. of IJCAI, S. 1606–1611, Hyderabad, Indien, 2007.
- D. He, D. Demner-Fushman, D.W. Oard, D. Karakos & S. Khudanpur: *Improving Passage Retrieval Using Interactive Elicitation and Statistical Modeling*. In: Proc. of TREC, Gaithersburg, MD, USA, 2004.
- L. Hirschman & R. Gaizauskas: *Natural language question answering: the view from here*. Natural Language Engineering 7(4):275–300, 2001.
- V. Jijkoun & M. de Rijke: *Retrieving answers from frequently asked questions pages on the web*. In: Proc. of CIKM, S. 76–83, Bremen, Deutschland, 2005.
- B. Katz, S. Felshin, D. Yuret, A. Ibrahim, J. Lin, G. Marton, A.J. McFarland & B. Temelkuran: *Omnibase: Uniform Access to Heterogeneous Data for Question Answering*. In: Proc. of NLDB (Lecture Notes in Computer Science Vol. 2553), S. 230–234. Berlin/Heidelberg: Springer, 2002.
- Y.-C. Lin: *ROUGE: A Package for Automatic Evaluation of Summaries*. In: Proc. of ACL Workshop on Text Summarization Branches Out, Barcelona, Spanien, 2004.
- D. Mollá & J.L. Vicedo: *Question Answering in Restricted Domains: An Overview*. Computational Linguistics 33(1):41–62, 2007.
- M.E.J. Newman & M. Girvan: *Finding and evaluating community structure in networks*. Physical Review E 69(2):026113, 2004.
- J. Otterbacher, G. Erkan & D.R. Radev: *Biased LexRank: Passage Retrieval using Random Walks with Question-Based Priors*. Inform Process & Manag 45(1):42–54, 2009.
- D.R. Radev, T. Allison, S. Blair-Goldensohn, J. Blitzer, A. Çelebi, S. Dimitrov, E. Drabek, A. Hakim, W. Lam, D. Liu, J. Otterbacher, H. Qi, H. Saggion, S. Teufel, M. Topper, A. Winkel & Z. Zhang: *MEAD – a platform for multidocument multilingual text summarization*. In: Proc. of LREC, Lissabon, Portugal, 2004.
- P.D. Turney: *Mining the Web for Synonyms: PMI-IR versus LSA on TOEFL*. In: Proc. of ECML, S. 491–502, Freiburg, Deutschland, 2001.



UBIQUITOUS
KNOWLEDGE
PROCESSING

“Hands on” – Demonstration des QA-Systems in der Pause!



Kontakt / Contact

Christian M. Meyer

Technische Universität Darmstadt
Ubiquitous Knowledge Processing Lab

📍 Hochschulstr. 10, 64289 Darmstadt, Germany

☎ +49 (0)6151 16–7477

📠 +49 (0)6151 16–5455

✉ meyer (at) ukp.informatik.tu-darmstadt.de

Rechtliche Hinweise

Die Folien sind für den persönlichen Gebrauch der Vortragsteilnehmer gedacht. Im Vortrag verwendete Photographien, Illustrationen, Wort- und Bildmarken sind Eigentum der jeweiligen Rechteinhaber oder Lizenzgeber. Um Missverständnisse zu vermeiden, wäre eine kurze Kontaktaufnahme vor Weitergabe oder -nutzung der Vortragsmaterialien empfehlenswert. Sofern Sie Ihre Rechte verletzt sehen, bitte ich ebenfalls um Kontaktaufnahme zur Klärung der Sachlage.

Legal Issues

The slides are intended for personal use by the audience of the talk. Photographies, illustrations, trademarks, or logos are property of the holder of rights. To avoid any misconceptions, I would strongly recommend to get in touch before reusing or redistributing the slides or any additional material of the talk. The same applies if you consider your rights infringed – please let me know to initiate further clarification.