

# Information Engineering 1: Information Retrieval

Kapitel 8: Ausblick

Conversational IR

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# "Themenkarte"

- Ein Ausblick auf ein kommendes, heisses Thema
- Quellen:
  - Recent Advances in Conversational Information Retrieval (CIR) - A review of neural approaches, Jianfeng Gao, Chenyan Xiong, Paul Bennett, Microsoft Research, SIGIR 2020
  - CAsT 2019: The Conversational Assistance Track Overview, Jeffrey, Chenyan Xiong, Jamie Callan, NIST TREC Proceedings
- Themen:
  - Conversational IR?
  - Vision
  - Aktueller Ansatz
  - Ausblick

# Lernziel Kapitel

- Kennen: was kommt in den nächsten Jahren auf das Feld Information Retrieval zu?
- Verstehen: Bezug zu den gelernten Basics

# Die nächste Generation IR?

Natürlichere Anfragen statt «Keywords»

## Ad hoc Search



startup seed investment



## Conversational Search



How does seed investment work for startups?



Keyword-based Queries



Natural Queries

- Voraussetzung: Sprachinterfaces
- Chancen: Natürlichere, explizitere Darstellung des Informationsbedürfnisses
- Herausforderung: Query Understanding

# Die nächste Generation IR?

Antworten, nicht Ranglisten

## Ad hoc Search

Startup Investing. Simplified. - SeedInvest

<https://www.seedinvest.com>

Join 300,000+ people who already use SeedInvest to find startup investment opportunities. SeedInvest is filled with investors and entrepreneurs that are passionate about building future innovation. They are accomplished individuals that invest ...

Log In

SeedInvest is a leading equity crowdfunding platform that provides individual investors ...

See more ▾

Browse Offerings

The following offerings are being conducted ...

Monogram Orthopaedics · Winc · Auto Invest

Ten Blue-Links



## Conversational Search

A strategy used by seed institutional investors is the **spray and pray** type of model in which investment funds are invested in a number of companies and see which ones pick up traction. Once the start-ups they are taking on are identified then you allocate additional capital to invest in follow on rounds of financing.



How Funding Rounds Work For Startups - Forbes

[www.forbes.com/sites/alejandrocromades/2018/12/26/how-funding-rounds-work...](https://www.forbes.com/sites/alejandrocromades/2018/12/26/how-funding-rounds-work...)

Natural Responses

- Voraussetzung: Sprachinterfaces
- Chancen: Direkterer, leichter Zugang zur Information
- Herausforderung: Document Understanding, Informationssynthese

# Die nächste Generation IR?

Konversation, nicht «Single Shot»

## Ad hoc Search



startup seed investment



startup seed investment amount



Single-Shot Query



## Conversational Search



How does seed investment work for startups?



How does it compare with crowdfunding?

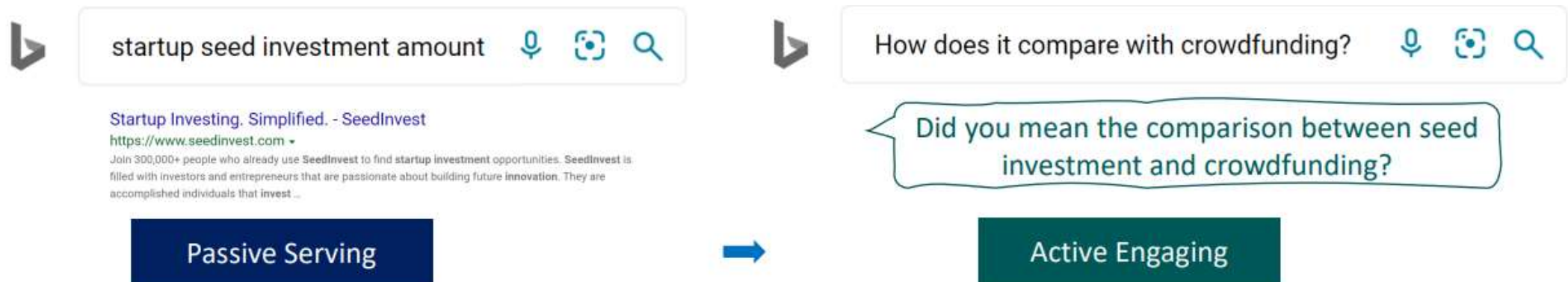


Multi-Turn Dialog

- Chancen: Komplexere Informationsbedürfnisse bedienen
- Herausforderung: Contextual Understanding, «Gedächtnis»

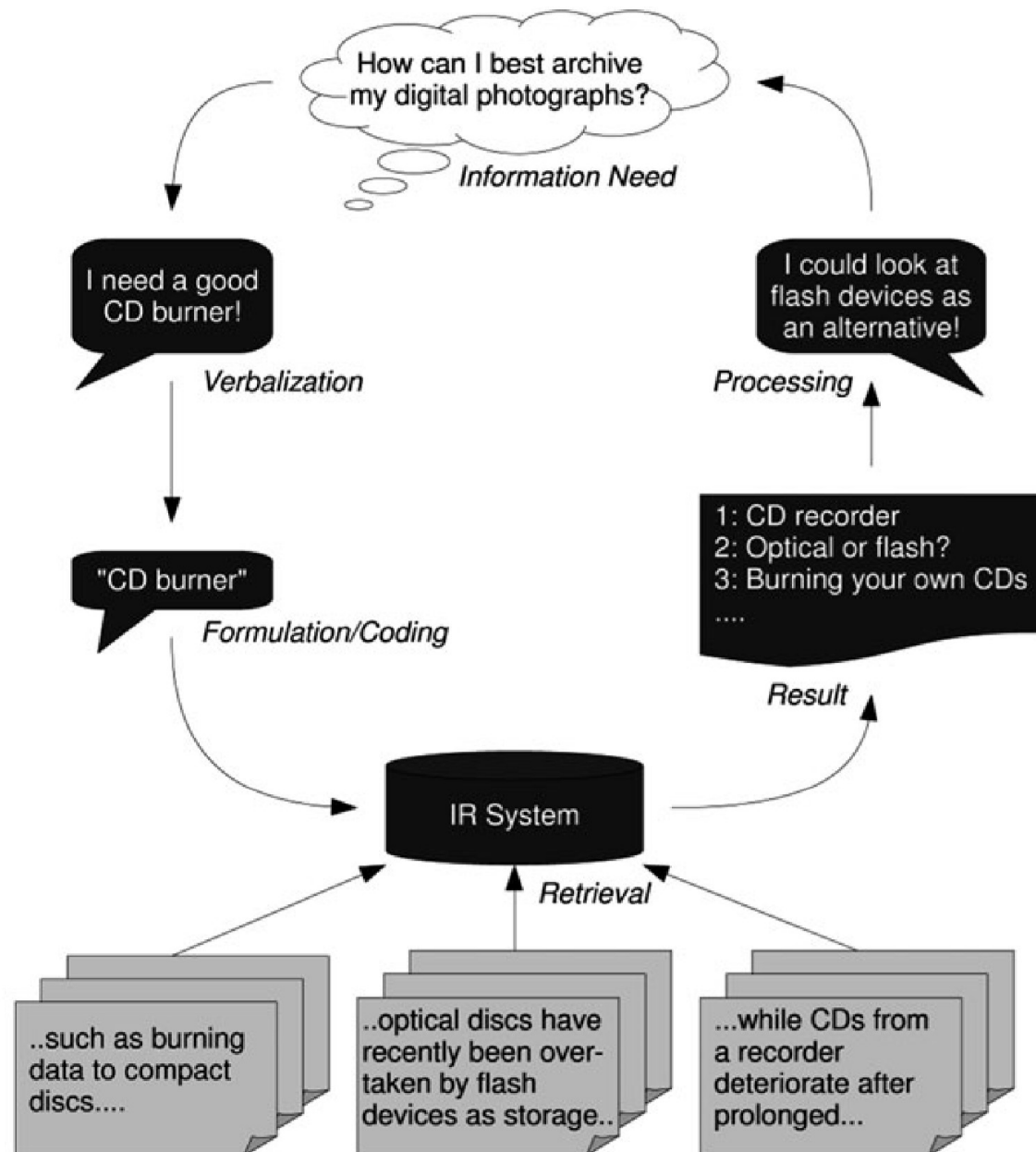
# Die nächste Generation IR?

Aktiver, nicht passiver, Dialog



- Chancen: Bessere, direktere Resultate
- Herausforderung: Dialog Management, User Experience muss stimmen

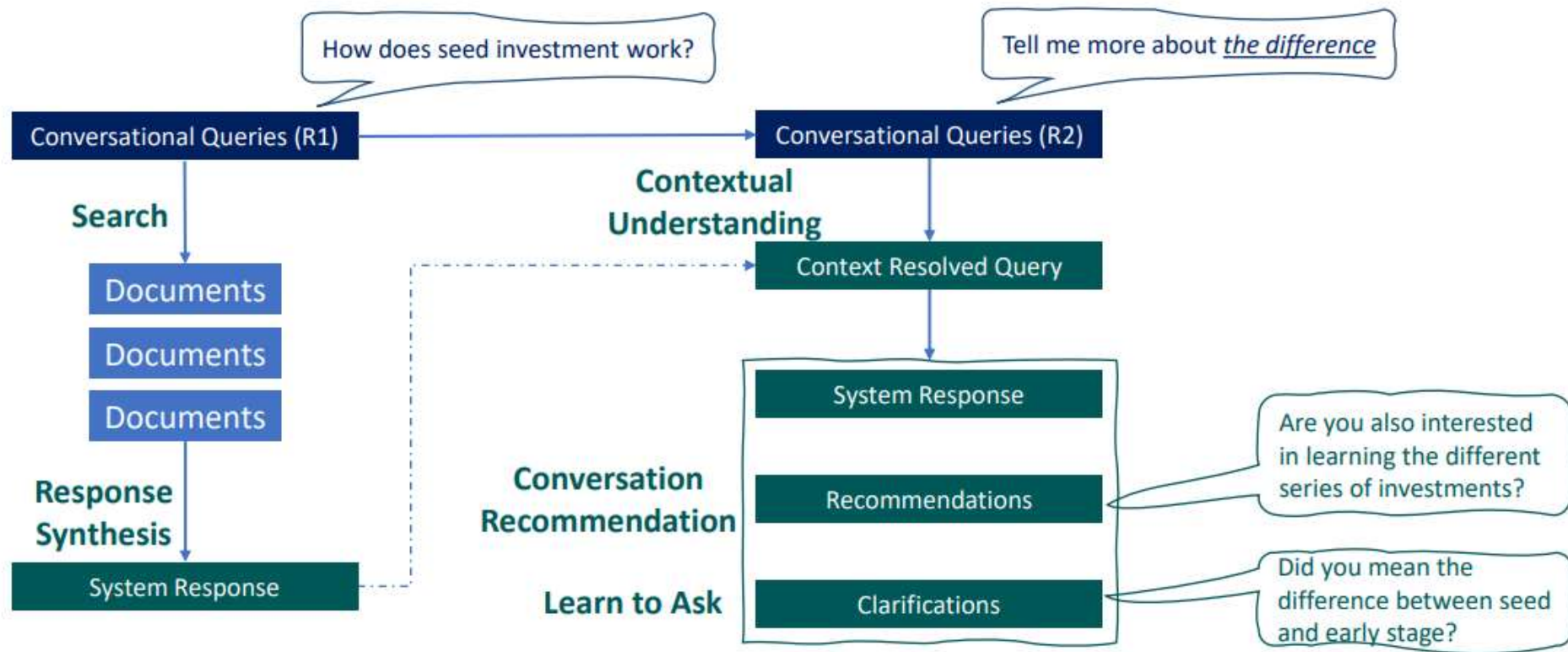
# Rückblick: IR-Kreislauf



Aus Peters et al., 2012

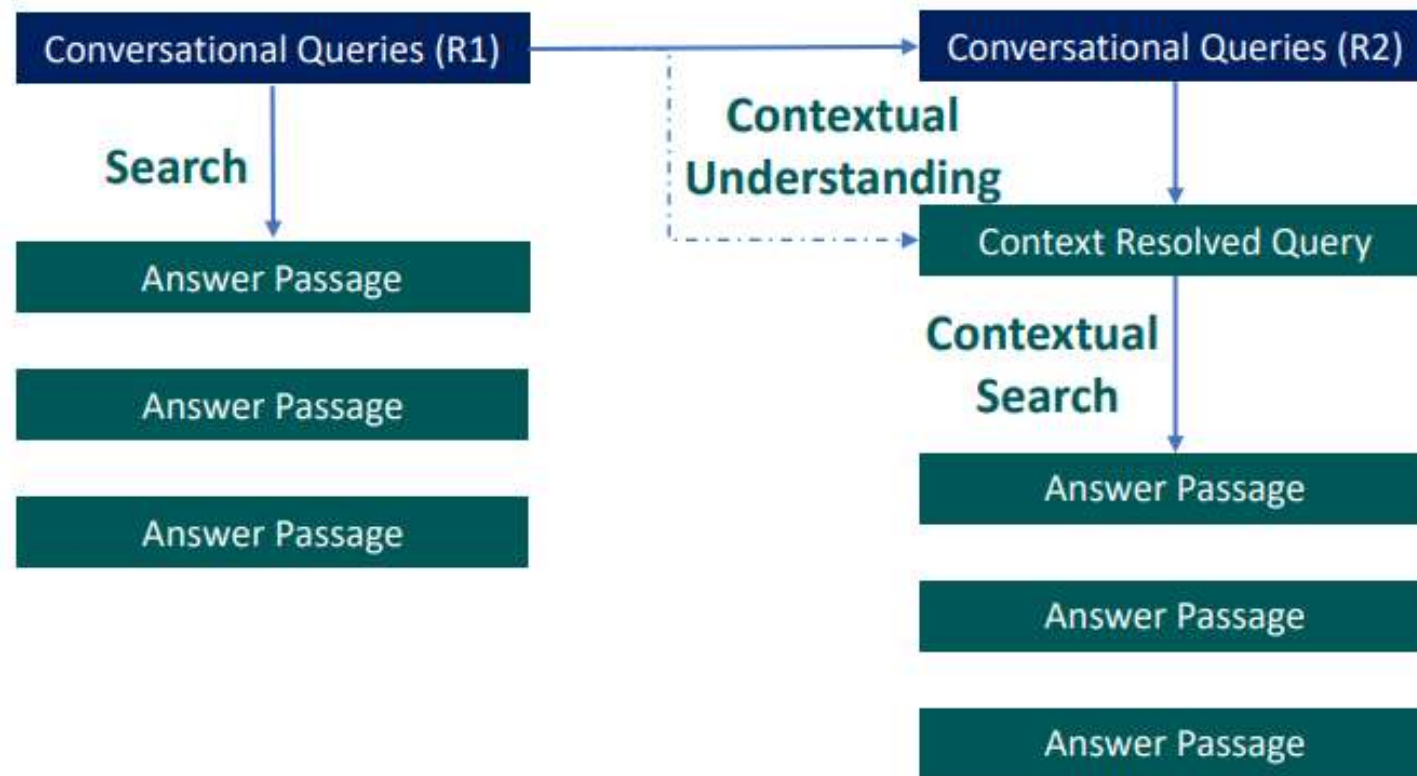


# Conversational IR: Vision



# Conversational IR: Simpler Ansatz

Der tatsächliche, heutige Ansatz



# Beispielanfrage

TREC CAsT («Conversational Assistance Track»)

~20 Queries mit je ~8 «Runden», Korpus aus Passagen

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Title: head and neck cancer

Description: A person is trying to compare and contrast types of cancer in the throat, esophagus, and lungs.

- 1 What is throat cancer?
- 2 Is it treatable?
- 3 Tell me about lung cancer.
- 4 What are its symptoms?
- 5 Can it spread to the throat?
- 6 What causes throat cancer?
- 7 What is the first sign of it?
- 8 Is it the same as esophageal cancer?
- 9 What's the difference in their symptoms?

# Query Rewriting

Herausforderung: kontextuelle Abhängigkeit zu früheren Anfragen

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Title: head and neck cancer

Description: A person is trying to compare and contrast types of cancer in the throat, esophagus, and lungs.

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- 4 What are its symptoms?
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## Manual Queries provided by CAsT Y1

- 1 What is throat cancer?
- 2 Is throat cancer treatable?
- 3 Tell me about lung cancer.
- 4 What are lung cancer's symptoms?
- 5 Can lung cancer spread to the throat
- 6 What causes throat cancer?
- 7 What is the first sign of throat cancer?
- 8 Is throat cancer the same as esophageal cancer?
- 9 What's the difference in throat cancer and esophageal cancer's symptoms?

# Probleme mit Query Rewriting

Es gibt nicht immer wirklich etwas, was umgeschrieben werden kann

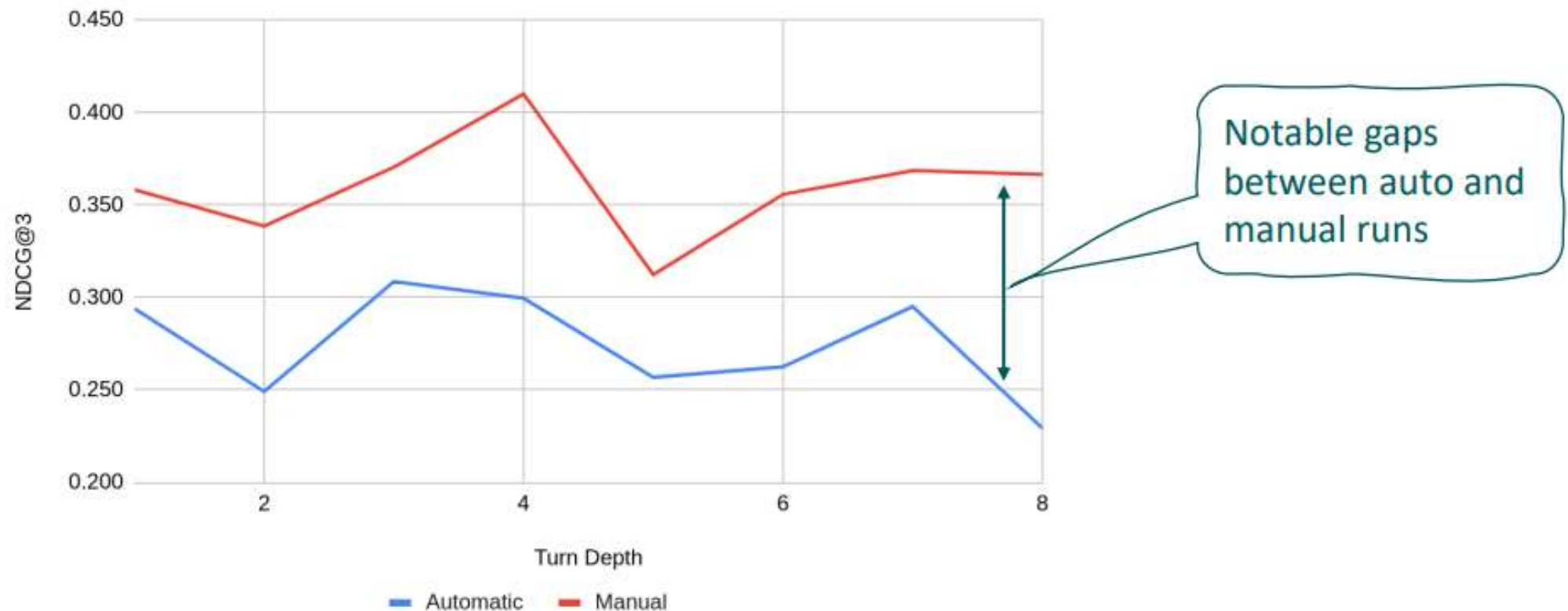
Type (#. Turns)	Utterance	Mention
<b>Pronominal (128)</b>	How do <b>they</b> celebrate Three Kings Day?	they -> Spanish people
<b>Zero (111)</b>	What cakes are traditional?	Null -> Spanish, Three Kings Day
<b>Groups (4)</b>	Which <b>team</b> came first?	which team -> Avengers, Justice League
<b>Abbreviations (15)</b>	What are the main types of <b>VMs</b> ?	VMs -> Virtual Machines

Manchmal auch einfach impliziten Kontext einbeziehen



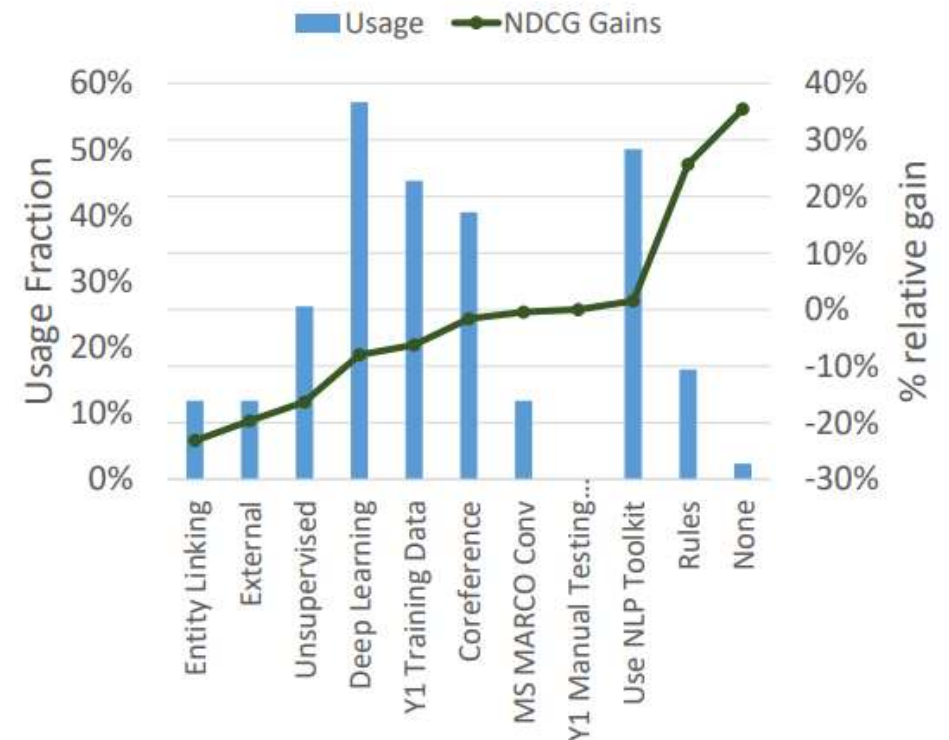
# State of the Art

- Query Understanding (oder Query Rewriting) ist schwer – die Fehler machen sich in späten Runden besonders bemerkbar.



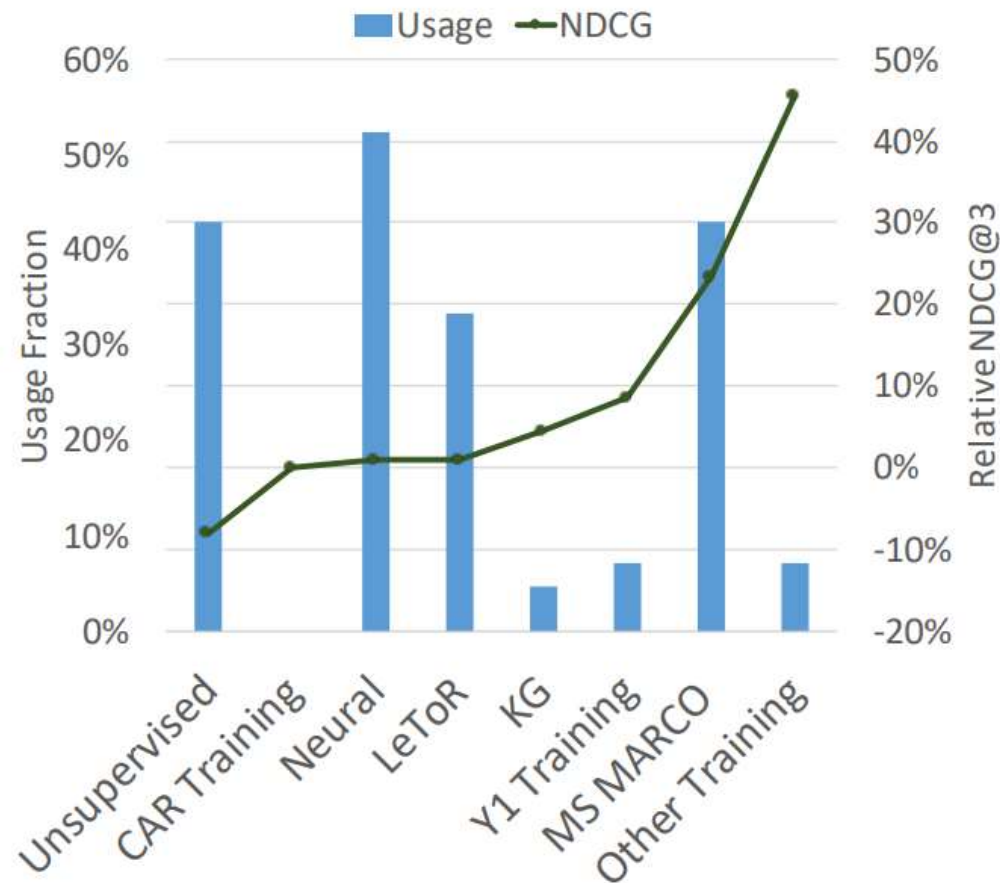
# State of the Art

- Query Rewriting:
  - Deep Learning-Ansätze negativ korreliert
  - Heuristische Regeln am effektivsten



# Ranking

Für das Ranking ist der Einbezug von externen Daten besonders effektiv





# State of the Art

- Der Einsatz von Techniken wie Transformern ist in diesem Kontext aufgrund der sehr spärlichen Trainingsdaten eingeschränkt (nur 50 Topics, nur je 10 Turns)
- Idee: wir verwenden Daten aus den Logs klassischer Suchmaschinen für das Training. Dazu werden diese «Conversationalisiert» → MS MARCO Dataset

# State of the Art

- Auf diesen «Pseudo-conversational» Queries kann das geübt werden, die für sich selbst stehenden Queries zu generieren

$Q_6$	What causes <b>throat cancer</b> ?
$Q_7$	What is the first sign of it?
$Q_8$	Is it the same as <b>esophageal cancer</b> ?
$Q_9$	What's the difference in <u>their</u> symptoms?
Oracle	What's the difference in <b>throat cancer and esophageal cancer's</b> symptoms?
Output	What's the difference between <b>throat cancer and esophageal cancer</b> ?

$Q_1$	What are the types of <b>pork ribs</b> ?
$Q_2$	What are baby backs?
$Q_3$	What are the differences with spareribs?
$Q_4$	What are ways to <b>cook</b> them?
$Q_5$	How <u>about</u> on the bbq?
Oracle	How <b>do you cook pork ribs</b> on the bbq?
Output	How about on the bbq?

# Ausblick

Findet Conversational Search heute statt?

Nein, die meisten Queries sind nicht «conversational»

- Nutzer/innen sind darauf getrimmt, Stichworte zu verwenden

Die Suche muss neu gedacht werden. «Für die Konversation nützlich» != relevant!

Beispiel «People also asked»: Für Query «Nissan GTR»

PEOPLE ALSO ASK		
What is Nissan GTR?	[Duplicate]	▼
How to buy used Nissan GTR in Pittsburgh?	[Too Specific]	▼
Does Nissan make sports car?	[Prequel]	▼
Is Nissan Leaf a good car?	[Miss Intent]	▼

# Fazit

- Letztlich ein weiterer Schritt weg von «Pattern Matching» zu **echtem** Information Retrieval
- Was wir über IR gelernt haben, bleibt gültig: auch für «Conversational Queries» muss Retrieval gemacht werden. Aber wir kommen näher an den Kreislauf aus Kapitel 1.

## Relevant

PEOPLE ALSO ASK	
What is Nissan GTR?	▼
How to buy used Nissan GTR in Pittsburgh?	▼
Does Nissan make sports car?	▼
Is Nissan Leaf a good car?	▼



## Relevant & Useful

PEOPLE ALSO ASK	
What are the pros and cons of Nissan GT-R?	
Is the Nissan GT-R the ultimate street car?	
Why is the Nissan GT-R known as 'the godzilla'?	
How fast can the Nissan GT-R go?	

Hier endet die Theorie des Moduls «Information Engineering 1»  
Vielen Dank für Ihr Interesse und Ihre Beiträge!



Zürcher Fachhochschule