

Project Internship – Intelligent Agents

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Magnus Bender

Institute of Information Systems – IFIS
University of Lübeck

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UNIVERSITÄT ZU LÜBECK
INSTITUT FÜR INFORMATIONSSYSTEME

Exercise 2

Recap
Possible Solution
Agents
Topic Model
Results
Feedback

Exercise 3

Graphically
Strategies

Recap

- Five agents of three types

1x Auctioneer Sells the documents to the IR agents.

2x Questioner Asks queries (in **queries_i.txt** and **queries_ii.txt**) to an IR agent.

2x IR Agent Combines the bidding functionality and the answering of queries.

- The auction will run simultaneously along with the query answering.

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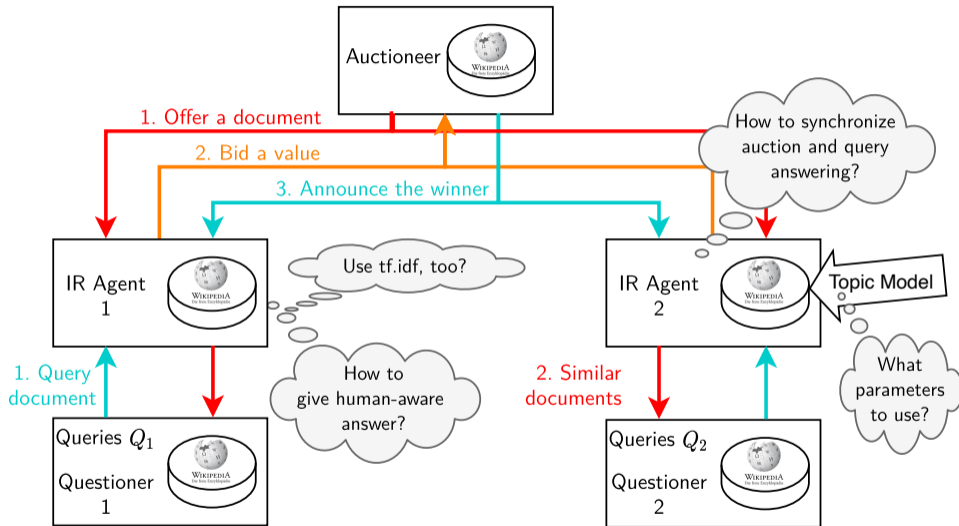
Feedback

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Recap



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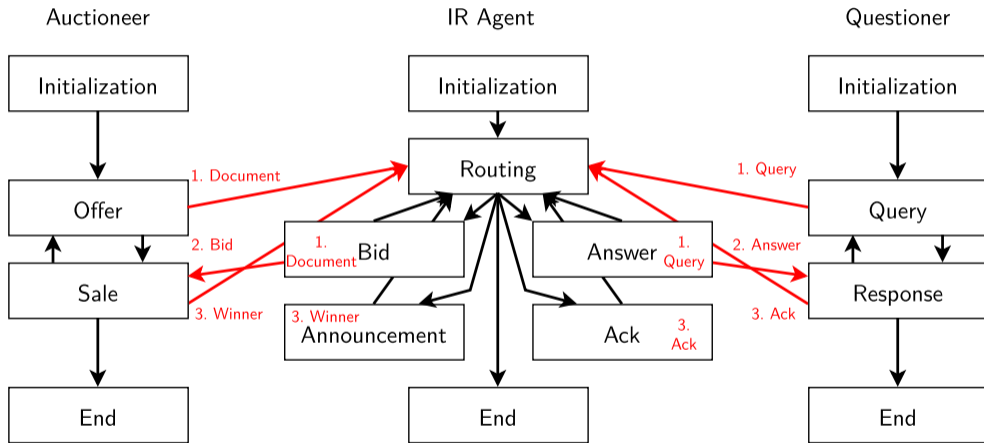
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Possible Solution

Agent Setup



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General

- ▶ Routing, each message contains query type and state
- ▶ All messages are JSON-encoded

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General

- ▶ Routing, each message contains query type and state
- ▶ All messages are JSON-encoded

Auction

- ▶ No changes to exercise 1
- ▶ Keep using tf.idf

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General

- ▶ Routing, each message contains query type and state
- ▶ All messages are JSON-encoded

Auction

- ▶ No changes to exercise 1
- ▶ Keep using tf.idf

Query Answering

- ▶ Use LDA and tf.idf
- ▶ LDA parameters $\alpha = 0.01, \beta = 0.1, K = 20$
- ▶ Comparability based on best matching document
- ▶ Classification of answer based on threshold

$$c_a(q) = \begin{cases} \textit{compatible} & \text{if } \text{sim}_{\text{LDA}}(q, a) \geq 0.6 \\ \textit{moderate} & \text{if } \text{sim}_{\text{tf.idf}}(q, a) \geq 0.06 \\ \textit{incompatible} & \text{else} \end{cases}$$

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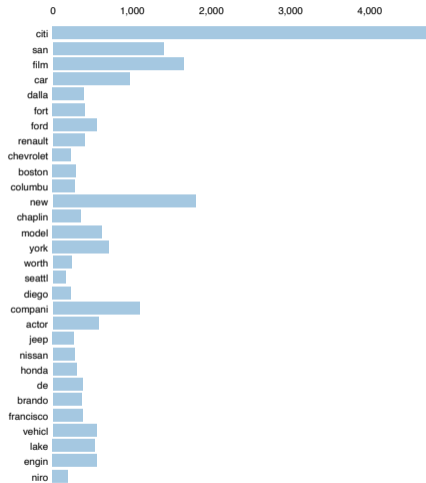
Intertopic Distance Map (via multidimensional scaling)



Marginal topic distribution



Top-30 Most Salient Terms¹



Overall term frequency

Estimated term frequency within the selected topic

1. saliency(term w) = frequency(w) * [sum_t p(t | w) * log(p(t | w)/p(t))]] for topics t; see C

2. relevance(term w | topic t) = $\lambda * p(w | t) + (1 - \lambda) * p(w | t)/p(w)$; see Sievert & Shirley

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Results I

```
==> Questioner:  queries_i
               num_incompatible:  4
               num_compatible_moderate:  7
               precision:  0.5714285714285714
               recall:  0.5090543259557344
               f1:  0.14109347442680778
```

<==

```
==> Questioner:  queries_ii
               num_incompatible:  3
               num_compatible_moderate:  8
               precision:  0.6625
               recall:  0.36347014925373133
               f1:  0.19323593073593076
```

<==

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Results II

```
==> Bidder: bidder1@localhost
Got 39 documents while giving 64 bids and spent overall
1661 money (average 42.59 per document).
Got value of 1661 and overall value of sold documents 1778,
missed 117 value
<==

==> Bidder: bidder2@localhost
Got 34 documents while giving 49 bids and spent overall
3863 money (average 113.62 per document).
Got value of 3863 and overall value of sold documents 3939,
missed 76 value
<==

==> Responder: bidder2@localhost
initially
    perplexity: 307.42744777458904
    coherence: -0.7205535406090815
finally
    perplexity: 302.254223192165
    coherence: -1.0445260311764577
<==
```

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Results III

==> Auctioneer

All 146 documents finished and got overall 5524 money.

Top Ten Prices:

Santa Clarita, California 364

Fayetteville, Arkansas 363

Amarillo, Texas 363

Documents Sold to:

bidder1@localhost (actors)

Lost 5 money for overpaid documents.

Toyota; Chandler, Arizona; ... Michael Fassbender;

Ben Kingsley; Paul Dano; ... Coconut

bidder2@localhost (cars, cities)

Lost 4 money for overpaid documents.

Fontana, California; San Bernardino, California;

... Benelli (motorcycles); Vespa; Paul Bettany

nobody

Alfa Romeo; ... Scottsdale, Arizona; ...

Kiwifruit; ... Advent

<==

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Any feedback regarding organisation, exercises, etc.?

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Overview

- ▶ Improve the agents bidding strategies
- ▶ Different sets of queries to answer
- ▶ Questioner awards rewards to IR agents
- More realistic queries and auction

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Overview

- ▶ Improve the agents bidding strategies
- ▶ Different sets of queries to answer
- ▶ Questioner awards rewards to IR agents
- More realistic queries and auction

- ▶ New sheet on Moodle
- ▶ Updated *Project Package* in Moodle

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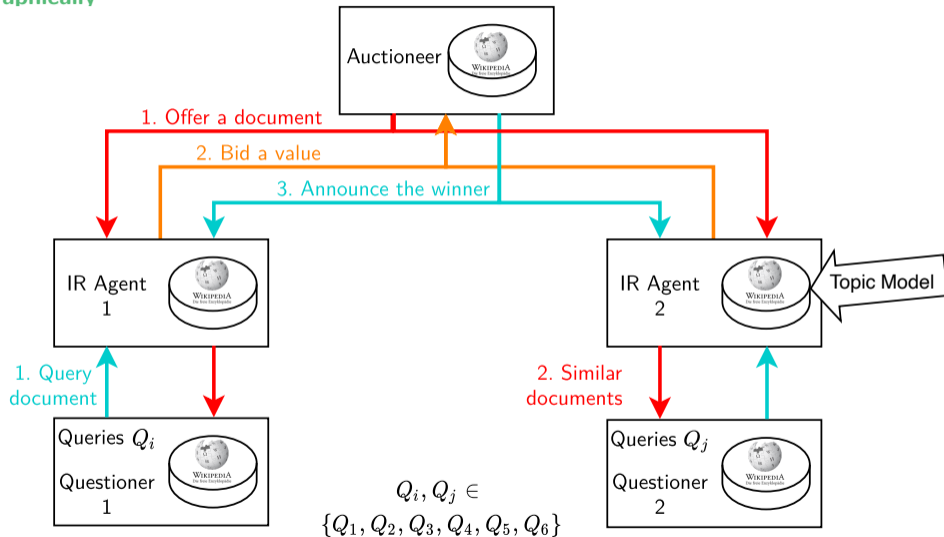
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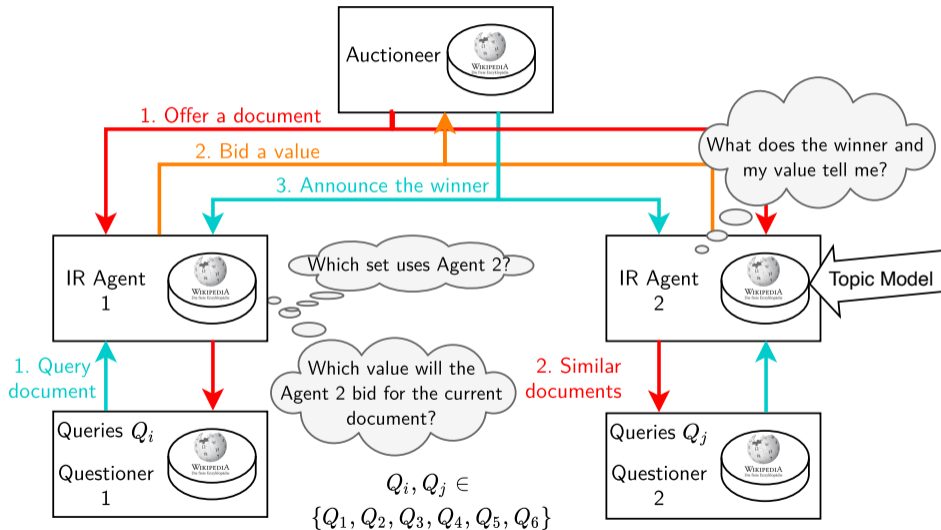
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Strategies

1. There exists a maximum amount of money the agent is allowed to spend:

$$75 \cdot \frac{|\{\text{Documents to sell}\}|}{6}$$

2. The difference of the value of the bought documents and the money spend to buy them must always be positive or zero.
3. The rewards awarded from the questioner are maximized.
4. Save as much money as possible while having enough documents. The ratio between money spent and value of the corpus is maximized.
5. Own goal?

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Questions?

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