

Ranking Relevance in Web Search

Dawei Yin

Yahoo Search Technology

- ~-20% DCG5 gap (2013 Winter)

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- Query: How much tesla

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New 2015 Tesla Prices w/ MSRP & Invoice - TrueCar

www.truecar.com/prices-new/tesla/

100% haggle-free price quote on all new 2015 Tesla cars! Compare Tesla price quotes to invoice price & MSRP pricing.

2015 Tesla Model S Sedan Pricing & Features |...

<http://www.edmunds.com/tesla/model-s/2015/>

Edmunds has detailed price information for the 2015 Tesla Model S Sedan, including average price paid and MSRP. See our 2015 Tesla page for detailed ...

What Does a Tesla Really Cost? - NerdWallet

<http://www.nerdwallet.com/blog/insurance/car-insurance-basics/tesla-cost/>

How Much Does a Tesla Cost? Are you interested in the Tesla Model S, but leery of its \$70,000+ price tag? The Model S is by no means a budget car, but there ...

How solar energy storage could make Tesla much more ...

<http://qz.com/241973/how-solar-energy-storage-could-make-tesla-much-more-than-an-automaker/>

That's according to Morgan Stanley, which this week placed a figure at \$2 billion on how much it thinks Tesla could make in annual

How much does a tesla cost

http://www.answers.com/Q/How_much_does_a_tesla_cost

The Roadster costs 100,000\$ after tax breaks. ... How much family does Nikola Tesla have? Even though Nikola Tesla did not have any kids, he still has relative living. ...

Here's How Much Tesla Owners LOVE Their Cars

http://www.huffingtonpost.com/2014/02/18/tesla-model-s-love-owners_n_4809529.html

Move over, Vanilla the Volkswagen Beetle. There's a new vehicle in town that's getting all the loving from its owners: the Tesla Model S. According to a new study, ...

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Tesla Cars: 2016 Tesla Prices, Reviews, Specs

<http://www.autoguide.com/new-cars/tesla/>

Tesla Cars: View the 2016 Tesla Cars lineup, including detailed Tesla prices, professional Tesla car reviews, and complete 2016 Tesla Car specifications.

New 2015 Tesla Prices w/ MSRP & Invoice

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100% haggle-free price quote on all new 2015 Tesla cars! ... Tesla is the innovator of the only continual production highway-capable electric car. ...

2013 Model S Price Increase | Tesla Motors

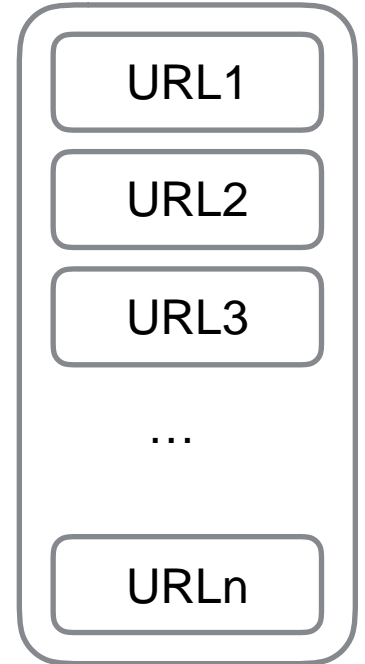
<https://www.teslamotors.com/blog/2013-model-s-price-increase>

We originally unveiled the Model S in March 2009 with a base price of \$57,400 (\$49,900 after federal tax credits). Today, Model S is the most award-winning car of the ...

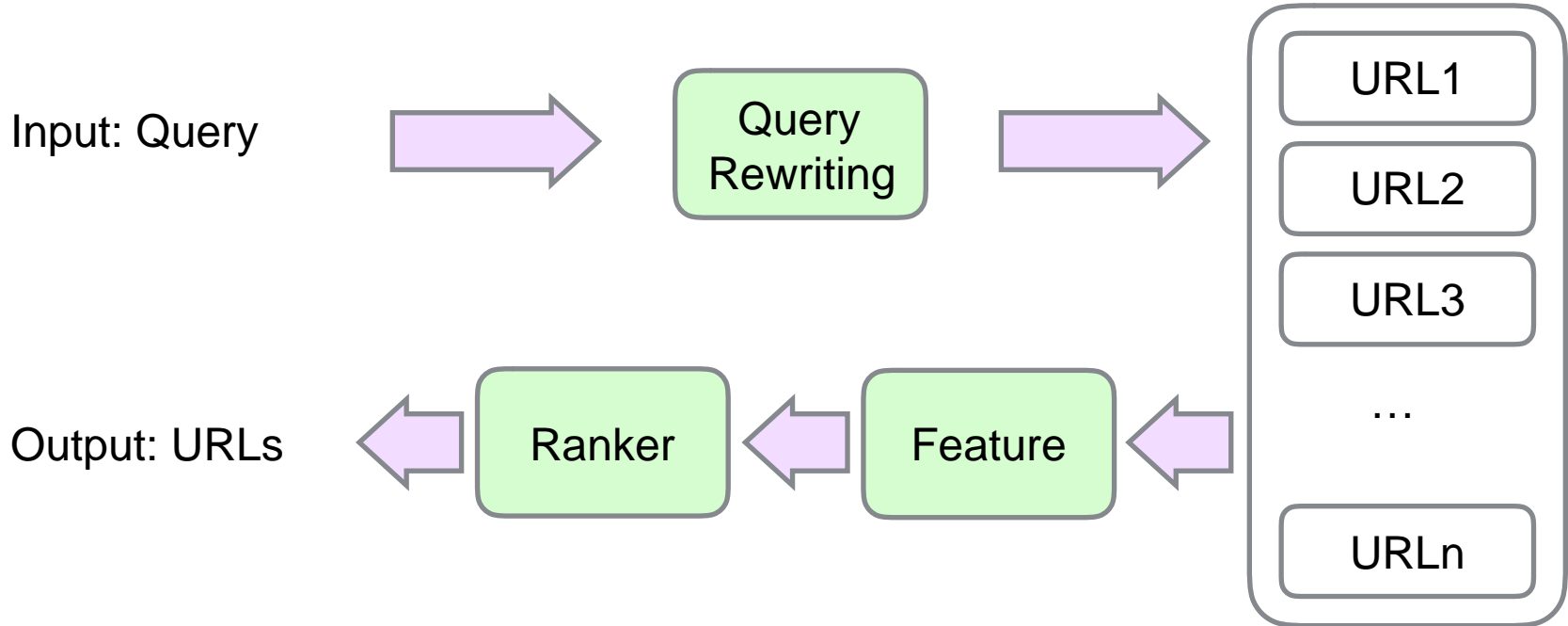
Overview

Input: Query

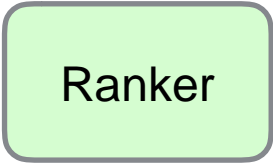
Output: URLs



Overview



Overview



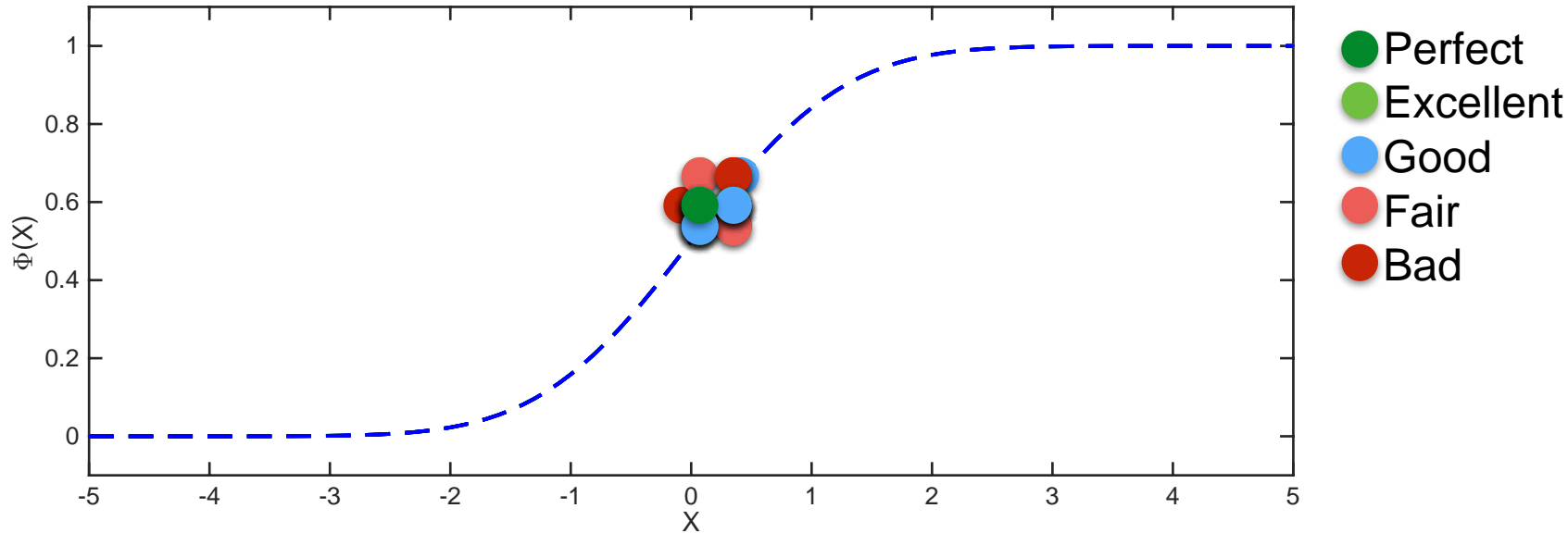
Ranker

Ranking/Reranking



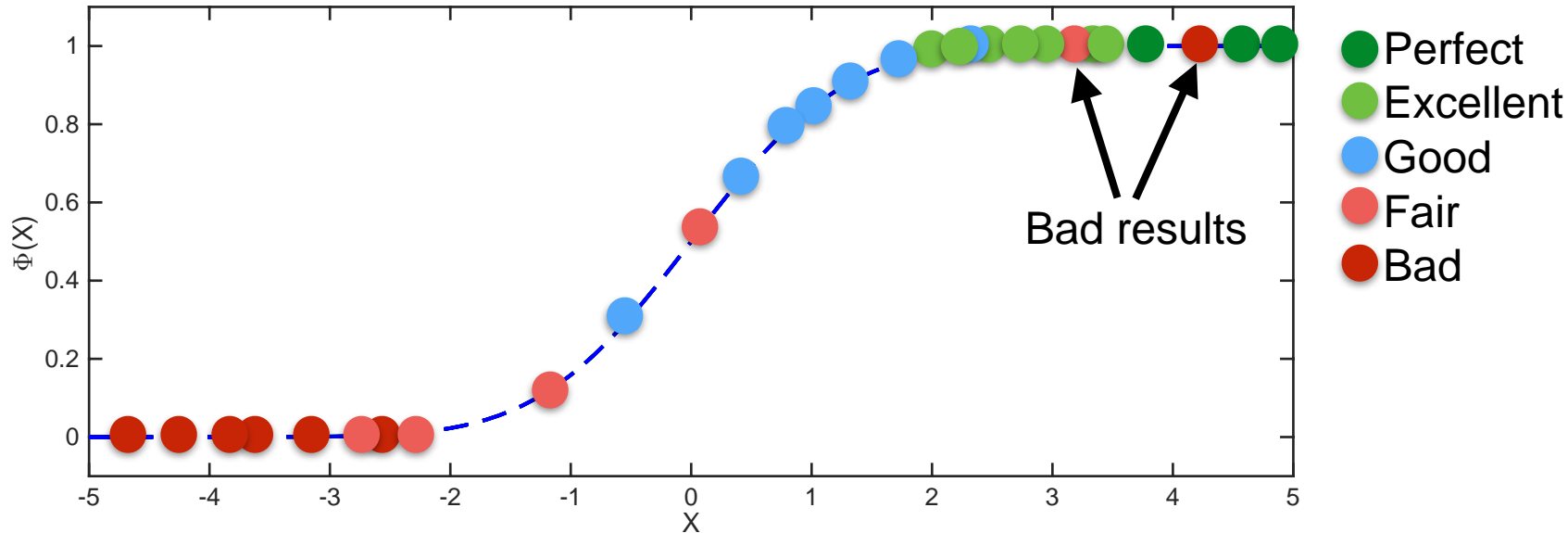
Machine Learning Ranking

- Core Ranking



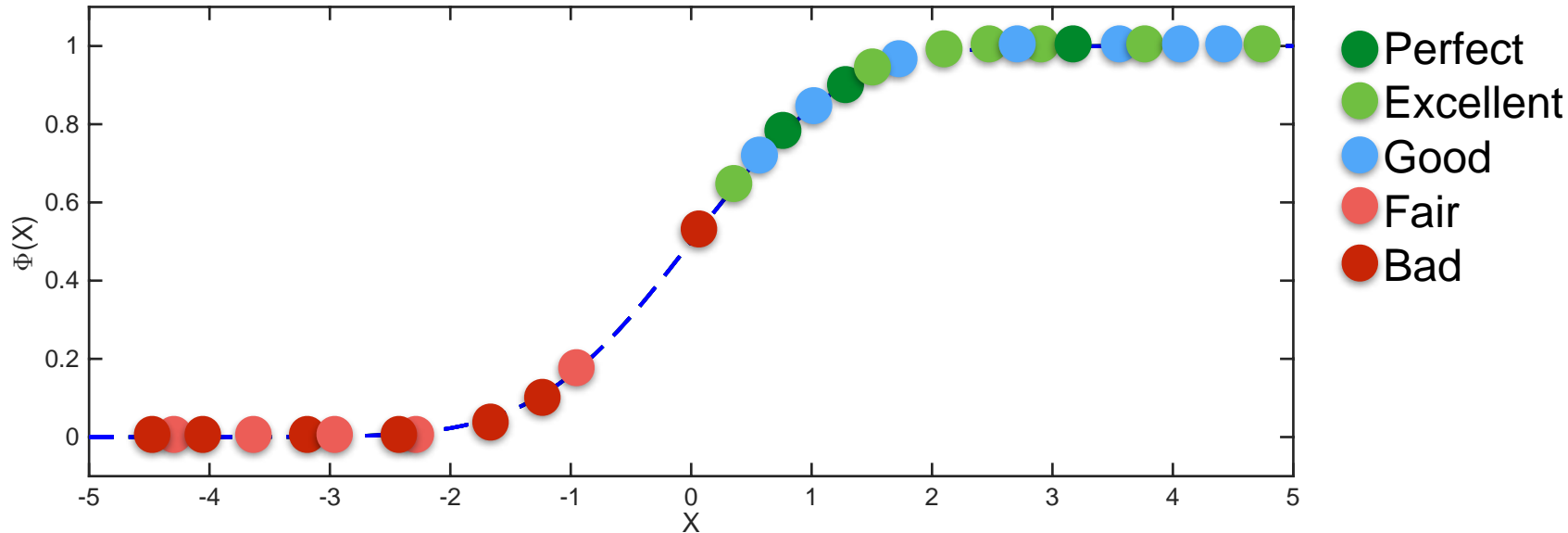
Machine Learning Ranking

- Core Ranking (GBRank)



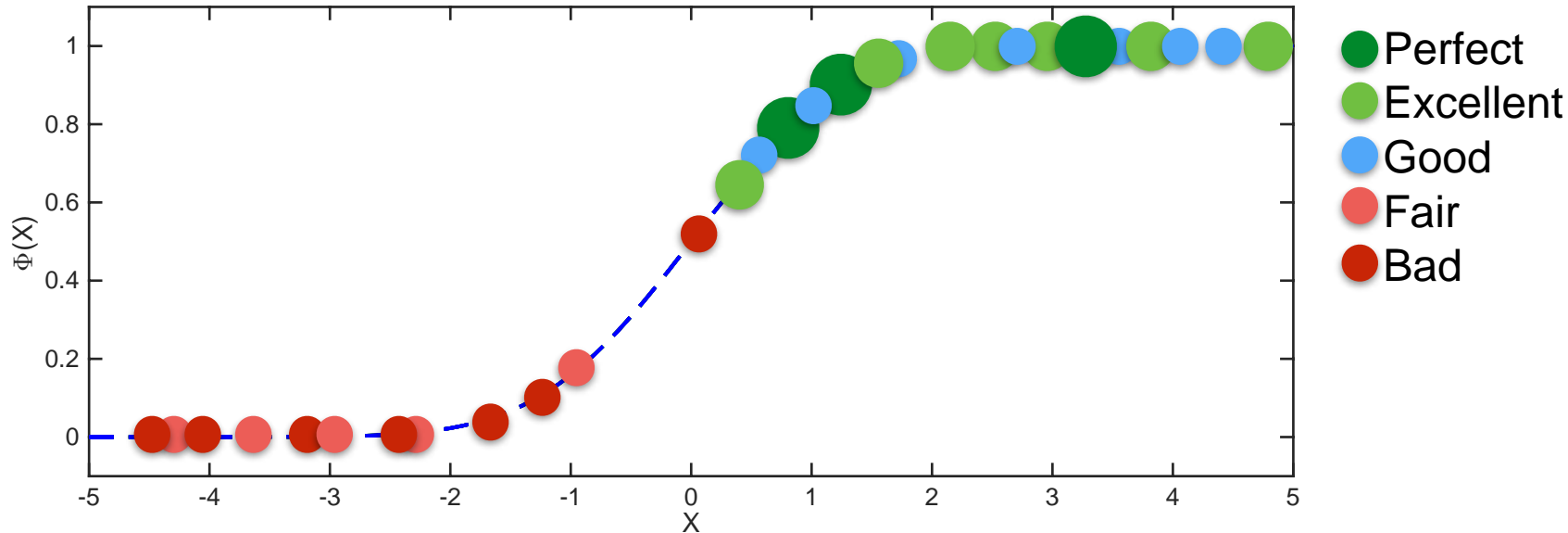
Machine Learning Ranking

- Core Ranking (Logistic Loss)



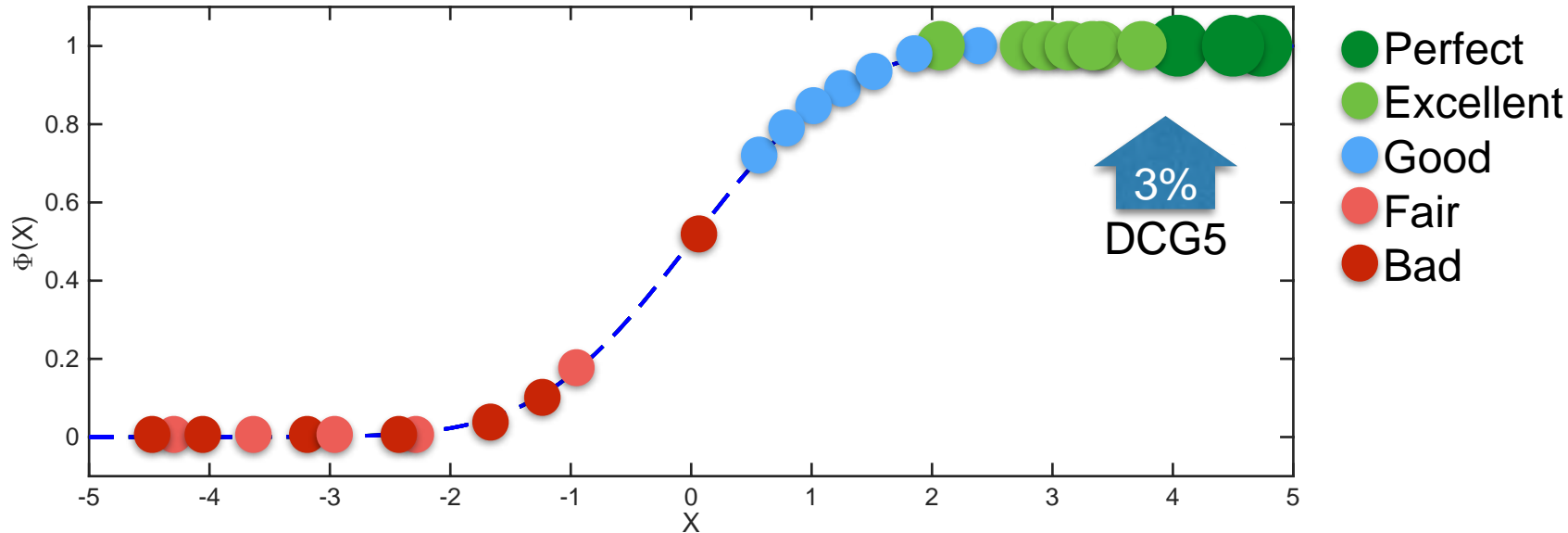
Machine Learning Ranking

- Core Ranking (Logistic Rank)



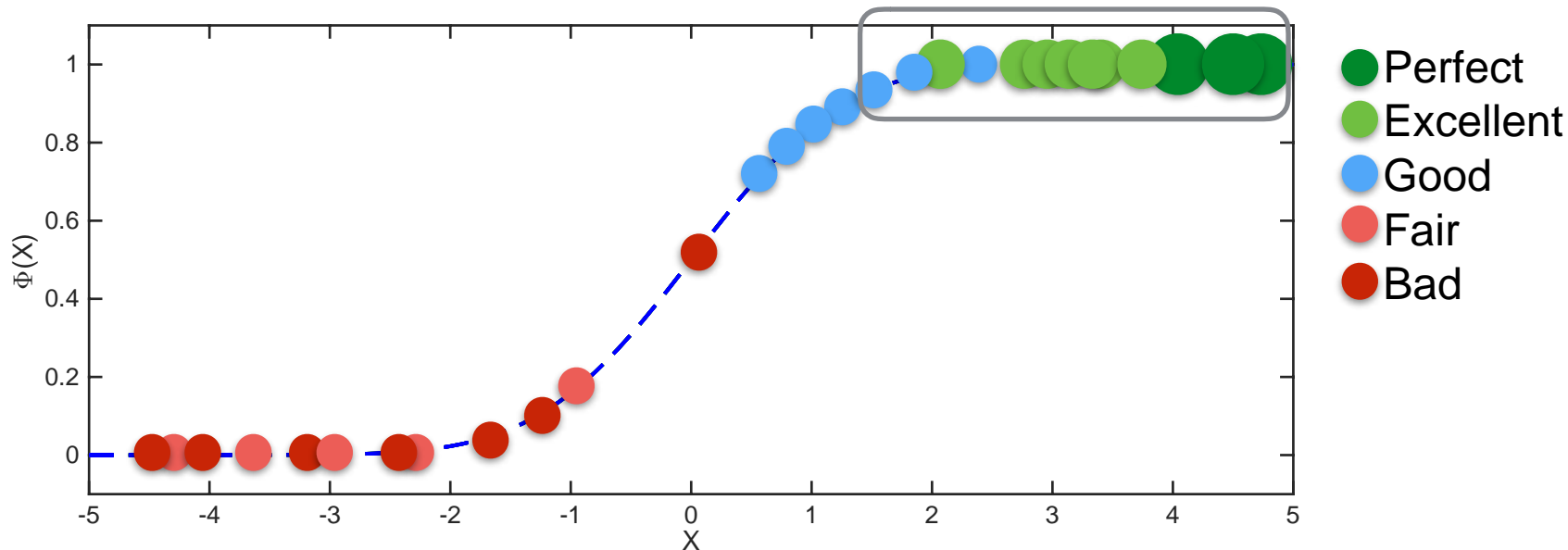
Machine Learning Ranking

- Core Ranking (Logistic Rank)



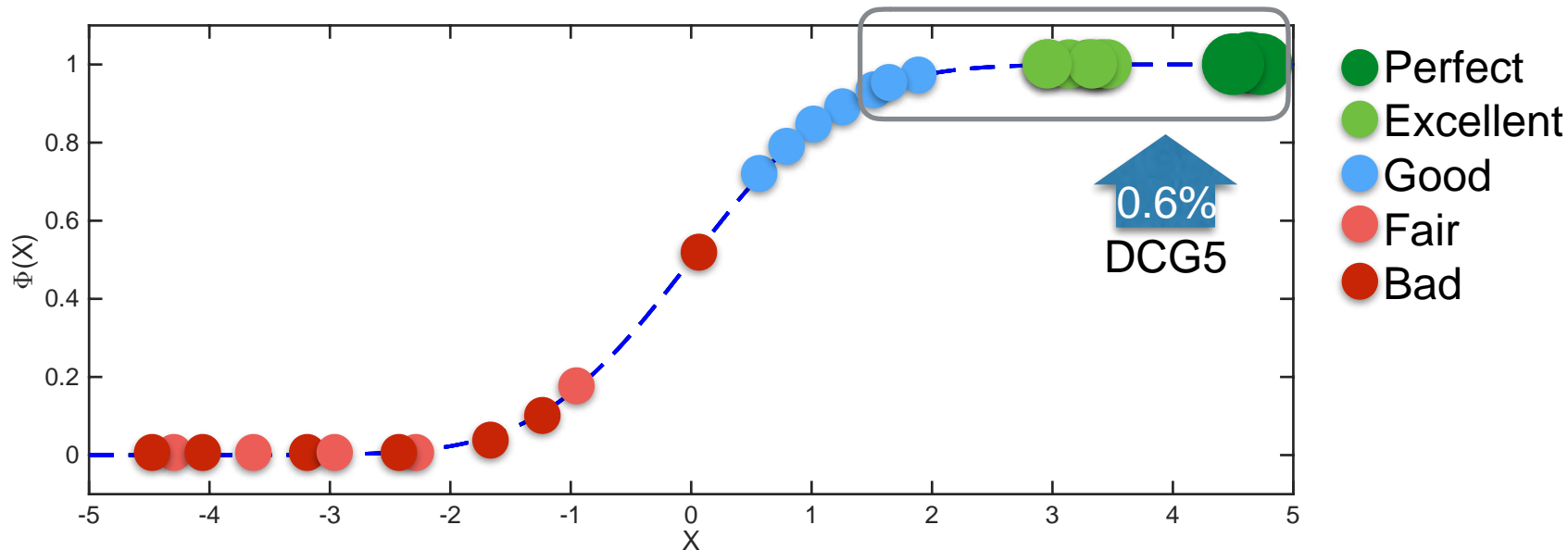
Machine Learning Ranking

- Contextual Reranking

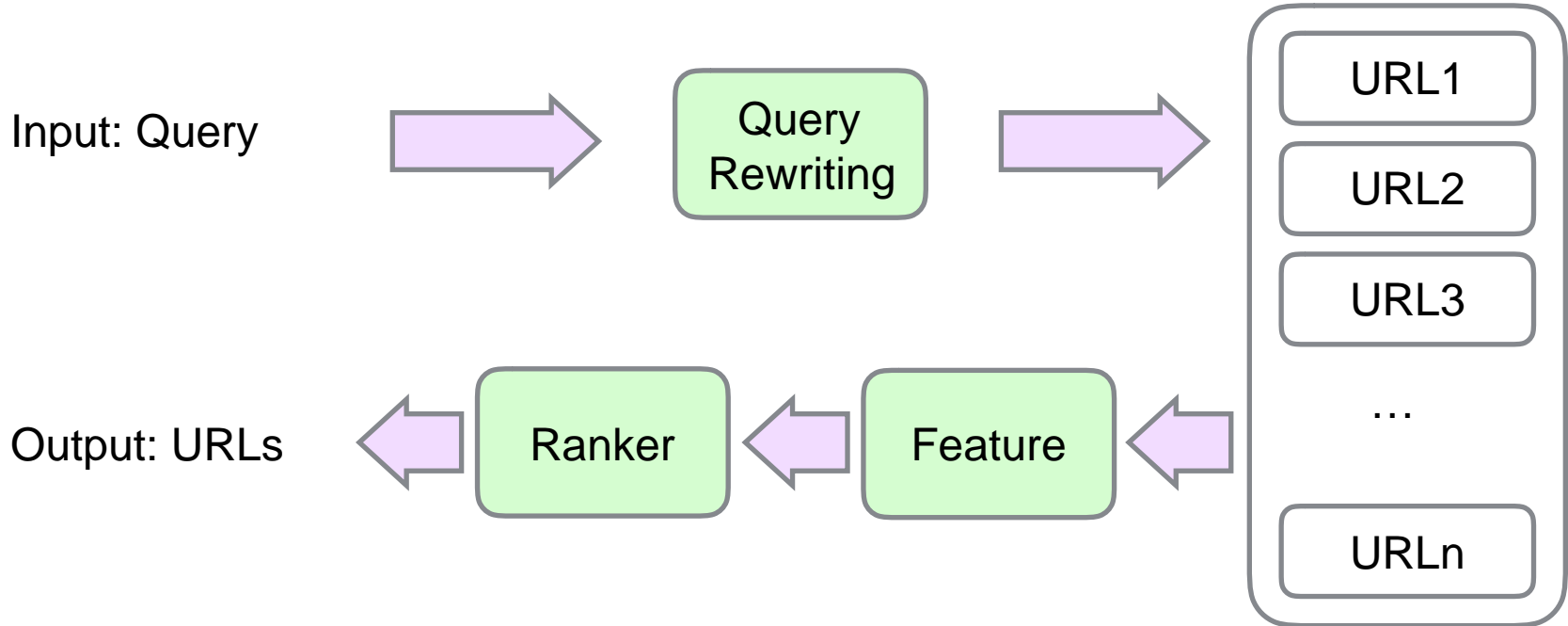


Machine Learning Ranking

- Contextual Reranking



Overview



Overview

Query
Rewriting

Overview

Machine Translation

Ranking Strategy

Query Rewriting

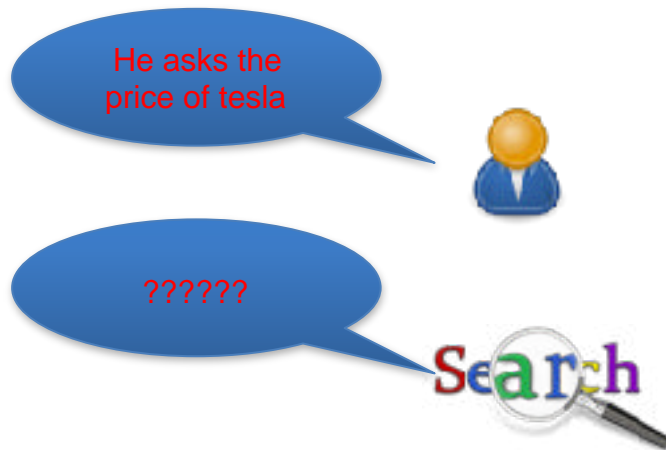
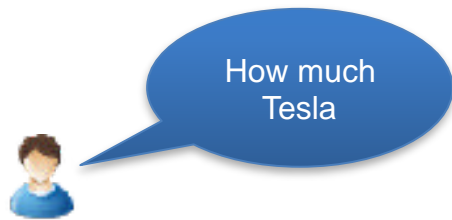


How much
Tesla

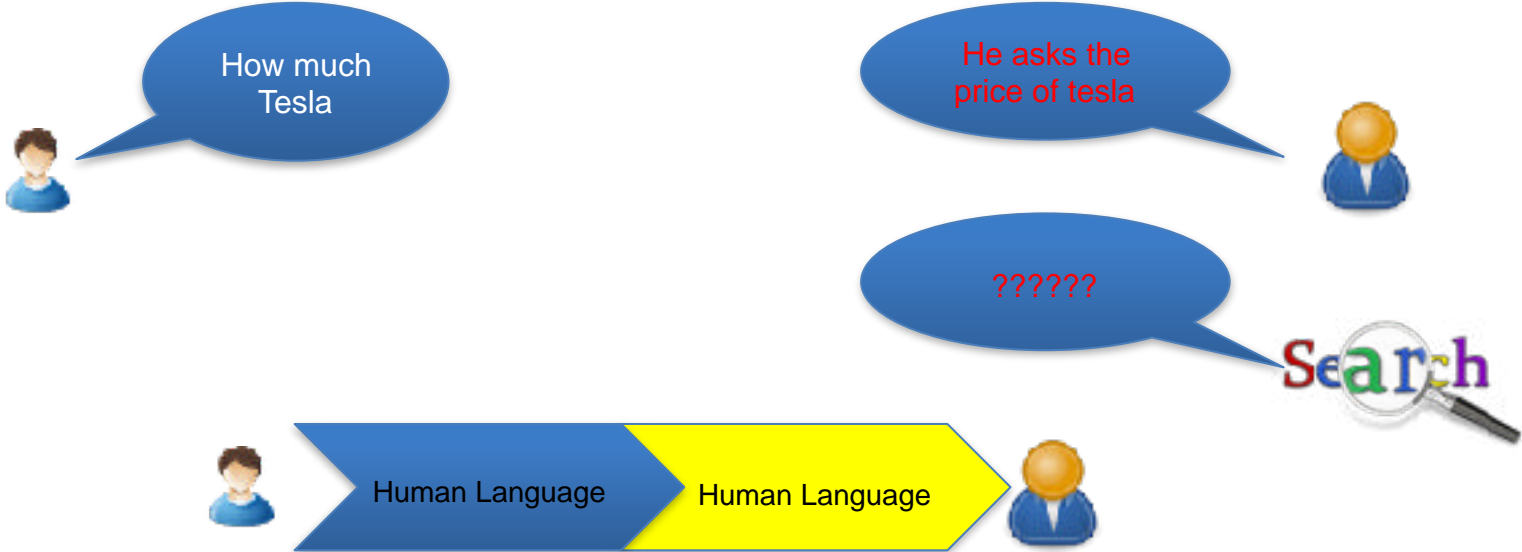
He asks the
price of tesla



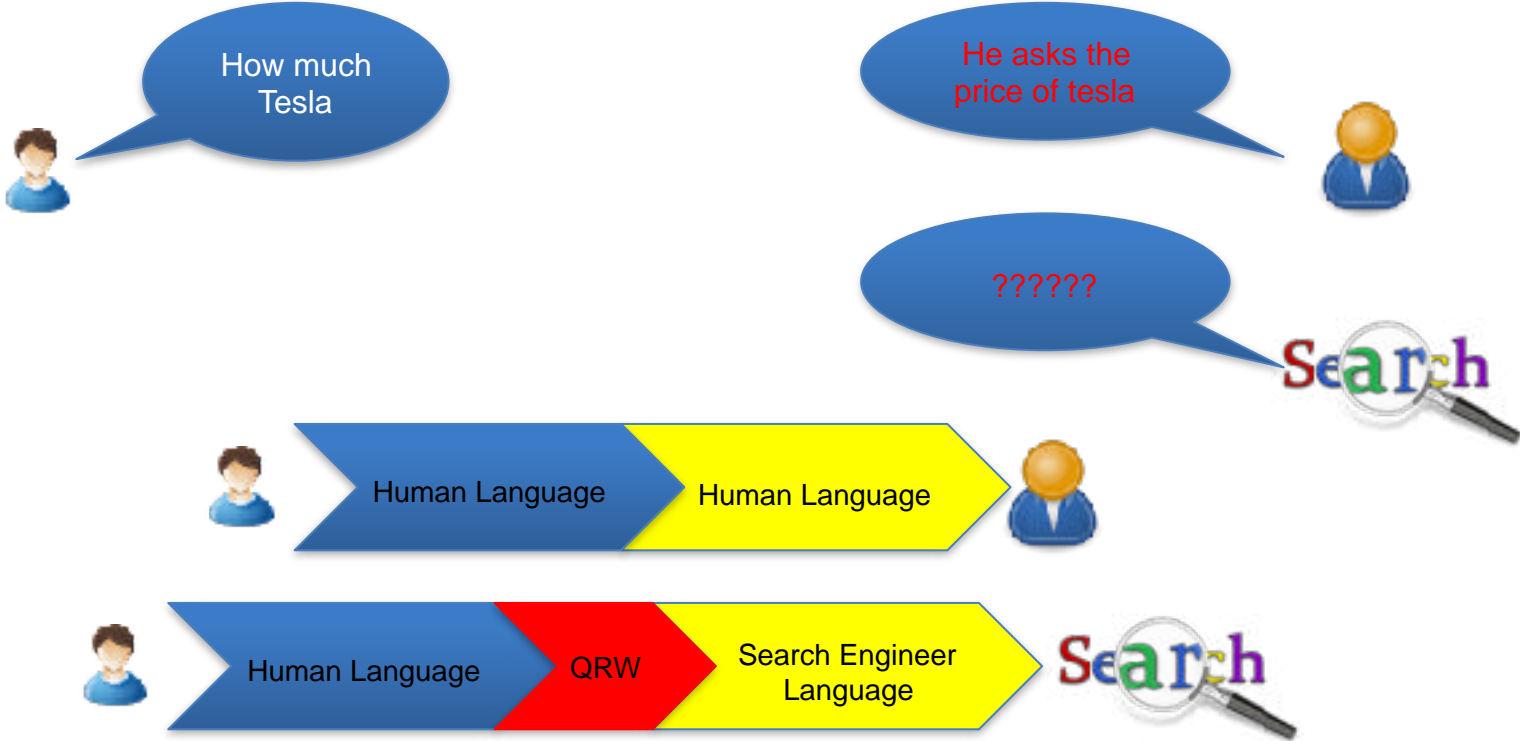
Query Rewriting



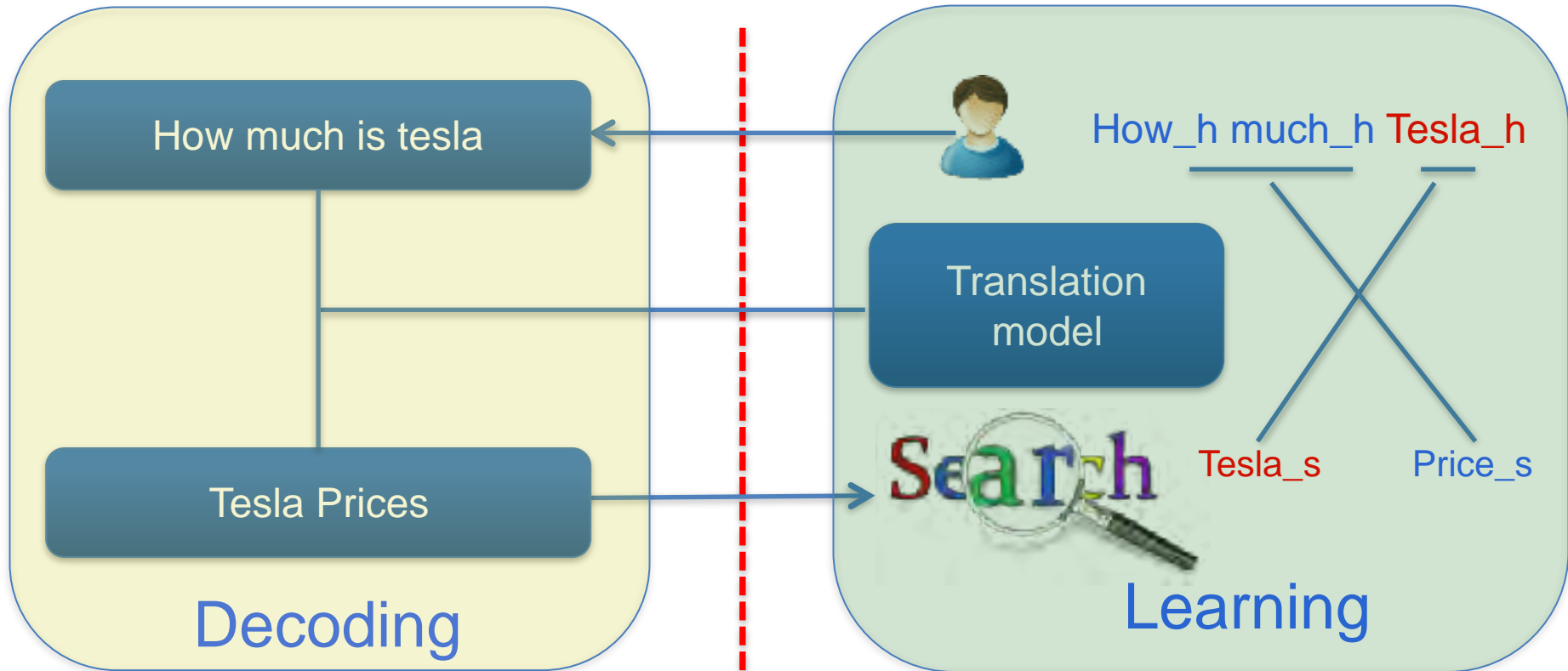
Query Rewriting



Query Rewriting



Query Rewriting

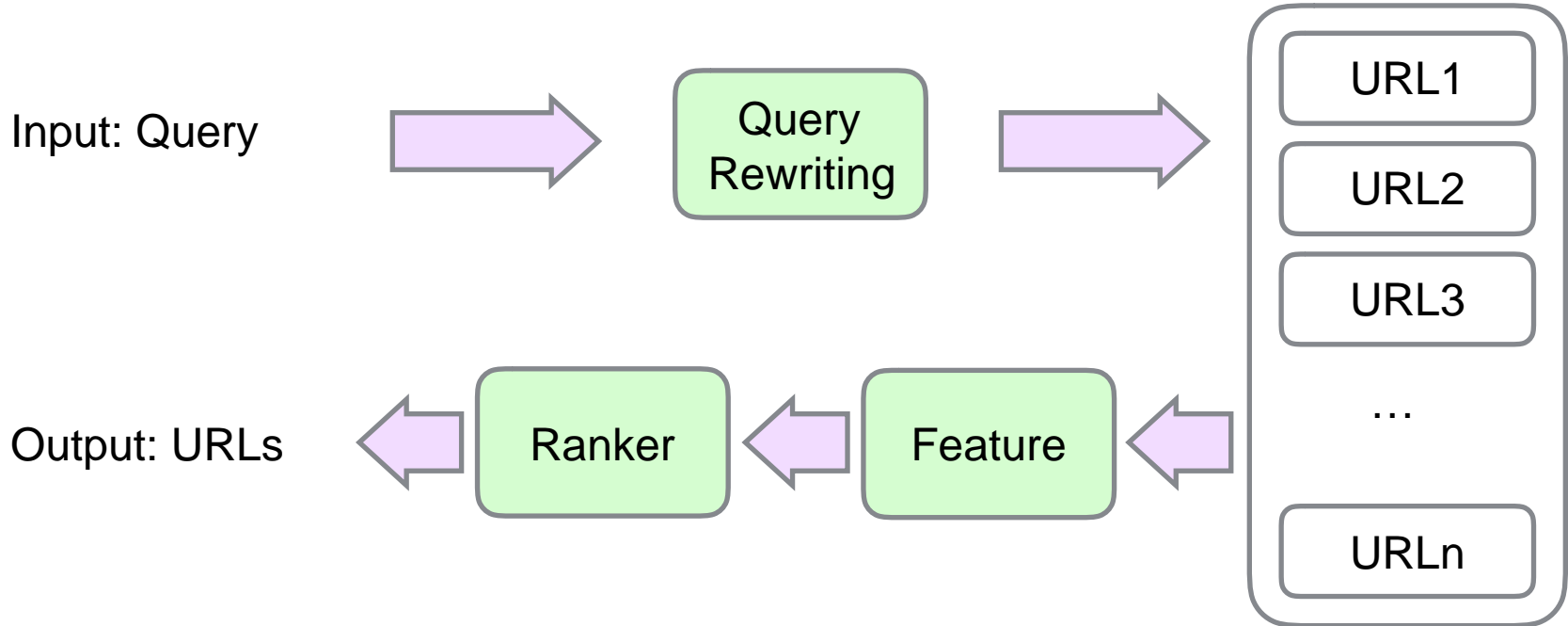


Query Rewriting


- Ranking Strategy
 - Input: the original query and rewritten query
 - Blending the results together
 - Improving 3% DCG5

Query Band	Coverage (%)	DCG1 (%)	DCG3 (%)	DCG5 (%)
Top (0-40%)	7.53	2.41	4.97	4.80
Torso (40%~60%)	16.57	6.18	7.71	8.82
Tail (60~75%)	27.86	12.06	13.35	14.13

Overview



Overview



Feature

Semantical Matching Features

Click Similarity

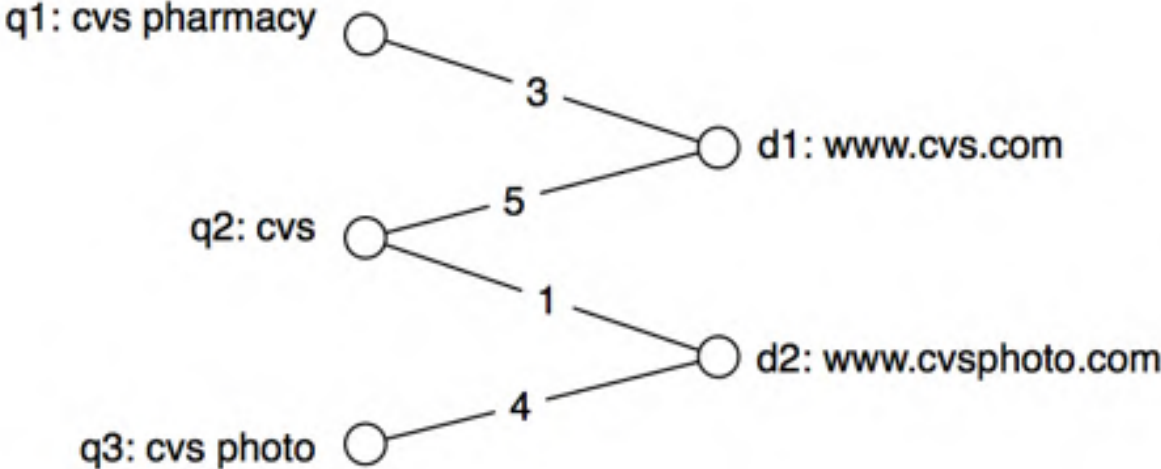
Translated Text

Deep Learning

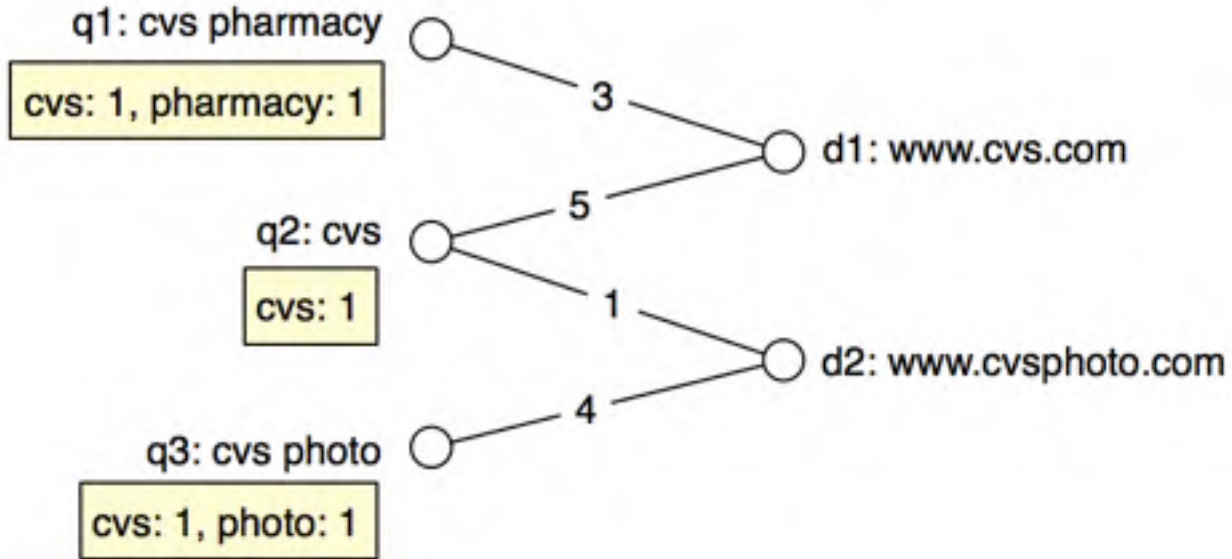
Revisit Users Clicks

- Relevance is far beyond text matching
- Clicks play more important role
 - Noisy
 - Sparse
 - N/A on tail query/url

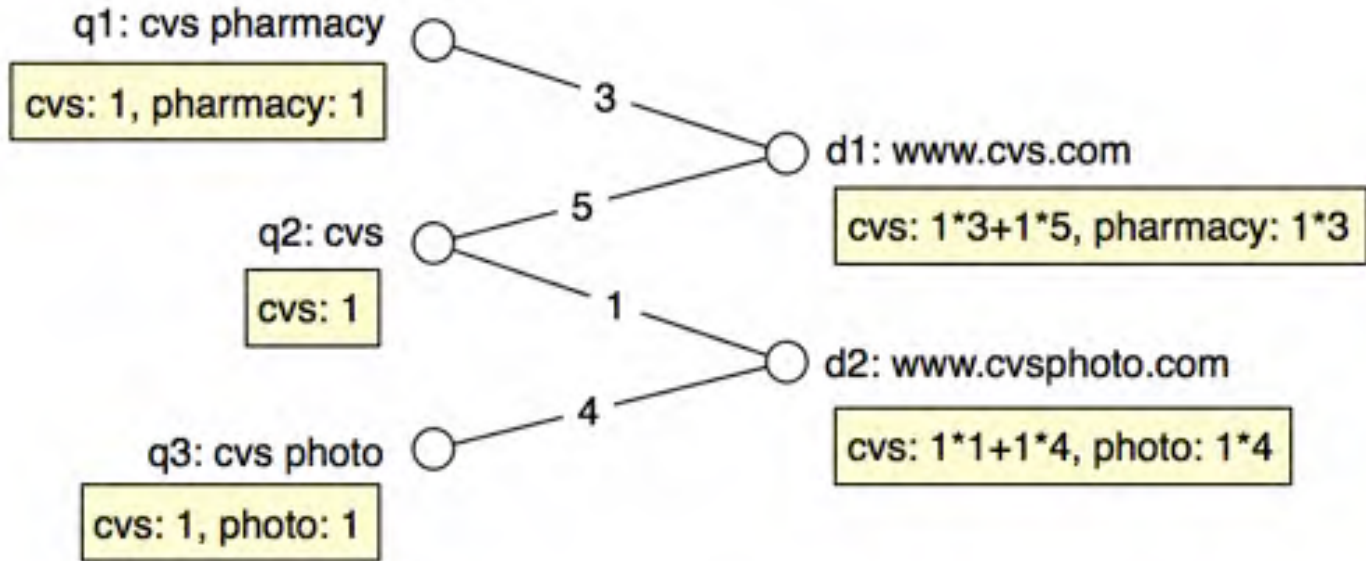
Click Similarity Features



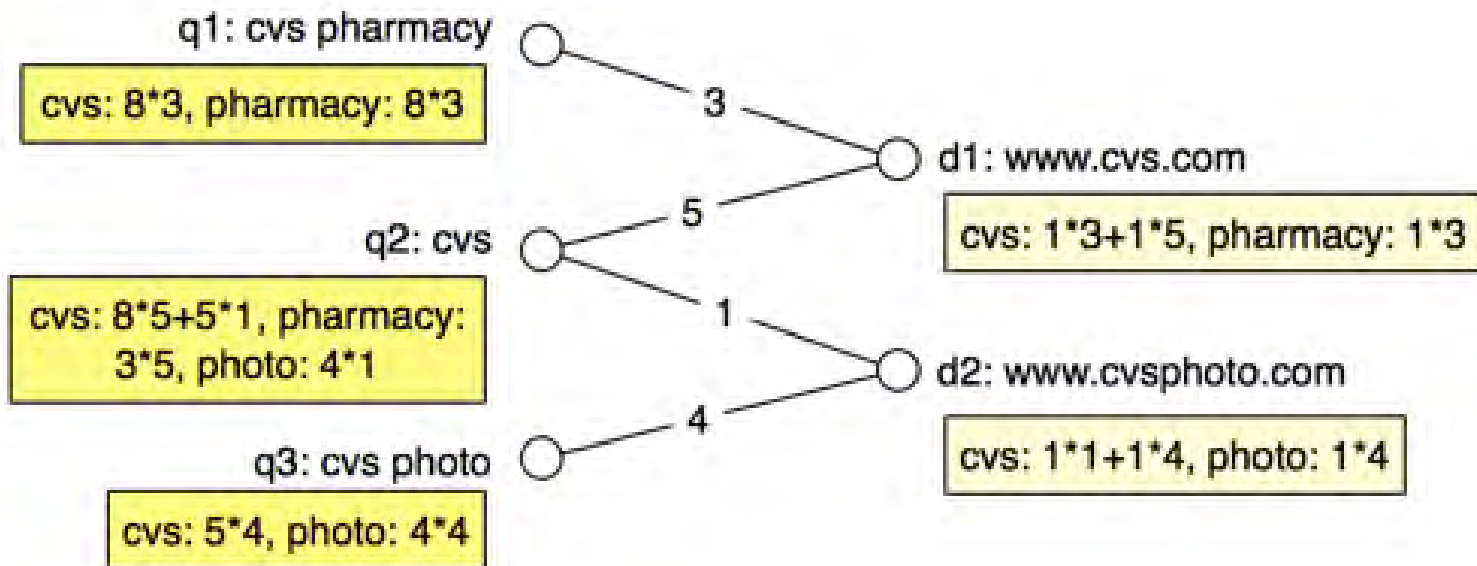
Click Similarity Features



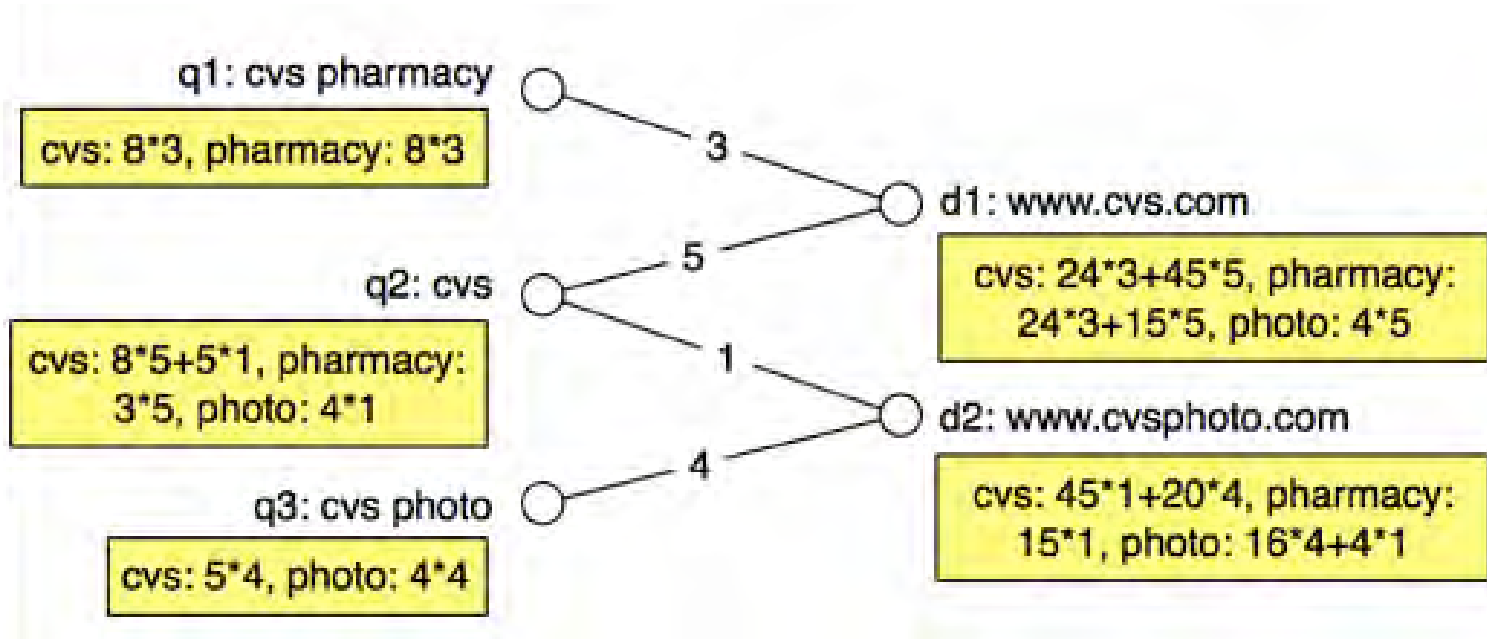
Click Similarity Features



Click Similarity Features



Click Similarity Features



Click Similarity Features

- Feature Importance
- Improve DCG5 by 2%
- Weakness?
 - N/A for non-clicked query and urls

Click Similarity Features

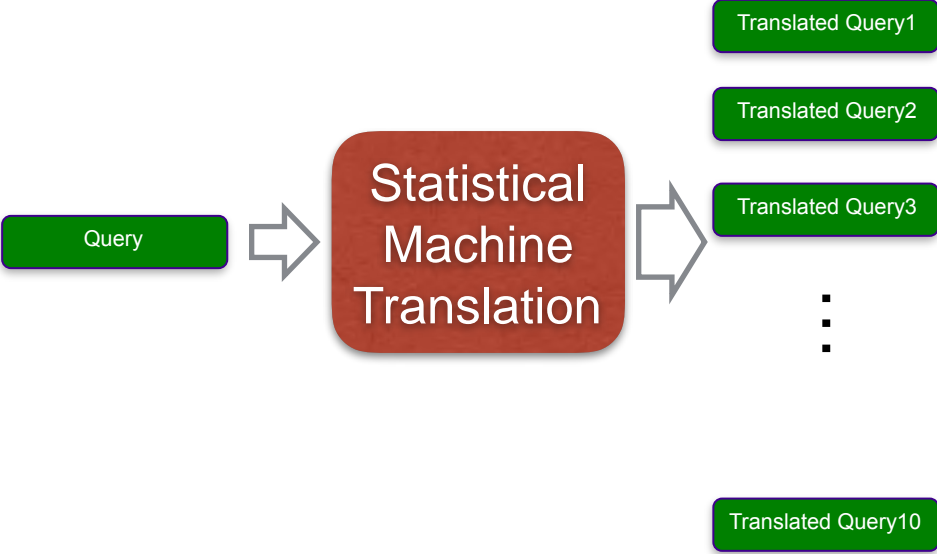
- Feature Importance
- Improve DCG5 by 2%
- Weakness?
 - N/A for non-clicked query and urls

Rank	feature	Importanc
1	FQUCLKSIM2	100
2	FTSC	39.6629
3	WFTSC	39.215
4	FBM25SD	27.1954
5	FQUNAVCTR_DKLCB	24.7328
6	FBM25SDUINF	22.8282
7	FQUCLKDUR_DK_AL	19.006
8	FURLCOV	18.5803
9	FQHIMPRATE_DK_US	17.4305
10	FQHCLKSIM2	15.9027

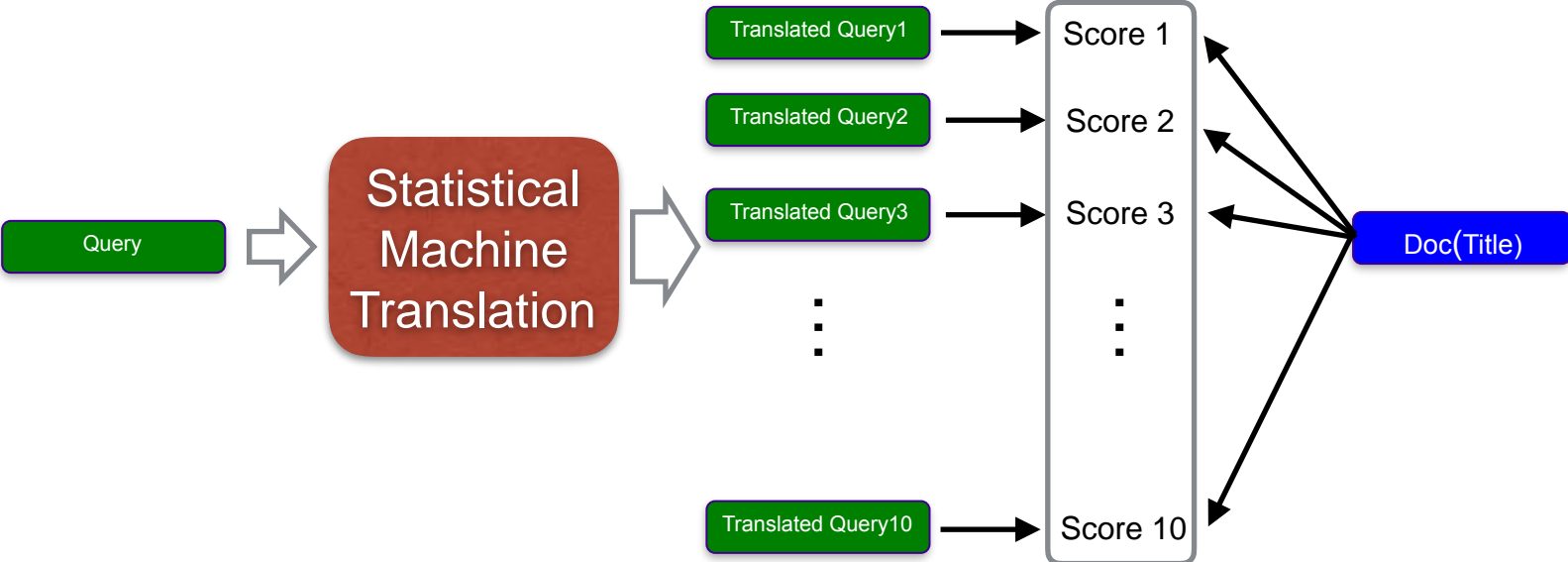
Translated Text Matching

Query

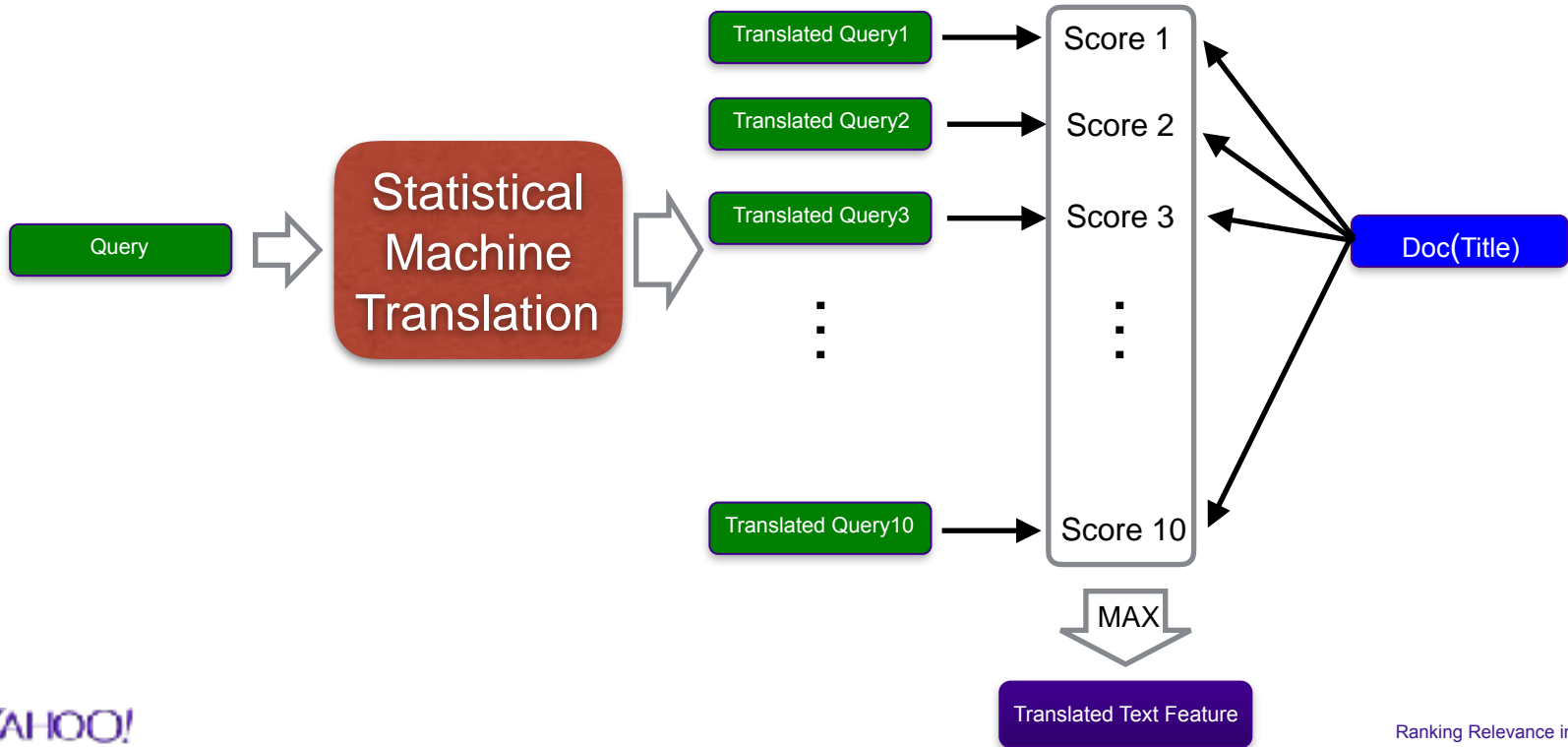
Translated Text Matching



Translated Text Matching



Translated Text Matching



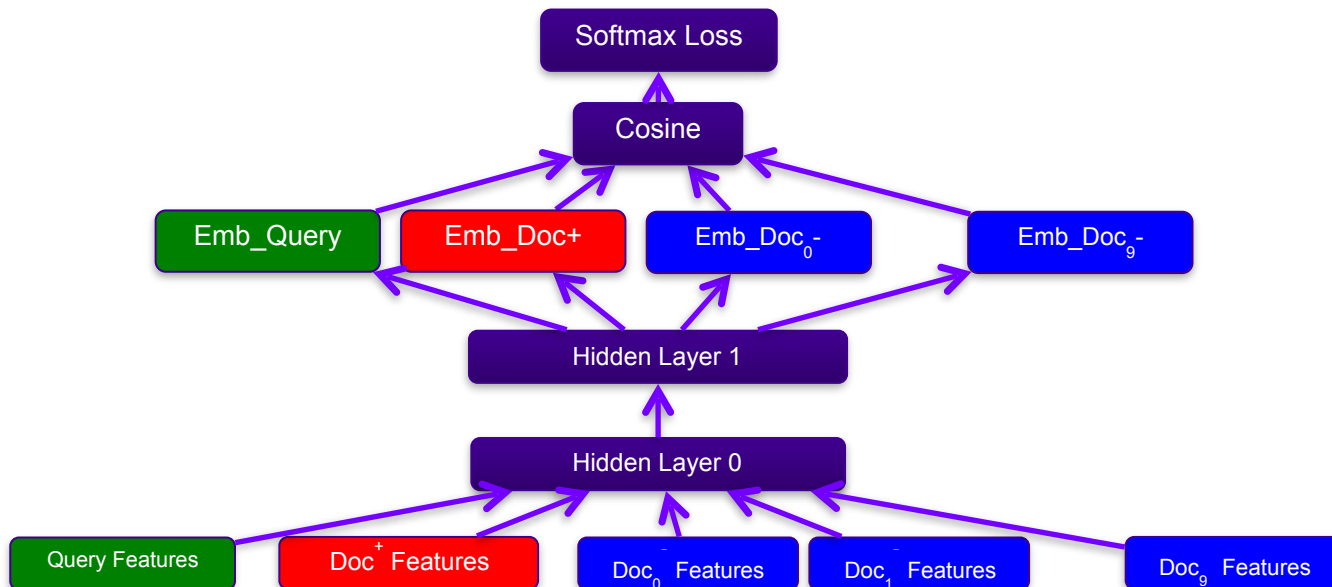
Translated Text Matching

- Improve DCG5 by 2% on tail query
- Feature Importance
- Weakness?
 - shallow architecture

Rank	feature	Importanc
1	FQUCLKSIM2	100
2	WFTSC	39.1162
3	FTSC	38.4871
4	Translated Text	29.334
5	FBM25SD	25.5941
6	FQUNAVCTR_DKLC	25.4899
7	FBM25SDUINF	21.6355
8	FQUCLKDUR_DK_A	19.3436
9	FQHIMPRATE_DK_U	16.6841
10	FQUTEST09	16.4806

Deep Semantical Matching

- Deep Neural Net Structure: Listwise

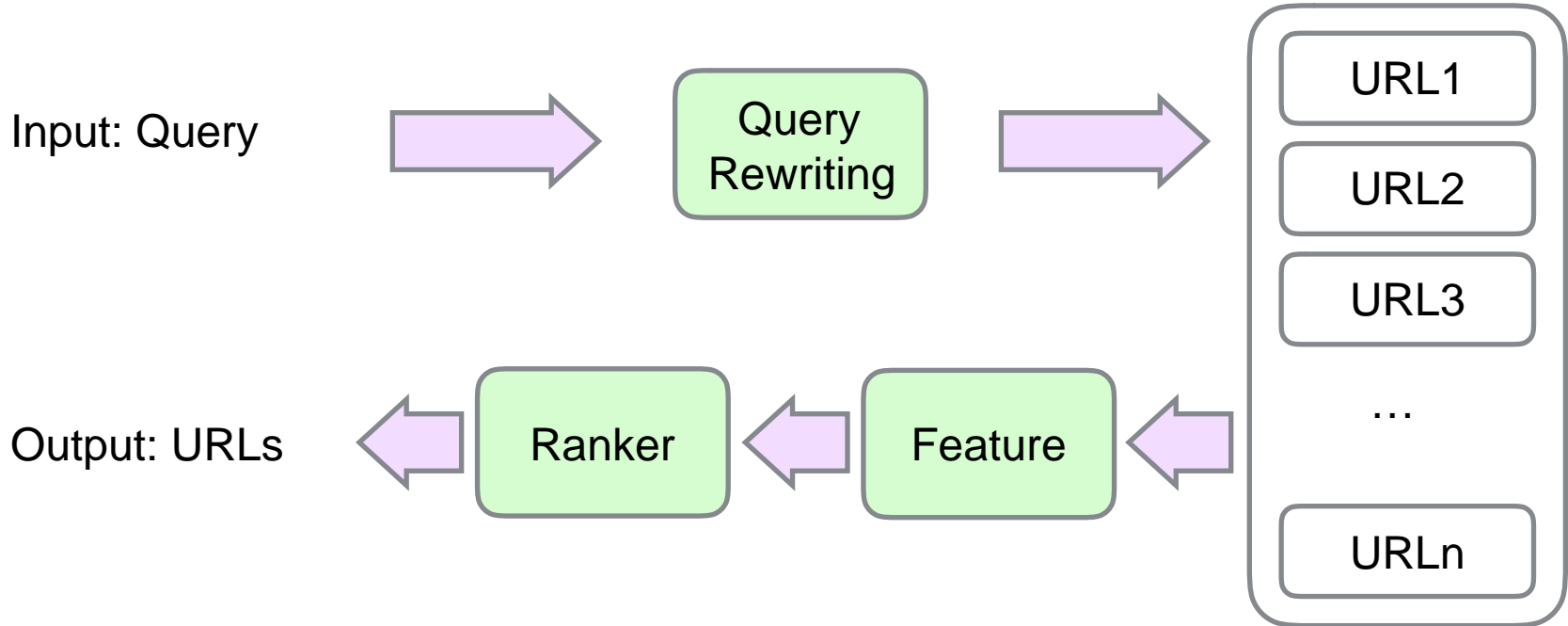


Deep Semantical Matching

- Feature Importance
- Improve DCG5 by 1% on tail query

Rank	feature	Importanc
1	FQUCLKSIM2	100
2	Deep Learning	76.8913
3	LSTM3X256C	61.0119
4	WFTSC	55.0603
5	FBM25SD	43.7654
6	FQUNAVCTR_DKLCB	39.2905
7	FQHPCTCLK_DK_US	37.1903
8	FQUPCTCLK DK US	31.5082
9	FQHIMPRATE DK U	29.0784
10	FQHCLKSIM2	28.1298

Overview



Yahoo Relevance Science



Dawei Yin



Yuening Hu



Jiliang Tang



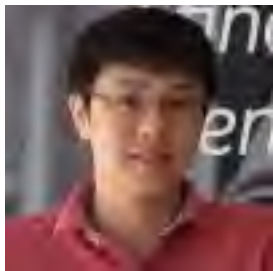
Tim Daly



Mianwei Zhou



Hua Ouyang



Jianhui Chen



C. Kang



Hongbo Deng



C. Nobata



JM Langlois



Yi Chang