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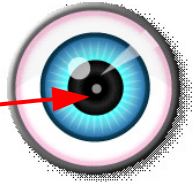
Renan G. Cattelan

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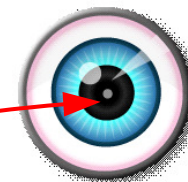
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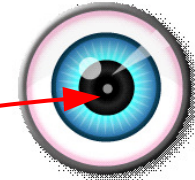
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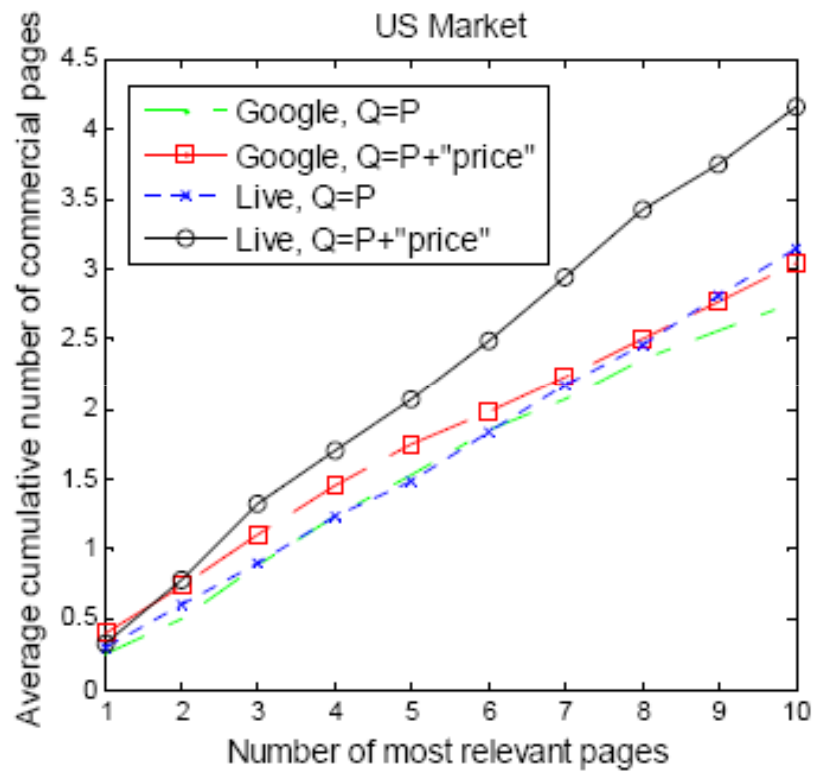
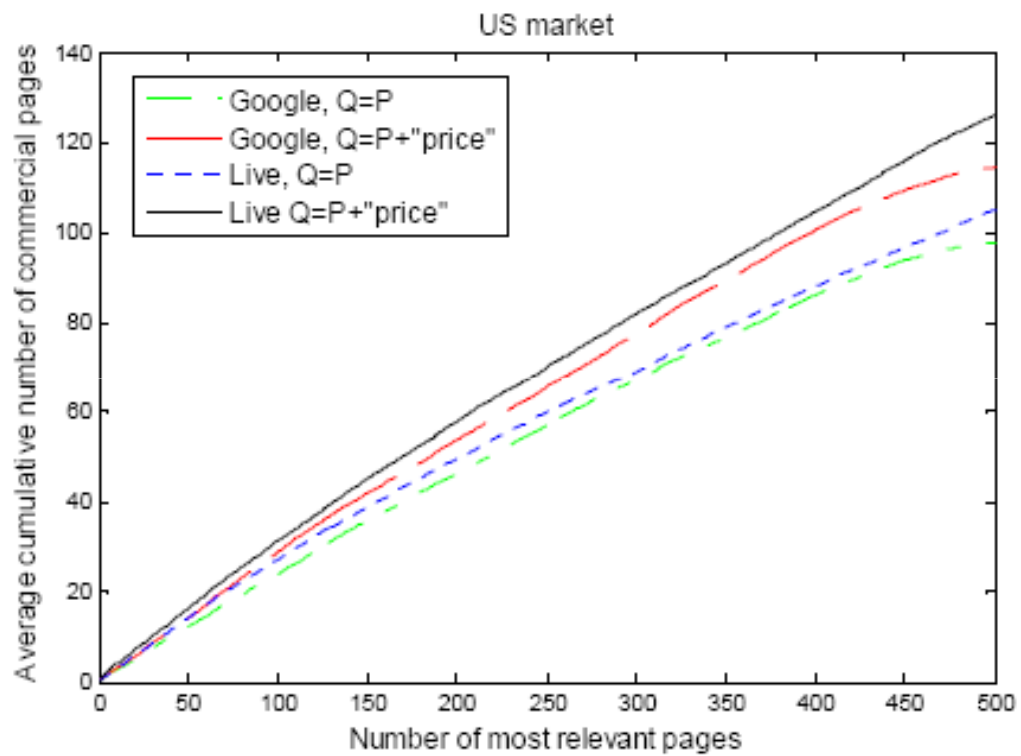
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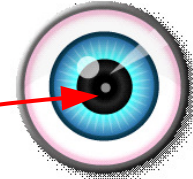
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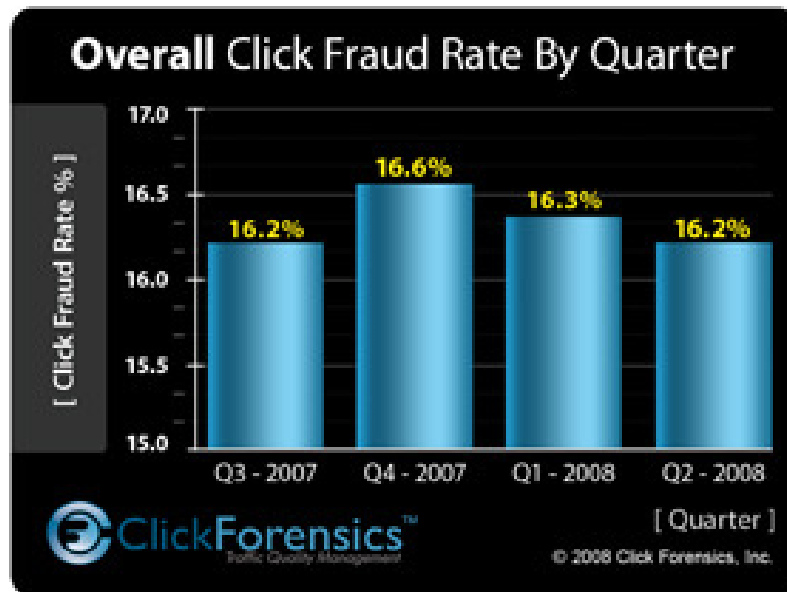
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    - Em 2006, aproximadamente 2/3 das despesas do Google foram referentes a instalações e folha de pagamento
    - Microsoft planeja a construção de 20 data centers ao custo de US\$1 bilhão cada

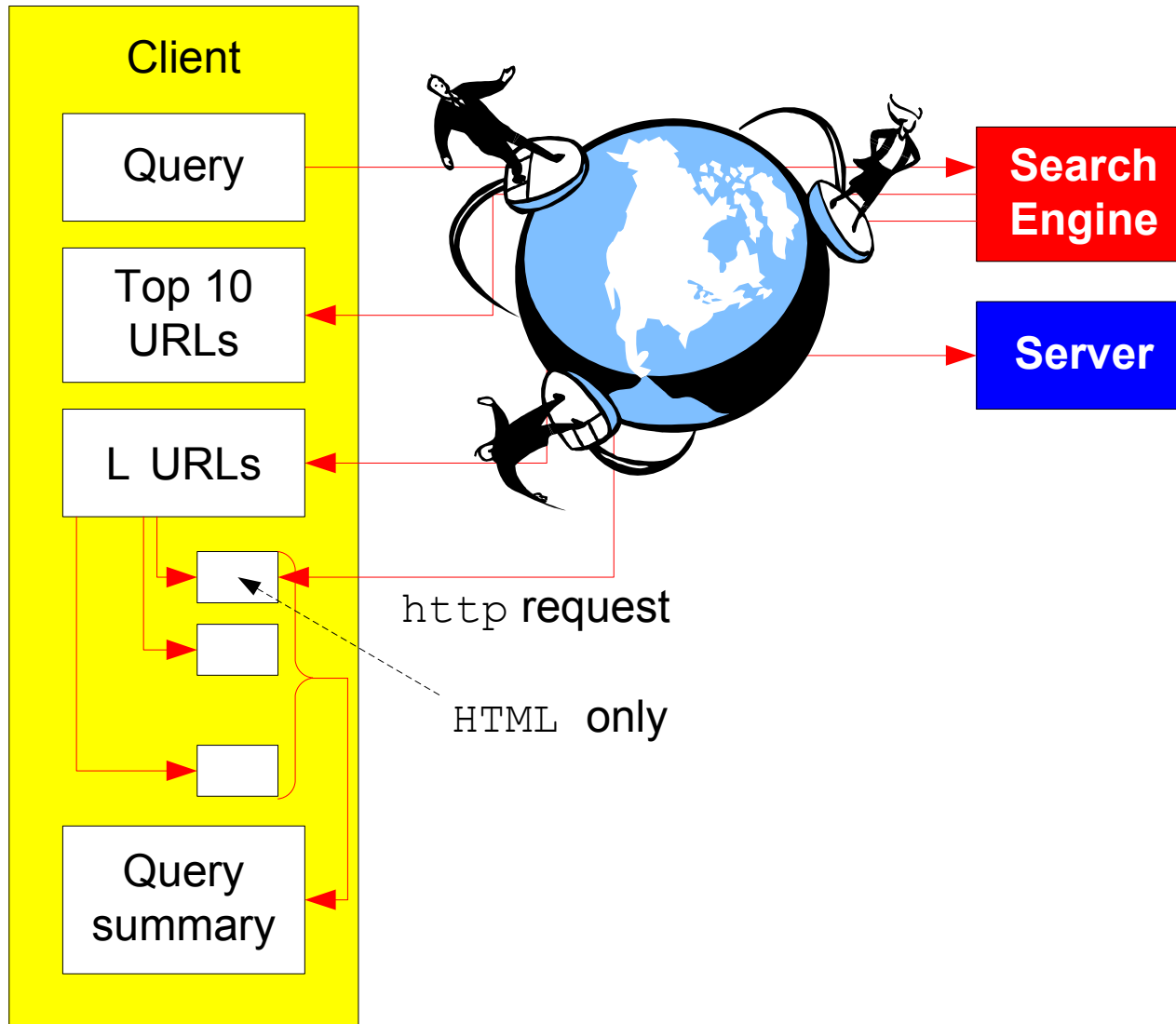
# O modelo de negócios

- Search engine
  - Altos custos
  - Canal de marketing
  - Controle
- Ad publishers
  - Receita fácil
  - Click fraud
- Anunciantes (Lojas)
  - Melhor opção disponível
  - Baixas margens de lucro
- Usuário
  - Confusão
  - Tomada de decisão pobre

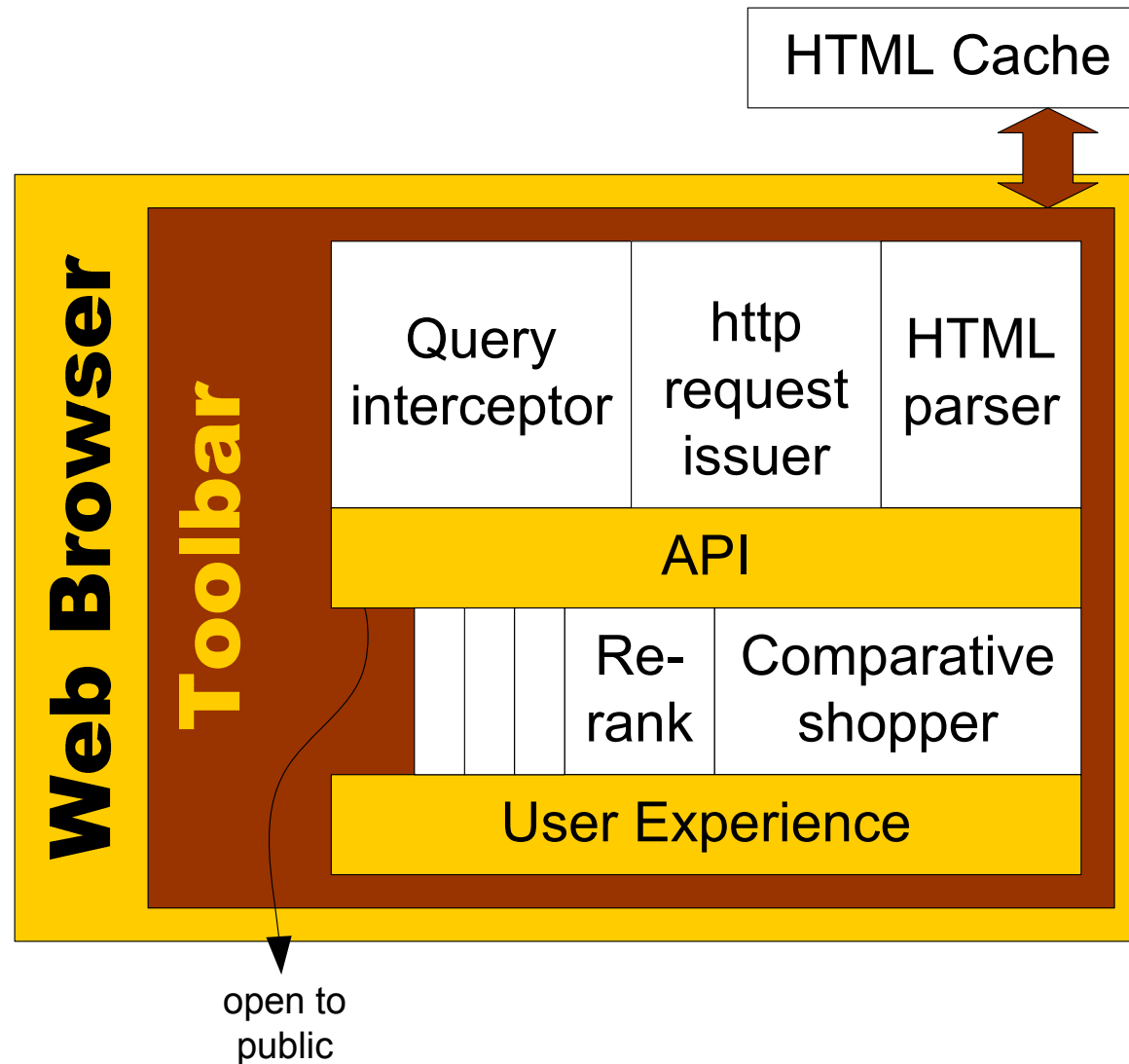
# O modelo de negócios

- Search engine
  - Altos custos
  - Canal de marketing
  - Cor 
- Ad publishers
  - Receita fácil
  - Click fraud
- Anunciantes (Lojas)
  - Melhor opção disponível
  - Baixas margens de lucro
- Usuário 
  - Confusão
  - Tomada de decisão pobre

# Um assistente de busca *client-side*



# Arquitetura



# Etapas

- S1. {server-side} Resposta à consulta tradicional
- S2. {server-side} Resposta à consulta em profundidade
- C1. {client-side} Download do conteúdo HTML
- C2. {client-side} Processamento do conteúdo HTML

# S1. {server-side} Resposta à consulta tradicional

- Cliente submete a primeira consulta
- Search engine responde com a primeira página de resultados
- Cliente apresenta os resultados da busca
- Usuário pode navegar os resultados

## S2. {server-side} Resposta à consulta em profundidade

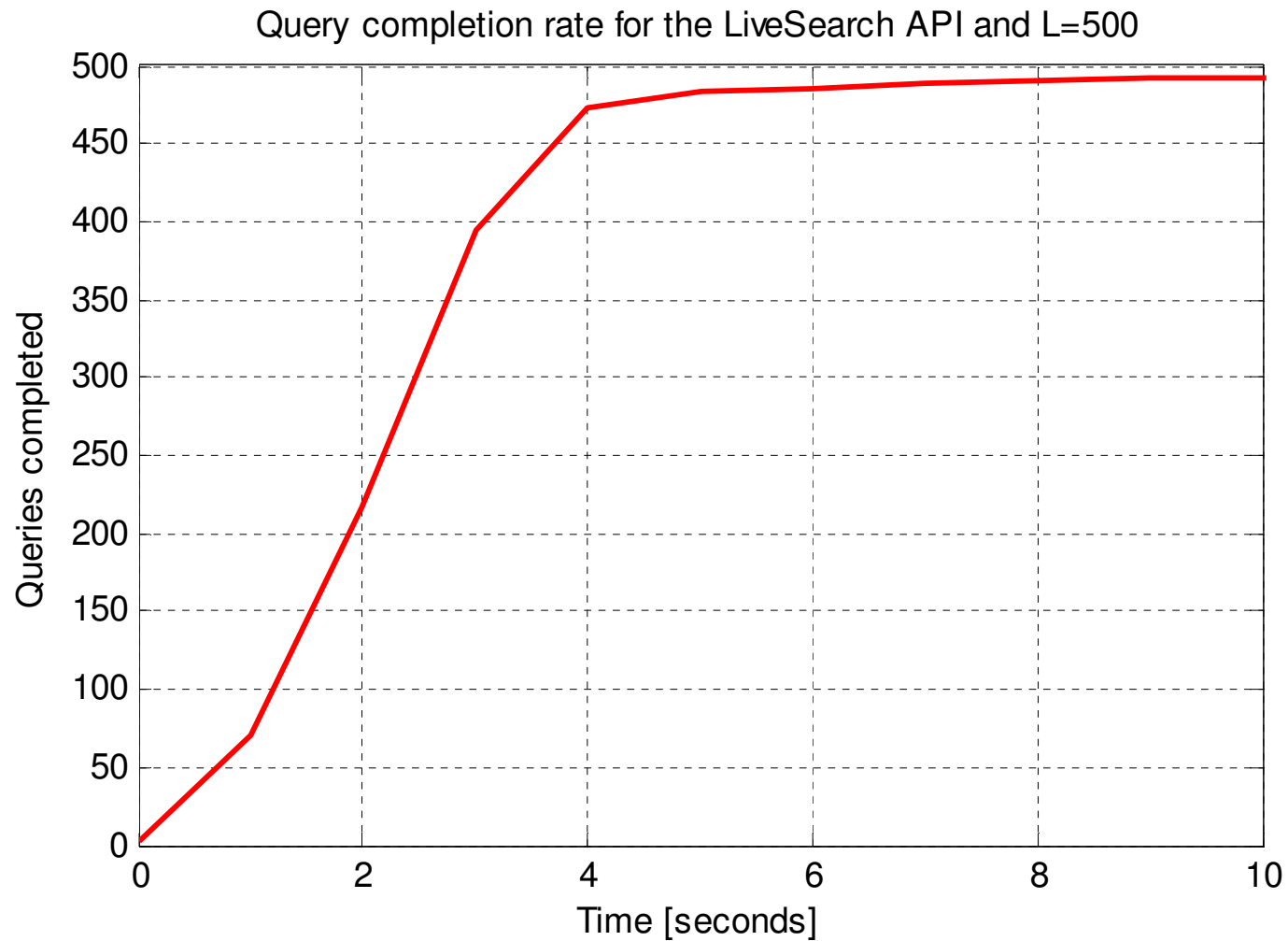
- Cliente submete a segunda consulta
  - Não necessariamente ao mesmo search engine
- Usuário navega resultados de S1
  - 30s – 1min?
- Search engine responde com uma lista L com centenas de resultados
  - LiveSearch API
  - Pool com 10 threads x 50 resultados cada



# Experimento

- Amostra de 500 strings de busca selecionadas de um query log do LiveSearch
- Para cada string de busca:
  - 500 URLs

# Consulta em profundidade



# Consulta em profundidade

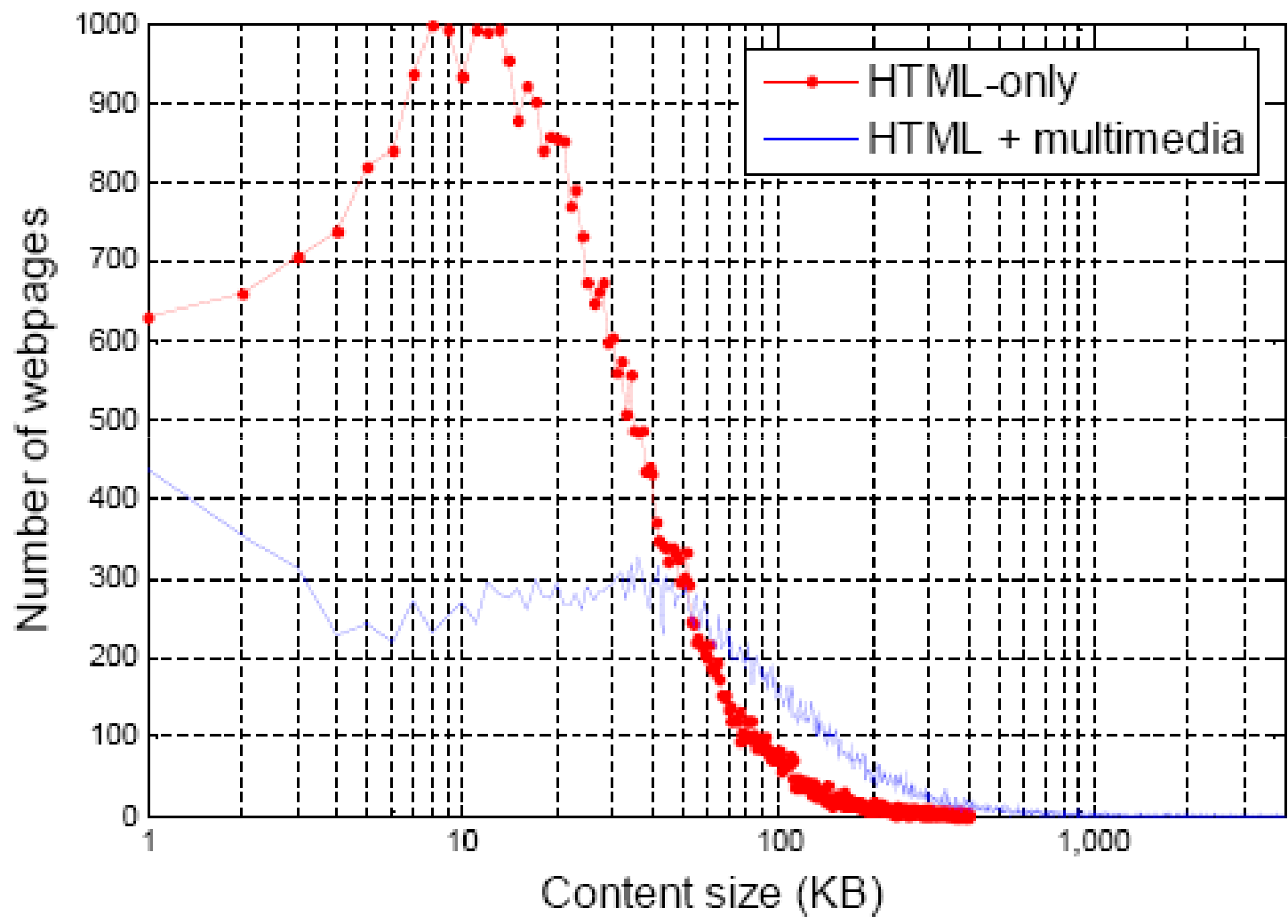
Localidade	Tempo de resposta para completar 90% das consultas (segundos)
Seattle – EUA	3.5
São Carlos – Brasil	6
Cambridge – UK	4.3
Bangalore – Índia	7.2
Belgrado – Sérvia	5.3
Pequim – China	4

# C1. {client-side} Download do conteúdo HTML

- Obtida resposta S2
- Cada URL é destinada a um thread
  - `HttpWebRequest()`
  - Timeout de 10s
  - Download apenas do código HTML
- Cache HTML

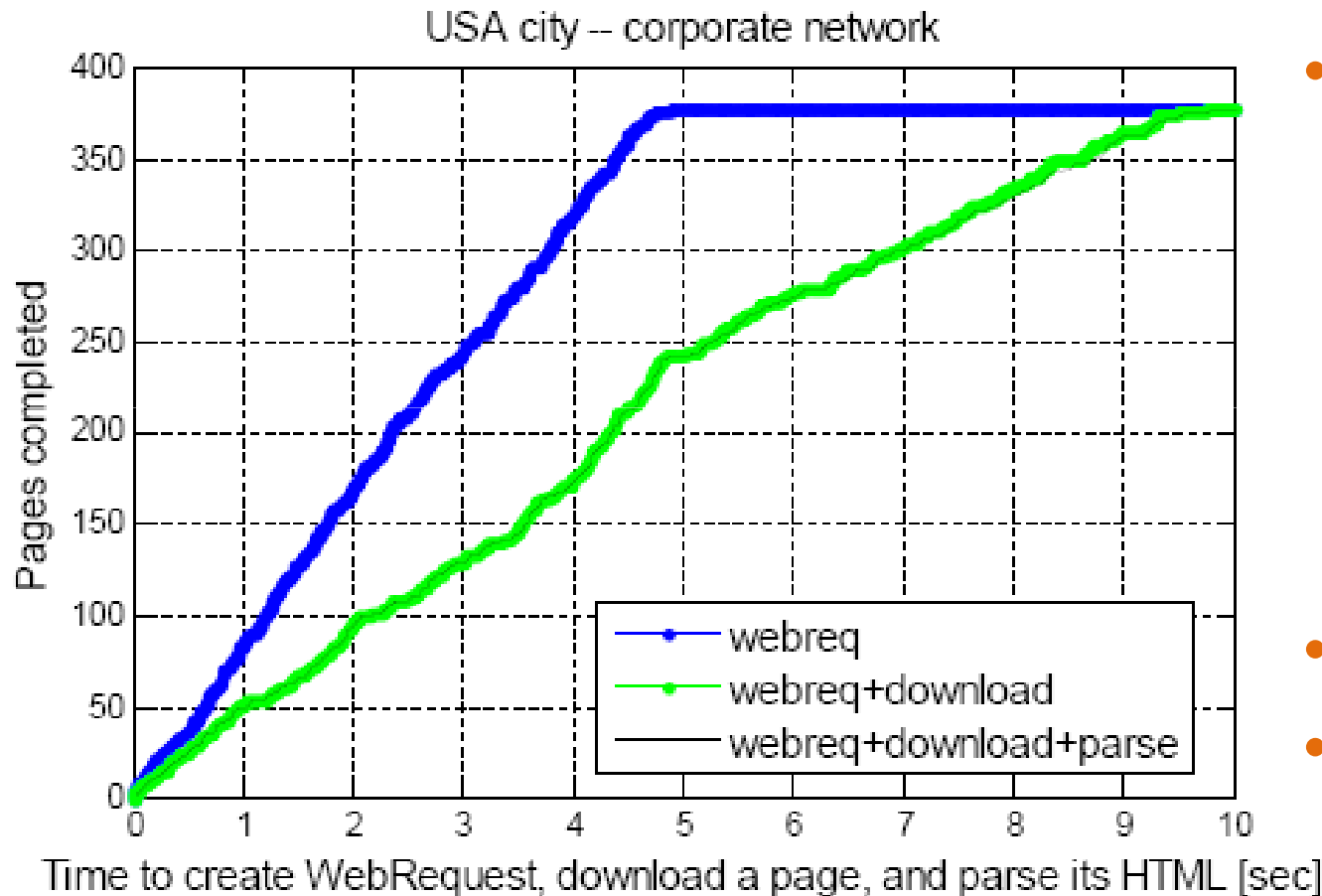
# Experimento

- Amostra de 500 strings de busca selecionadas de um query log do LiveSearch
- Para cada string de busca:
  - 500 URLs
  - Download de 100 páginas Web
    - Top 50 URLs
    - 50 URLs selecionadas aleatoriamente dentre as 450 restantes
  - = 50.000 páginas Web



Content type	Occurrence
text/html	97.3%
text/xml	< 0.1%
text/plain	< 0.2%
pdf	2%
MS Word	< 0.3%
Other	< 0.4%

# Desempenho multi-threaded

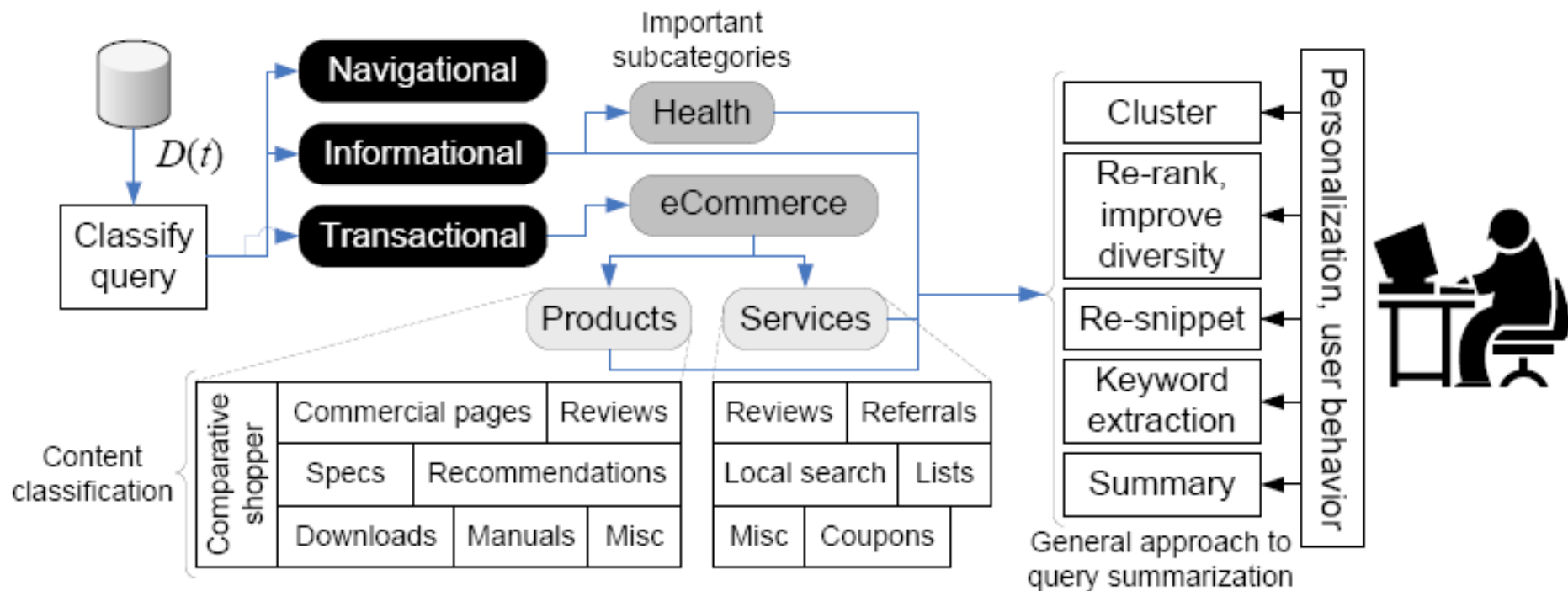


- Custos divididos ao meio entre multi-threading overhead e download
- 50 pág./s
- 75% das URL completadas

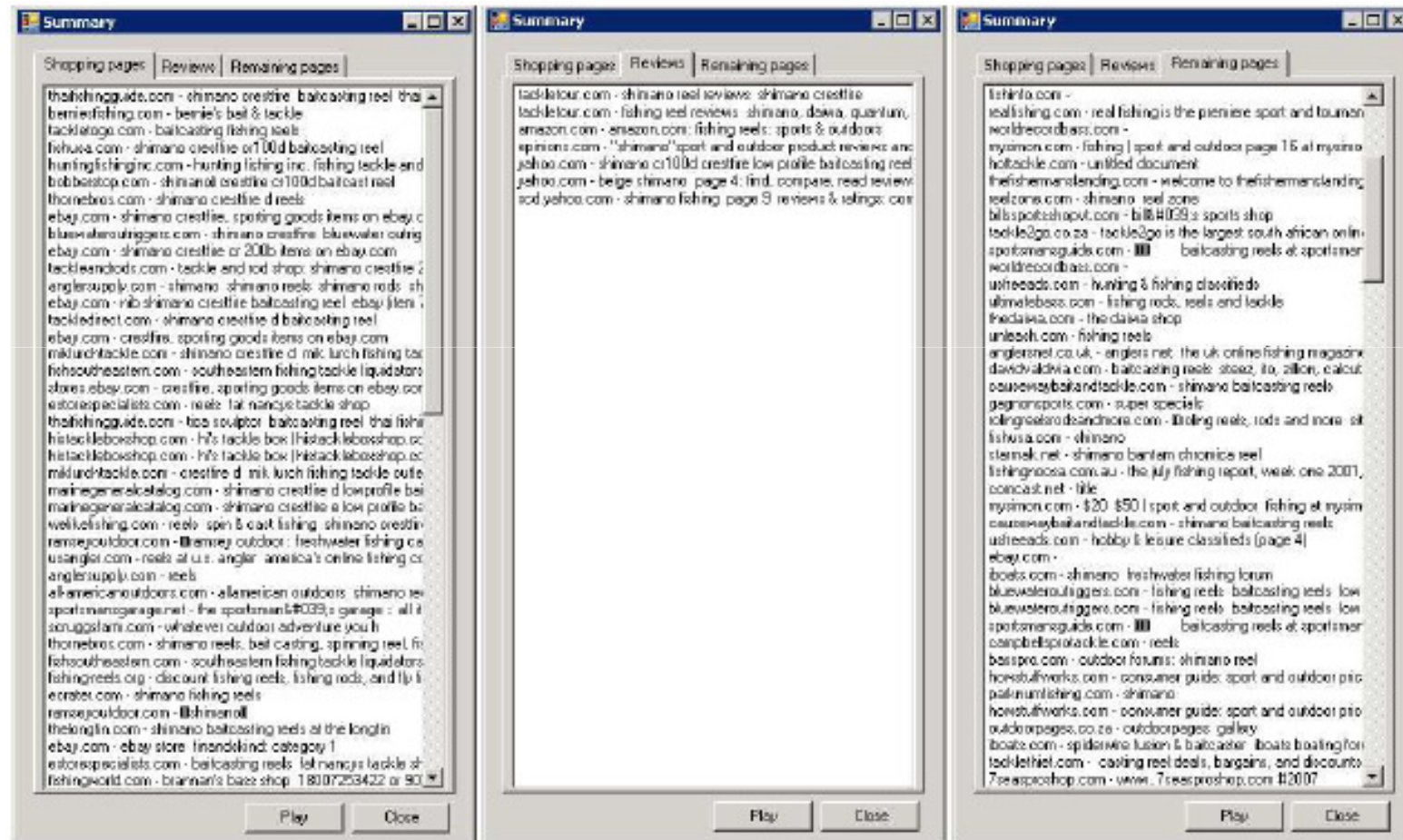


# C2. {client-side} Processamento do conteúdo HTML

- Algoritmos on-line

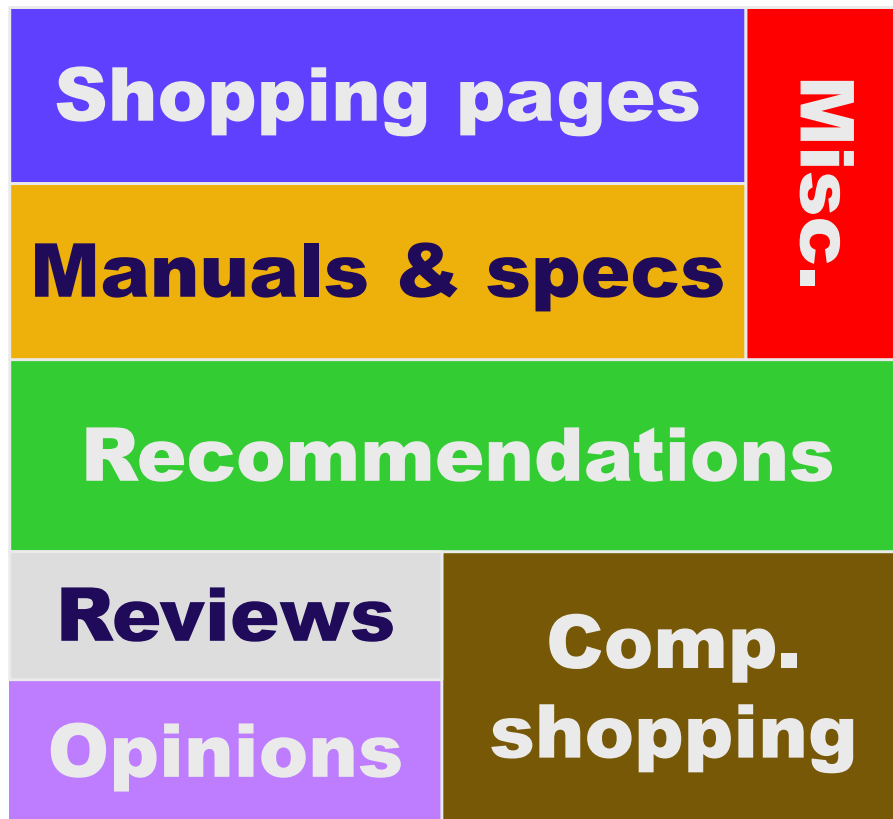


# Plug-in para compras



# Visão desejada pelo usuário

## Produtos



## Serviços



# Detector de páginas comerciais

amazon.com Hello, Renan G Cattelan. We have [recommendations](#) for you. (Not Renan?)

Renan's Amazon.com Today's Deals Gifts & Wish Lists Gift Cards Your Account | Help

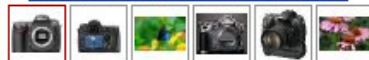
Shop All Departments Search Camera & Photo GO Cart Your Lists

Camera & Photo Browse Brands Bestsellers Digital SLRs Point-and-Shoots Camcorders Pro Video Accessories Today's Deals

Customers viewing this page may be interested in this Sponsored Link (What's this?)  
[Buy Hobart Directly](#) Discounted Hobart Mixers. GSA Buy Today w/ A Free Shipping Offer! www.ValiantEquipment.com



[See larger image and other views](#)



[See all 192 customer images](#)

## Nikon D300 DX 12.3MP Digital SLR Camera (Body Only)

Other products by [Nikon](#)

★★★★★ (187 customer reviews) | [More about this product](#)

Style Name:

D300 Body Only: [Click for price](#)

Price: To see our price, add this item to your cart. You can always remove it later. [Why don't we show the price?](#)

This item ships for **FREE with Super Saver Shipping**. [Details](#)

**In Stock.**

Ships from and sold by **Amazon.com**. Gift-wrap available.

**Want it delivered Monday, December 1?** Order it in the next 35 hours and 45 minutes, and choose **One-Day Shipping** at checkout. [See details](#)

**Ordering for Christmas?** To ensure delivery by December 24, choose **FREE Super Saver Shipping** at checkout. [Read more about holiday shipping.](#)

> [28 used & new](#)

Quantity: 1

[Add to Shopping Cart](#)

or

[Sign in](#) to turn on 1-Click ordering.

or

[Add to Cart with FREE Two-Day Shipping](#)

To enjoy, sign up for an Amazon Prime Free Trial when you check out. [Learn More](#)

**More Buying Choices**

**OneCall** [Add to Cart](#)

**\$1,485.77** + Free Shipping

In Stock

**Cameta Camera** [Add to Cart](#)

**\$1,539.00** + Free Shipping

In Stock

# Detectores individuais

- 9 características
  - **H1:** Botão ATC
  - **H2:** Detalhes de preço
  - **H3:** Quantidade
  - **H4:** Descrição do produto
  - **H5:** Botão “View Cart”
  - **H6:** Botão “Checkout”
  - **H7:** Disponibilidade
  - **H8:** Informação sobre entrega
  - **H9:** Recomendações

add to cart

 Add to Shopping Cart

Sale: \$449.99

\$59.99

Quantity



Free Shipping



Customers who bought this item also bought

# Análise do HTML

- 9 características
    - H1: Botão ATC `<input type="submit" value="Add to Cart" />`
    - H2: Detalhes de preço `<b>Price:</b>`
    - H3: Quantidade `<td colspan="2">Qty:</td>`
    - H4: Descrição do produto
    - H5: Botão "View Cart" `<form action="./add_to_cart.aspx" ... />`
    - H6: Botão "Checkout"
    - H7: Disponibilidade
    - H8: Informação sobre entrega `<td>Free shipping eligible</td>`
    - H9: Recomendações `<b>In Stock</b>`
- ``

# Funções binárias

Commercial Pages – Training Set

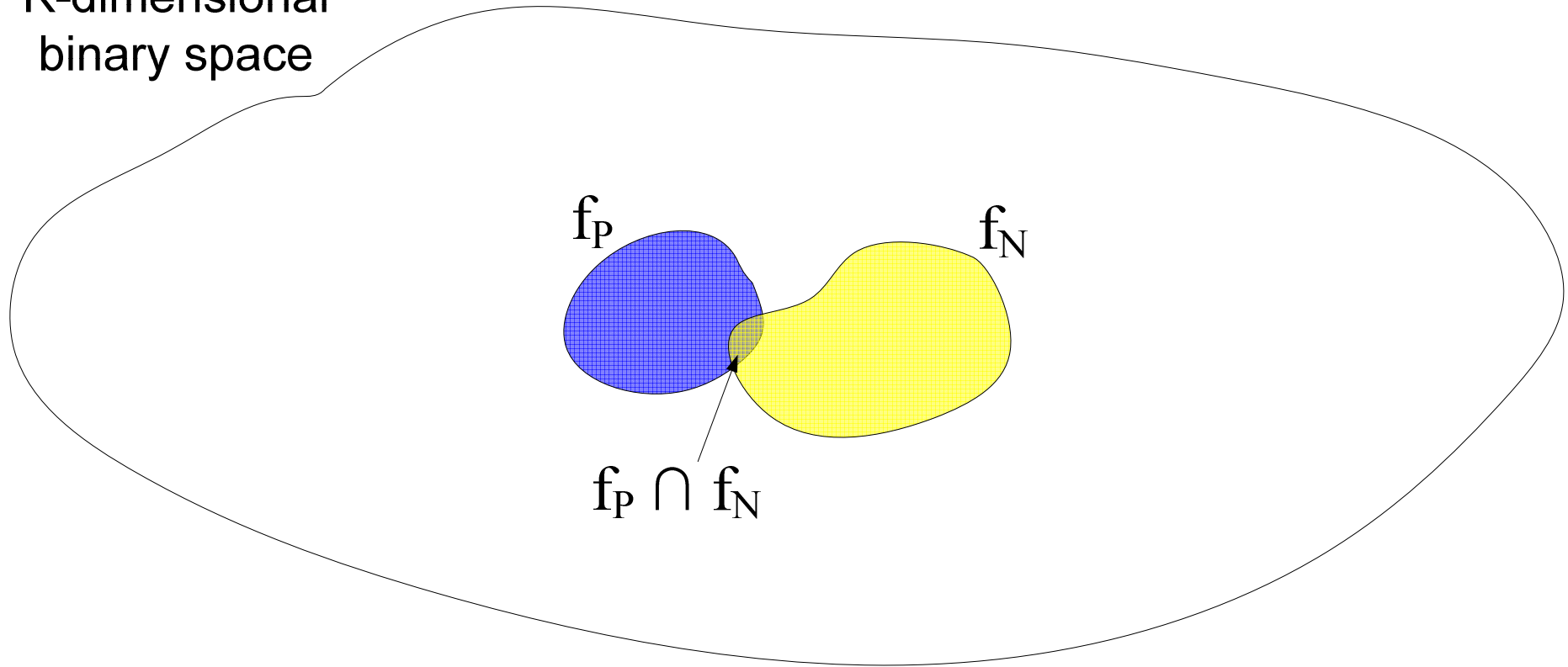
	H1	H2	H3		HK
P1	0	1	1		0
P2	1	1	0		0
P3	1	0	1		0
PL	0	0	0		1

Non-commercial Pages – Training Set

	H1	H2	H3		HK
Q1	1	1	1		0
Q2	1	1	1		1
Q3	1	0	1		1
QM	1	0	0		1

- Funções  $f_P(H1, \dots, HK)$  e  $f_N(H1, \dots, HK)$
- Expandir  $f_P$  e  $f_N$  para cobrir  $\{0,1\}^K$

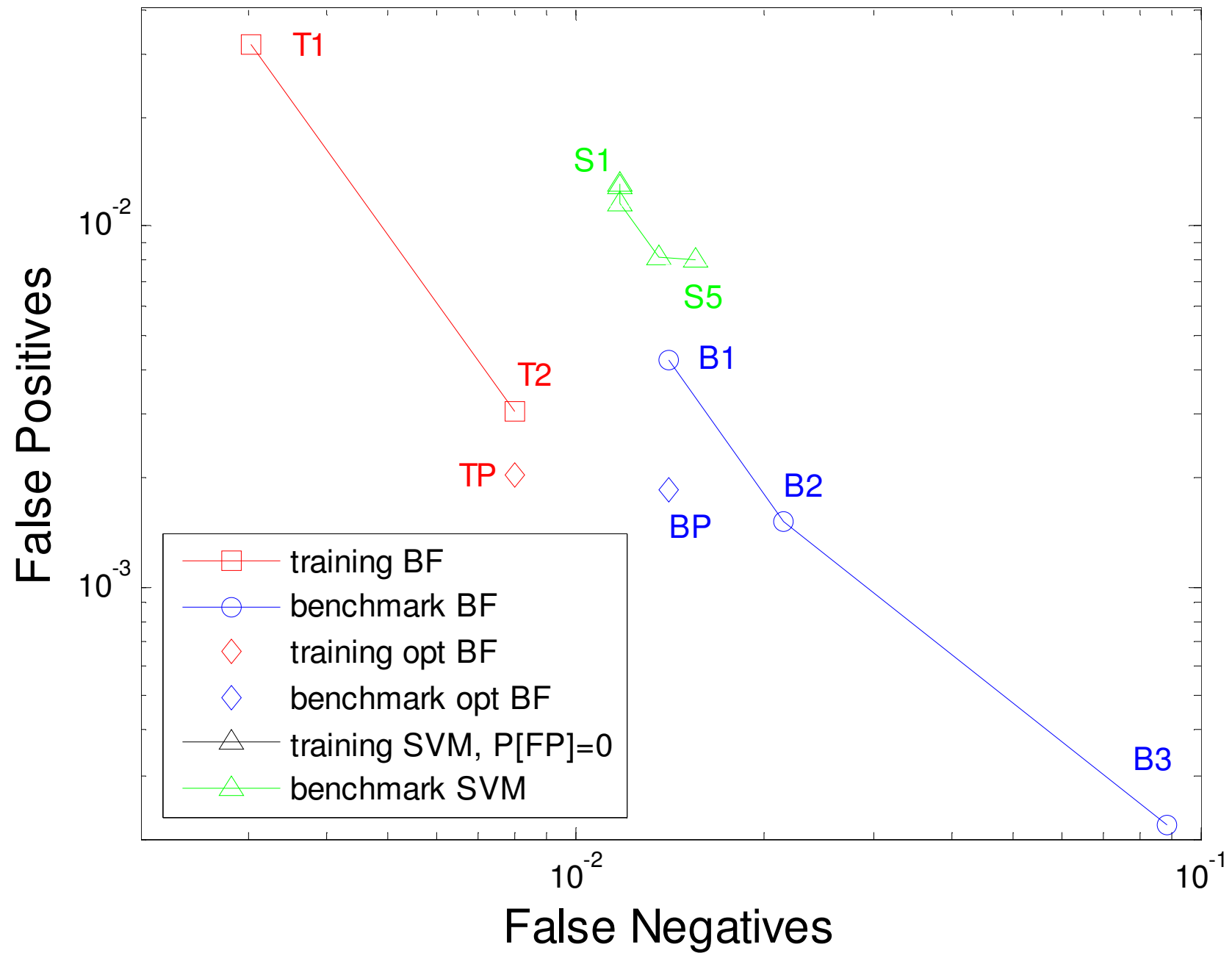
K-dimensional  
binary space



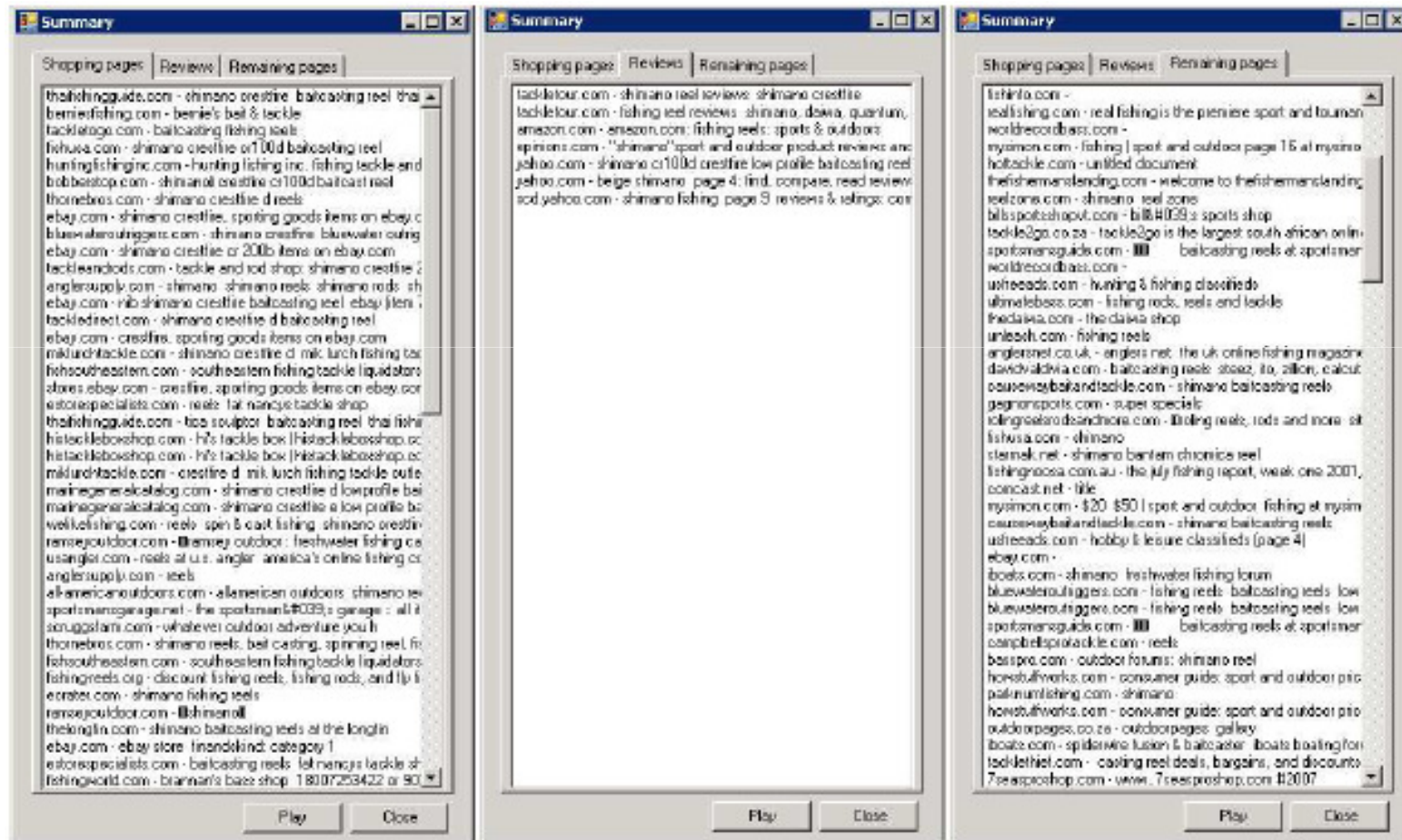
- Objetivo: expandir  $f_P$  e  $f_N$ ?
  - Trade-off: falso negativos e falso positivos
- Crescimento de  $f$ : heurísticas automatizadas ou geração manual interativa de funções
  - Exemplo: N de K



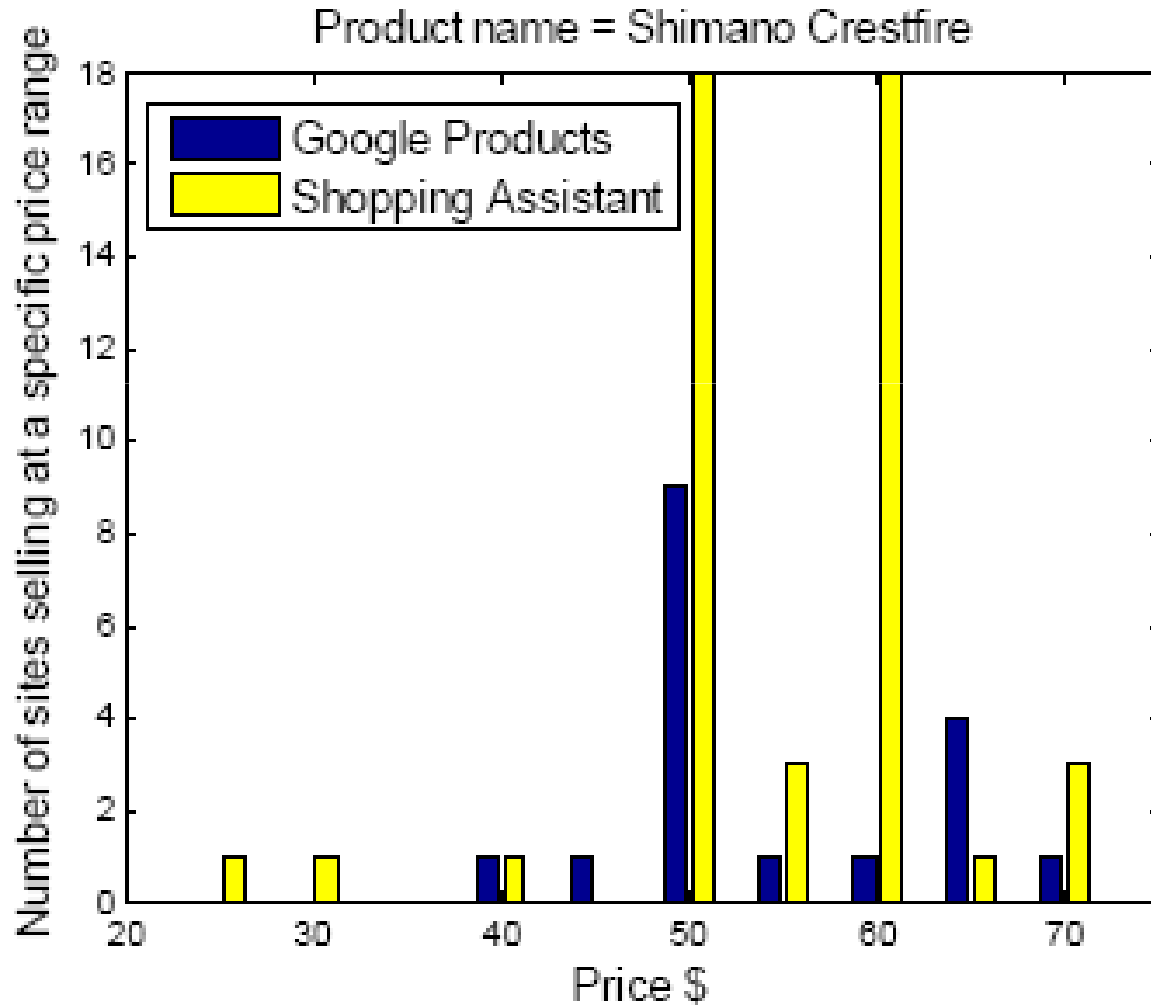
# ROC Curve



# Demo



# Shopping assistant vs. Google Products



- Lojas
  - SA: 43
  - GP: 26
- Preço mínimo
  - SA: US\$24.99
  - GP: US\$39.99

# Contribuições

- Esquema simples para migrar para o cliente o pós-processamento dos resultados de uma busca
  - Deep querying → download do HTML no cliente → processamento e entendimento dos resultados → resumo ao usuário
  - Dumb server, smart client
  - Mais tempo e poder de processamento
  - Melhora na experiência de busca
  - Foco: satisfação do usuário
- Plataforma de pesquisa

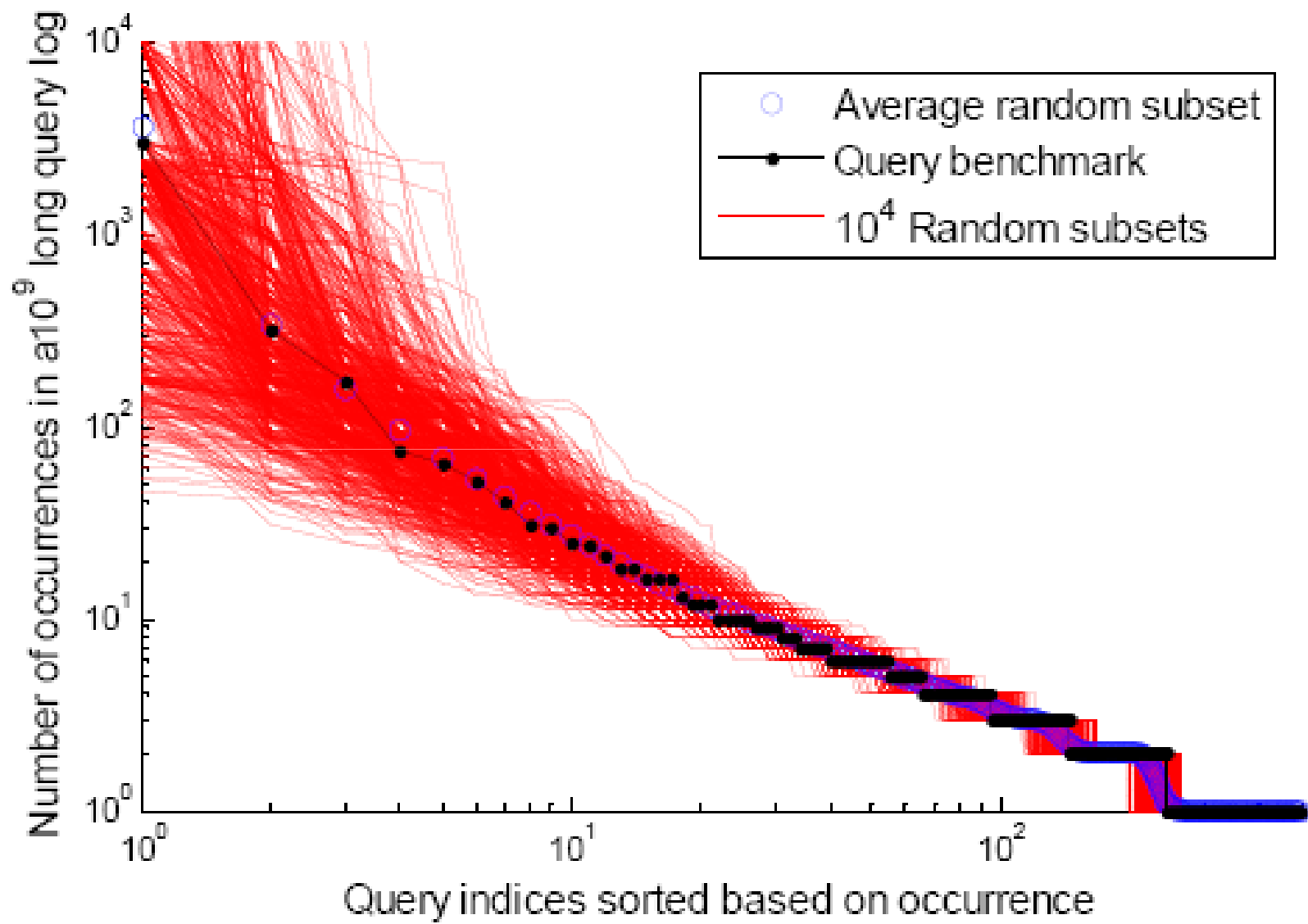
# Vantagens e desvantagens

Entidade	Custos	Ganhos
Search engine	<ul style="list-style-type: none"><li>• Consultas em profundidade</li></ul>	<ul style="list-style-type: none"><li>• Migração do processamento para os clientes</li><li>• Expansão ilimitada de funcionalidades com consumo de energia relativamente constante</li></ul>
Usuário	<ul style="list-style-type: none"><li>• Aumento no tráfego*</li></ul>	<ul style="list-style-type: none"><li>• Acesso imparcial à Web</li><li>• Melhora na privacidade</li></ul>
Web hosts	<ul style="list-style-type: none"><li>• Aumento de moderado a elevado no tráfego*</li></ul>	<ul style="list-style-type: none"><li>• Presença imparcial na Web</li><li>• Redução nos custos de marketing (lojas)</li></ul>

\* HTML corresponde a 4-5% de todo tráfego <http://> [2]

# Caching dos resumos

- Clientes podem armazenar os resumos já computados em um cache no servidor
- Clientes maliciosos
  - Votação por clientes selecionados aleatoriamente
- Atualização dos resumos
- SE: alta cobertura da consulta → resumo



# Referências

- [1] L.A. Barroso, J. Dean, and U. Hözl. Web search for a planet: The Google cluster architecture. IEEE Micro, Vol.23, pp.22-28, 2002.
- [2] Ellacoya Networks. Ellacoya Data Shows Web Traffic Overtakes Peer-to-Peer (P2P) as Largest Percentage of Bandwidth on the Network. Company news release, June 18, 2007. <http://www.ellacoya.com/news/pdf/2007/NXTcommEllacoyaMediaAlert.pdf>



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