



College of Information Studies

University of Maryland Hornbake Library Building College Park, MD 20742-4345

Machine-Assisted Indexing

Week 12

LBSC 671

Creating Information Infrastructures

Machine-Assisted Indexing

- Goal: Automatically suggest descriptors
 - Better consistency with lower cost
- Approach: Rule-based expert system
 - Design thesaurus by hand in the usual way
 - Design an expert system to process text
 - String matching, proximity operators, ...
 - Write rules for each thesaurus/collection/language
 - Try it out and fine tune the rules by hand

Machine-Assisted Indexing Example

Access Innovations system:

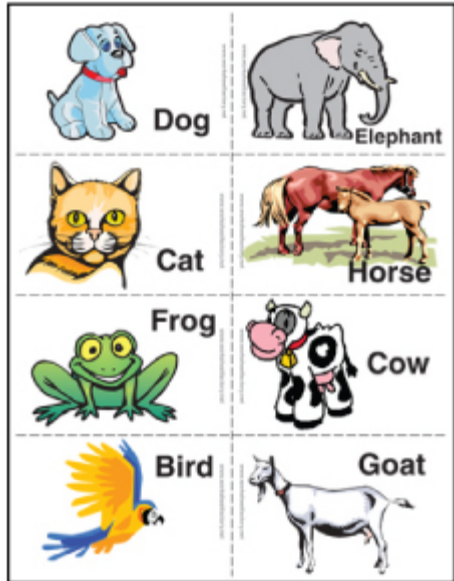
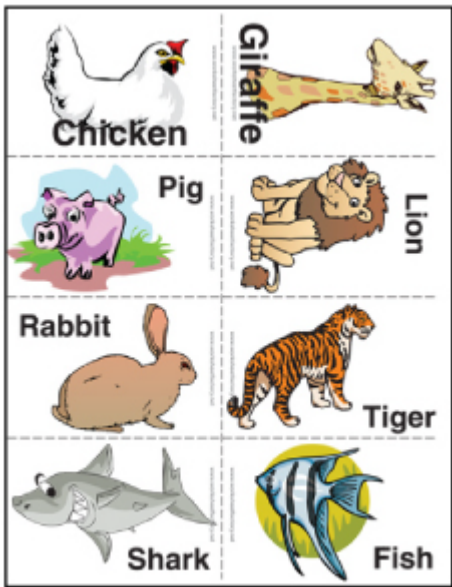
```
//TEXT: science
IF (all caps)
    USE research policy
    USE community program
ENDIF
IF (near "Technology" AND with "Development")
    USE community development
    USE development aid
ENDIF
```

near: within 250 words

with: in the same sentence

Modeling Use of Language

- Normative
 - Observe how people **do** talk or write
 - Somehow, come to understand what they mean each time
 - Create a **theory** that associates language and meaning
 - Interpret language use based on that theory
- Descriptive
 - Observe how people **do** talk or write
 - Someone “trains” us on what they mean each time
 - Use **statistics** to learn how those are associated
 - Reverse the model to guess meaning from what’s said



Cute Mynah Bird Tricks

- Make scanned documents into e-text
- Make speech into e-text
- Make English e-text into Hindi e-text
- Make long e-text into short e-text
- Make e-text into hypertext
- Make e-text into metadata
- Make email into org charts
- Make pictures into captions
- ...

Waikato researcher 'wikifies' the web

Software detects topics in documents and links to appropriate Wikipedia articles

By Computerworld staff, Auckland | Thursday, 27 November, 2008

A PhD student in computer science at the University of Waikato is working on ways to automatically "wikify" documents, by detecting the topics in the document and creating links to the appropriate Wikipedia articles.

David Milne, and his supervisor Professor Ian Witten, recently won an award for their paper at the Computers in Knowledge Management conference, held in California's Napa Valley. Close to 800 papers were submitted to the conference, which is organised annually by the Association of Computing Machinery (ACM).

Milne has used existing Wikipedia articles to "train" his software to make the same decisions as humans regarding what is important in any document, he says.

"Every single Wikipedia article is an example of how to cross-reference a document with Wikipedia," he says. "That means we have millions of examples for how to do the job."

Automatic systems face several hurdles, he says. They have to resolve ambiguity; to decide, for example, if the word "kiwi" refers to the bird, the fruit or to New Zealanders. They must also allow for polysemy — where there are different terms with similar

Wikification Demo Results

The Wikification system has identified the following entities with Wikipedia articles. Click on an entity to visit the corresponding Wikipedia page. Hover over links to view the categories associated with each entity.

Disambiguating **concepts** and **entities** in a context sensitive way is a fundamental **problem** in [natural language processing](#). The comprehensiveness of [Wikipedia](#) has made the [online encyclopedia](#) an increasingly popular **target** for **disambiguation**. **Disambiguation** to [Wikipedia](#) is similar to a traditional Word Sense **Disambiguation** task, but distinct in that the [Wikipedia](#) link **structure** provides additional information about which **disambiguations** are compatible. In this work we analyze **approaches** that utilize this information to arrive at coherent **sets** of **disambiguations** for a given **document** (which we call "global" **approaches**), and compare them to more traditional (local) **approaches**. We show that previous **approaches** for global **disambiguation** can be improved, but even then the local **disambiguation** provides a baseline which is very hard to beat.

Abraham Lincoln's Watch, around 1858



DESCRIPTION

Lincoln's English gold watch was purchased in the 1850s from George Chatterton, a Springfield, Illinois, jeweler. Lincoln was not considered to be outwardly vain, but the fine gold watch was a conspicuous symbol of his success as a lawyer.

The watch movement and case, as was often typical of the time, were produced separately. The movement was made in Liverpool, where a large watch industry manufactured watches of all grades. An unidentified American shop made the case. The Lincoln watch has one of the best grade movements made in England and can, if in good order, keep time to within a few seconds a day. The 18K case is of the best quality made in the US.

A Hidden Message

Just as news reached Washington that Confederate forces had fired on Fort Sumter on April 12, 1861, watchmaker Jonathan Dillon was repairing Abraham Lincoln's timepiece. Caught up in the moment, Dillon unscrewed the dial and engraved: "April 13, 1861 Fort Sumpter was attacked by the rebels on the above date J Dillon April 13, 1861 Washington" and "thank God we have a government Jonth Dillon."

In 1864 a second watchmaker, L. E. Gross, signed his name. Also, at some point someone etched "Jeff Davis" inside the watch, either as a joke or a statement of support for the Confederacy.

Lincoln never knew about the messages he carried in his watch. The inscription remained hidden behind the dial for over a century. After hearing from Jonathan Dillon's great-great-grandson, the Museum removed the dial on March 10, 2009, to reveal the watchmakers' declarations.

Gift of Lincoln Isham, great-grandson of Abraham Lincoln, 1958

PHYSICAL DESCRIPTION

gold; glass (watch material)

metal (key material)

gold (watch chain material)

wood; metal; fabric (box material)

MEASUREMENTS

watch: 2 in x 3 in x 1/2 in; 5.08 cm x 7.62 cm x 1.27 cm

watch chain: 13 in; 33.02 cm

ID NUMBER

PL*219098.01

CATALOG NUMBER

219098.01

ACCESSION NUMBER

219098

SUBJECT

Clothing & Accessories

Government, Politics, and Reform

Selections from the Abraham Lincoln Collection

EVENT

Battle of Fort Sumter, 1861

SEE MORE ITEMS IN

[Political History: Political History, Presidential History Collection](#)

[Selections from the Abraham Lincoln Collection](#)

DATA SOURCE

National Museum of American History, Kenneth E. Behring Center

CREDIT LINE

gift of Lincoln Isham, great-grandson of Abraham Lincoln, 1958

RELATED PUBLICATION

Rubenstein, Harry R.. Abraham Lincoln: An Extraordinary Life

Lincoln's English gold watch was purchased in the 1850s from George Chatterton, a Springfield, Illinois, jeweler. Lincoln was not considered to be outwardly vain, but the fine gold watch was a conspicuous **symbol** of his success as a lawyer.

The watch movement and **case**, as was often typical of the time, were produced separately. The **movement** was made in Liverpool, where a large watch industry manufactured watches of all grades. An unidentified American shop made the **case**. The Lincoln watch has one of the best grade **movements** made in England and can, if in **good order**, keep time to within a few **seconds** a day. The 18K case is of the best **quality** made in the US.

A Hidden Message

Just as news reached Washington that Confederate forces had fired on Fort Sumter on April 12, 1861, watchmaker Jonathan Dillon was repairing Abraham Lincoln's timepiece. Caught up in ...

NEIL A. ARMSTRONG

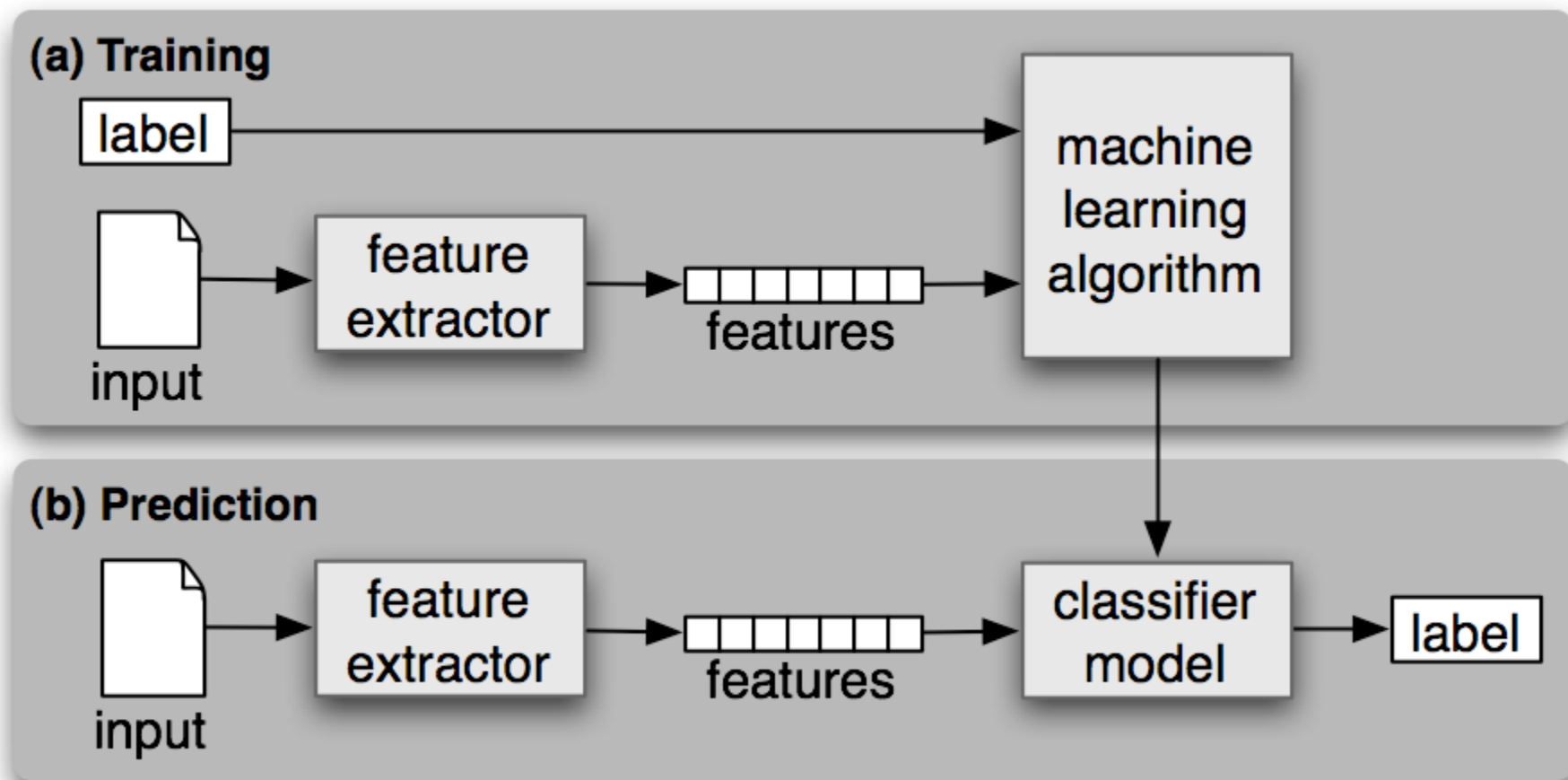
INTERVIEWED BY DR. STEPHEN E. AMBROSE AND DR. DOUGLAS BRINKLEY
HOUSTON, TEXAS – 19 SEPTEMBER 2001

ARMSTRONG: I'd always said to colleagues and friends that one day I'd go back to the university. I've done a little teaching before. There were a lot of opportunities, but the [University of Cincinnati](#) invited me to go there as a faculty member and pretty much gave me carte blanche to do what I wanted to do. I spent nearly a decade there teaching engineering. I really enjoyed it. I love to teach. I love the kids, only they were smarter than I was, which made it a challenge. But I found the [governance](#) unexpectedly difficult, and I was poorly prepared and trained to handle some of the aspects, not the teaching, but just the—universities operate differently than the world I came from, and after doing it—and actually, I stayed in that job longer than any job I'd ever had up to that point, but I decided it was time for me to go on and try some other things.

AMBROSE: Well, dealing with administrators and then dealing with your colleagues, I know—but Dwight Eisenhower was convinced to take the presidency of Columbia [University, New York, New York] by Tom Watson when he retired as chief of staff in 1948, and he once told me, he said, "You know, I thought there was a lot of [red tape](#) in the army, then I became a college president." He said, "I thought we used to have awful arguments in there about who to put into what position." Have you ever been with a bunch of deans when they're talking about—

ARMSTRONG: Yes. And, you know, there's a lot of constituencies, all with different perspectives, and it's quite a challenge. <http://wikipedia-miner.cms.waikato.ac.nz/demos/annotate/>

Supervised Machine Learning



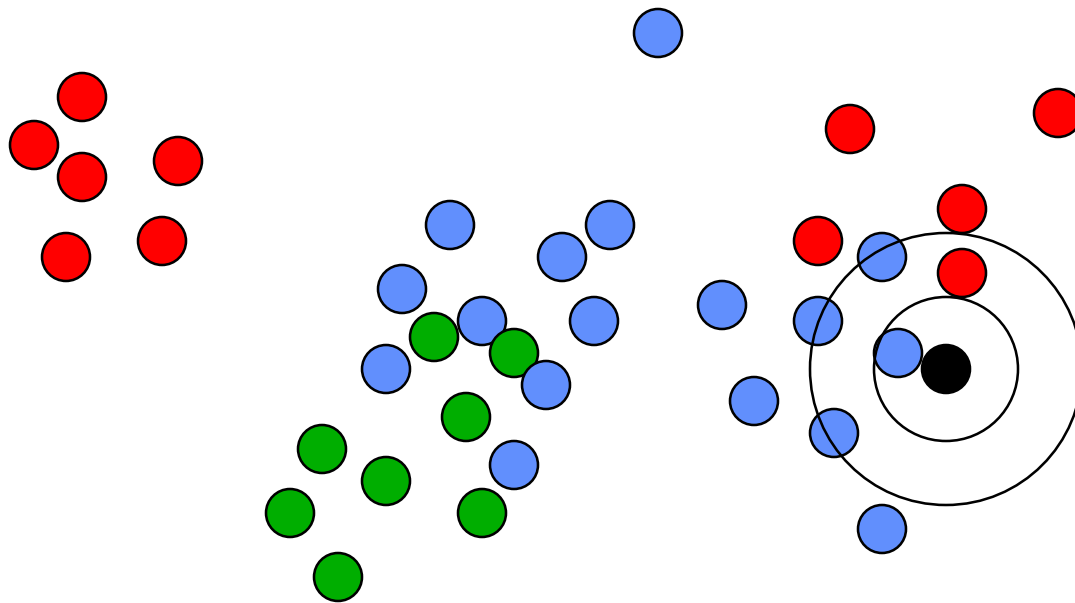
Rule Induction

- Automatically derived Boolean profiles
 - (Hopefully) effective and easily explained
- Specificity from the “perfect query”
 - AND terms in a document, OR the documents
- Generality from a bias favoring short profiles
 - e.g., penalize rules with more Boolean operators
 - Balanced by rewards for precision, recall, ...

Statistical Classification

- Represent documents as vectors
 - e.g., based on TF, IDF, Length
- Build a statistical model for each label
 - e.g., a “vector space”
- Use that model to label new instances
 - e.g., by largest inner product

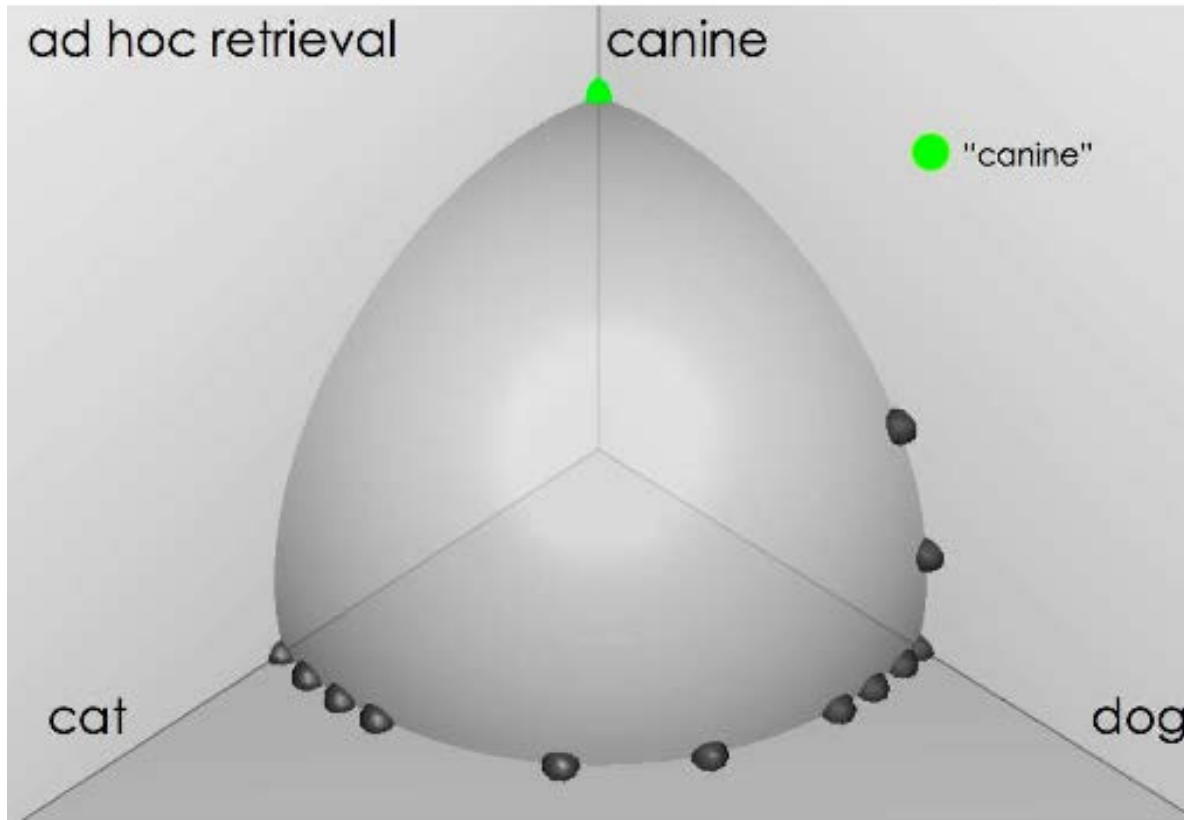
Machine Learning for Classification: The k-Nearest-Neighbor Classifier



Machine Learning Techniques

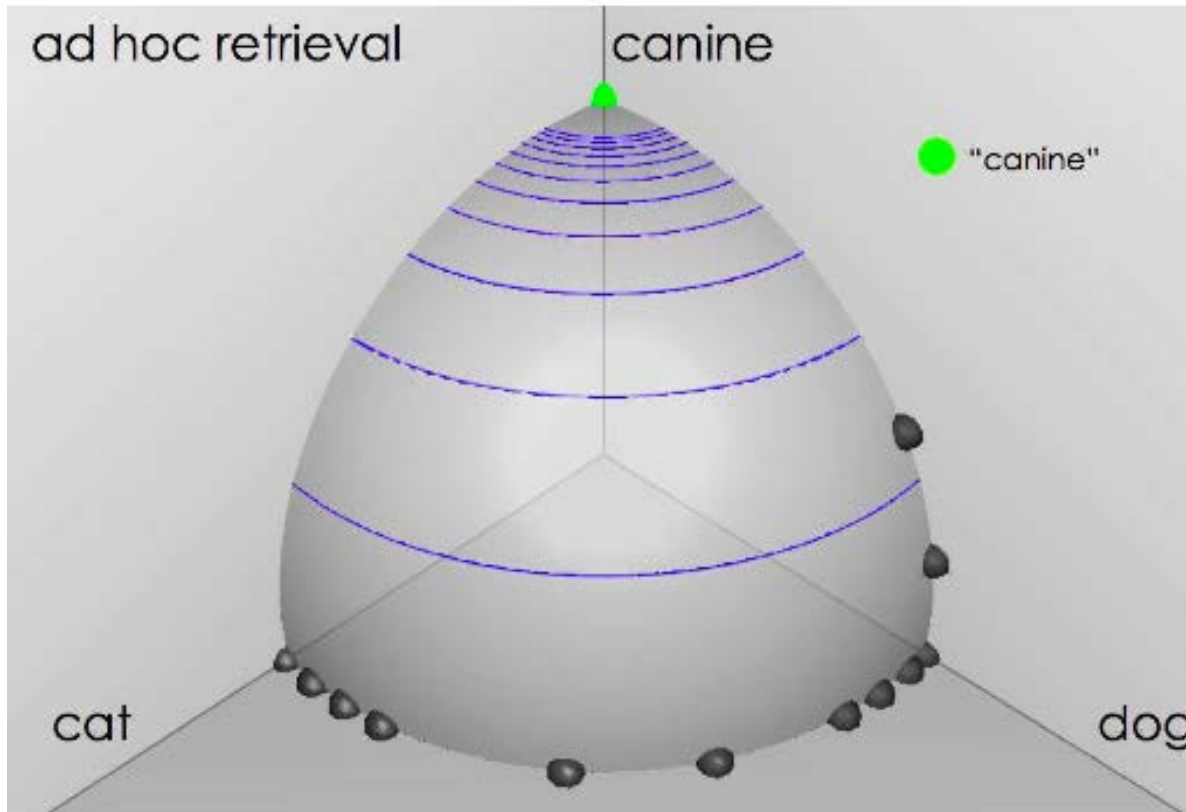
- Hill climbing (Rocchio)
- Instance-based learning (kNN)
- Rule induction
- Statistical classification
- Regression
- Neural networks
- Genetic algorithms

Vector space example: query “canine” (1)



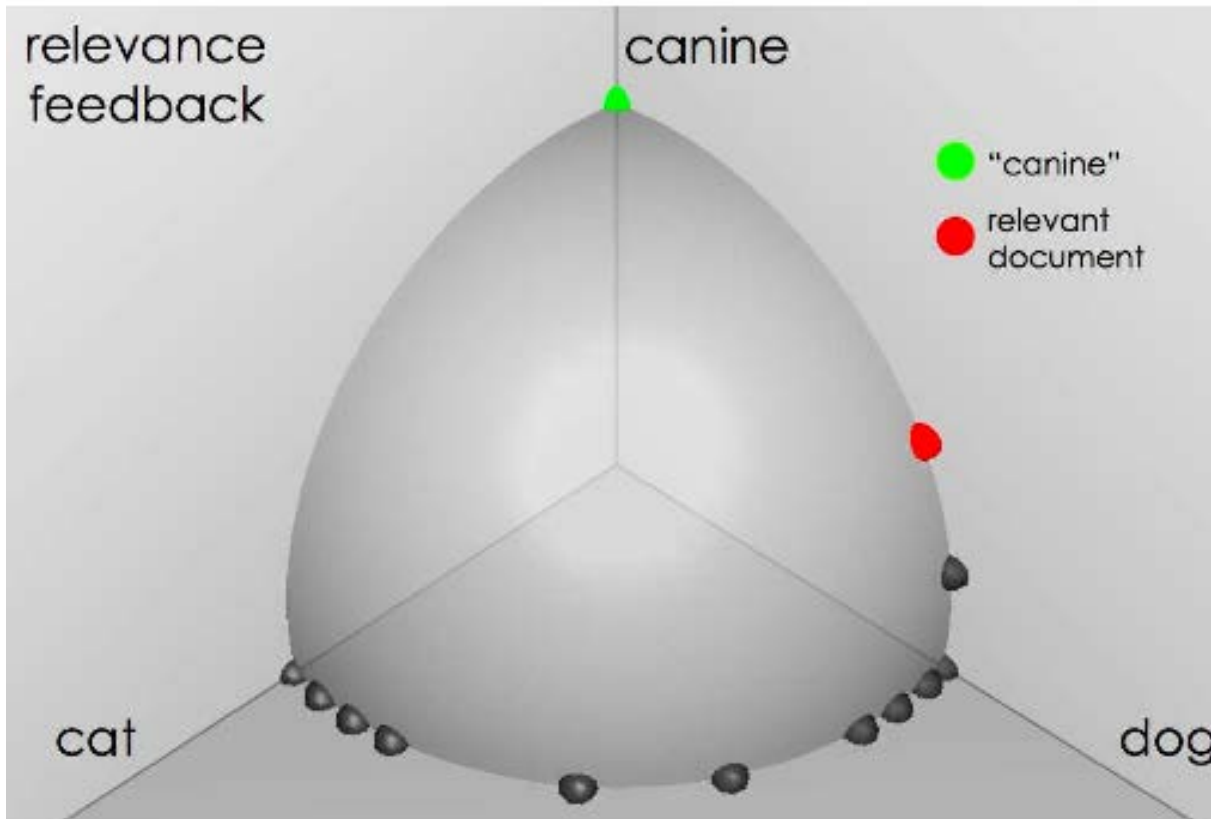
Source:
Fernando Díaz

Similarity of docs to query “canine”



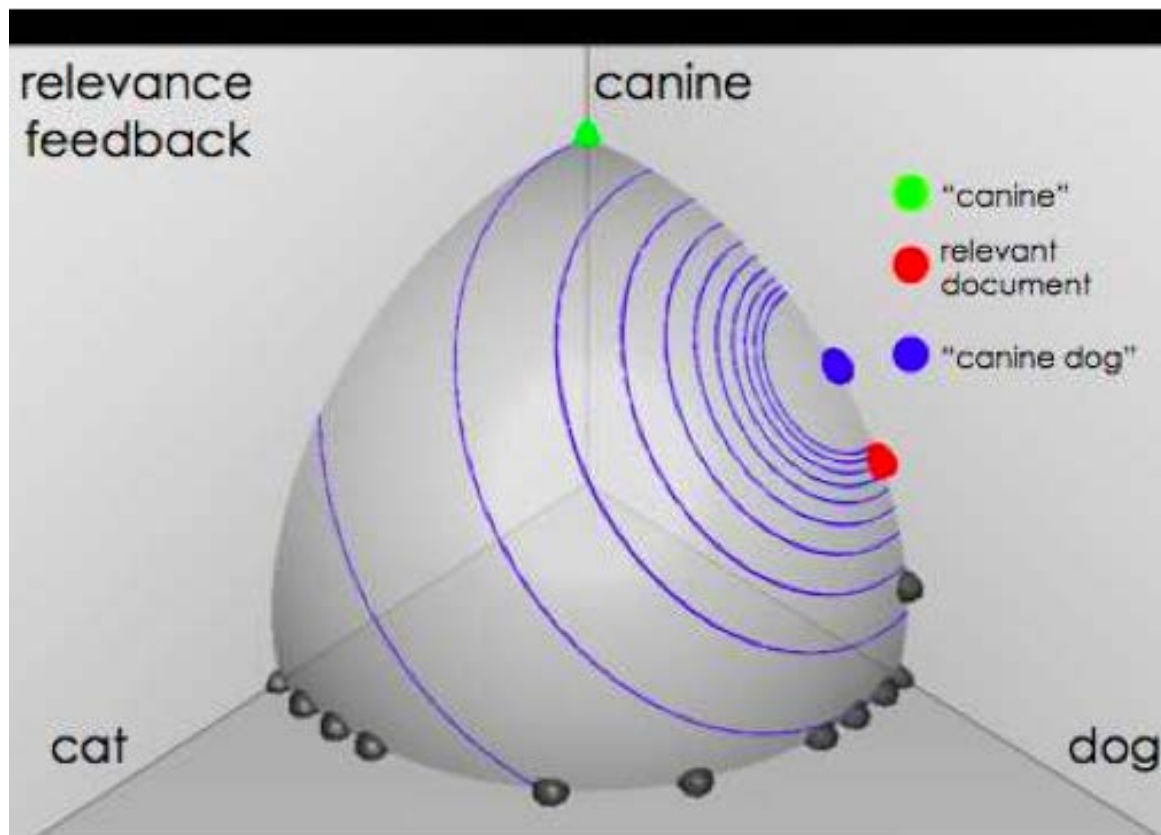
Source:
Fernando Díaz

User feedback: Select relevant documents



Source:
Fernando Díaz

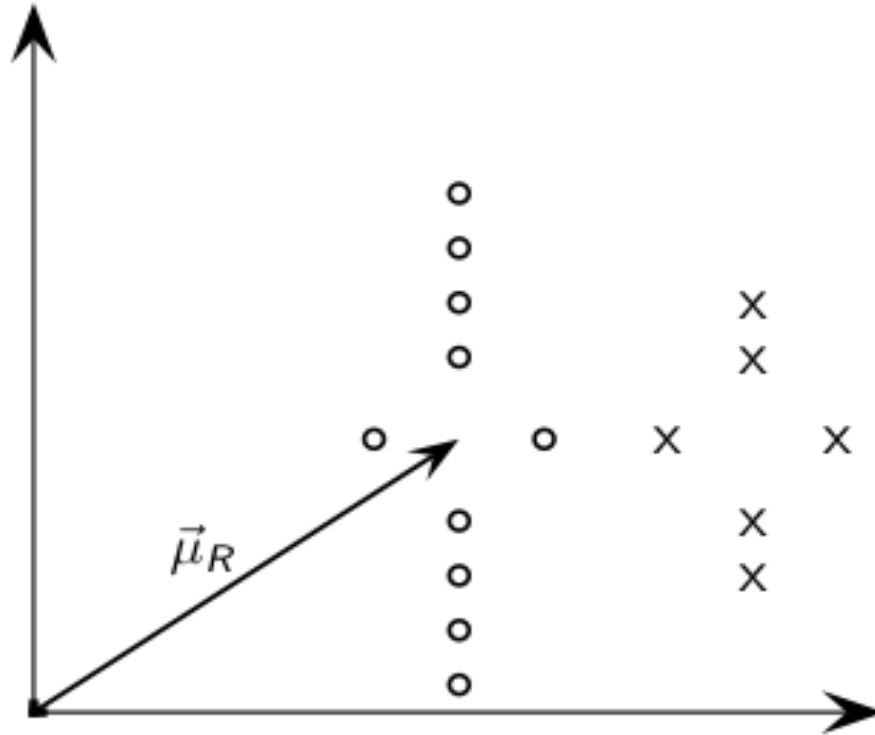
Results after relevance feedback



Source:

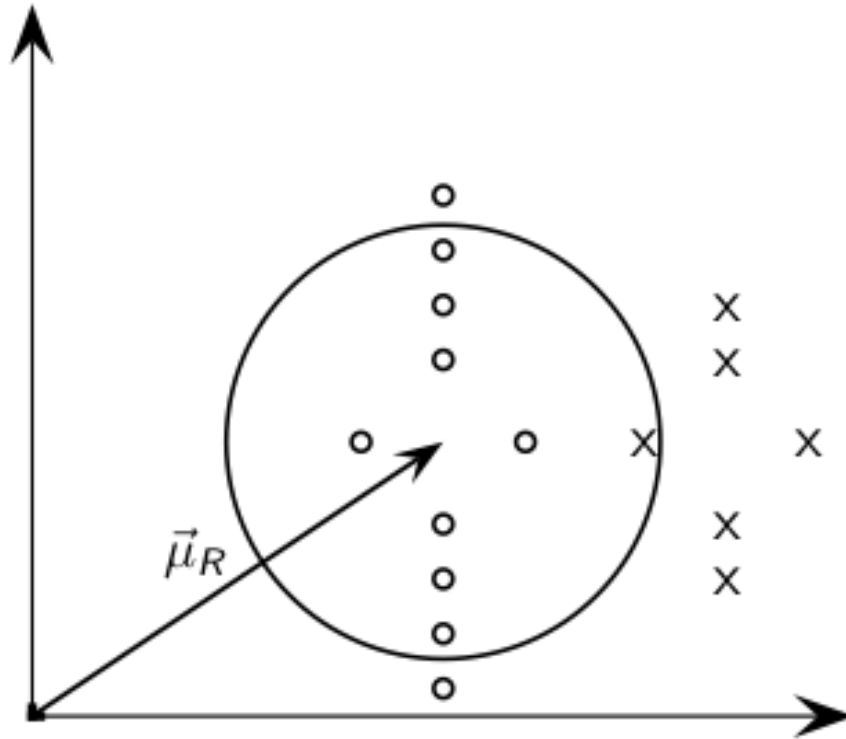
Fernando Díaz

Rocchio' illustrated



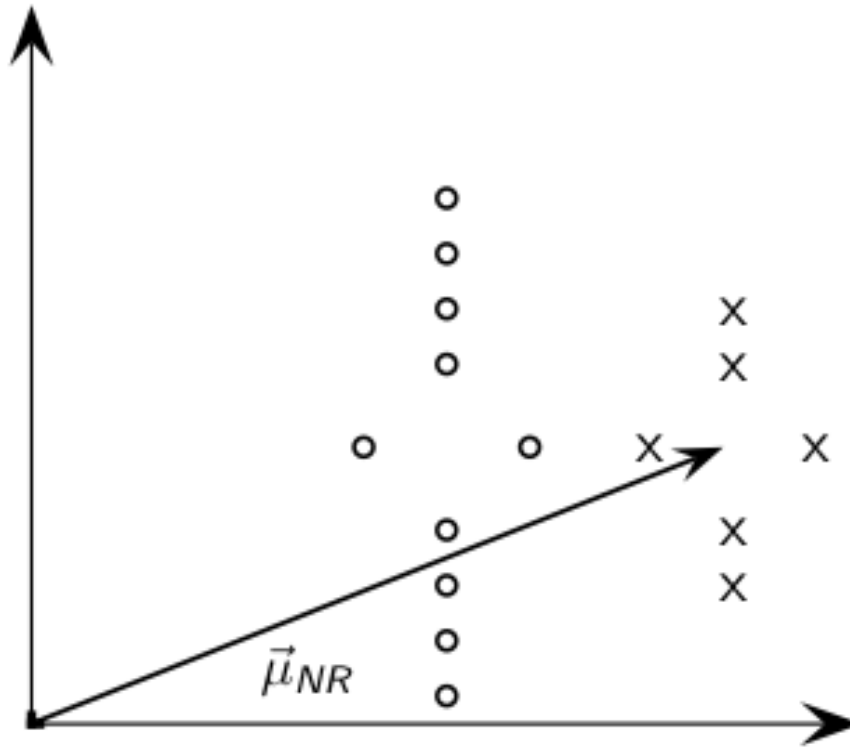
$\vec{\mu}_R$: centroid of relevant documents

Rocchio' illustrated



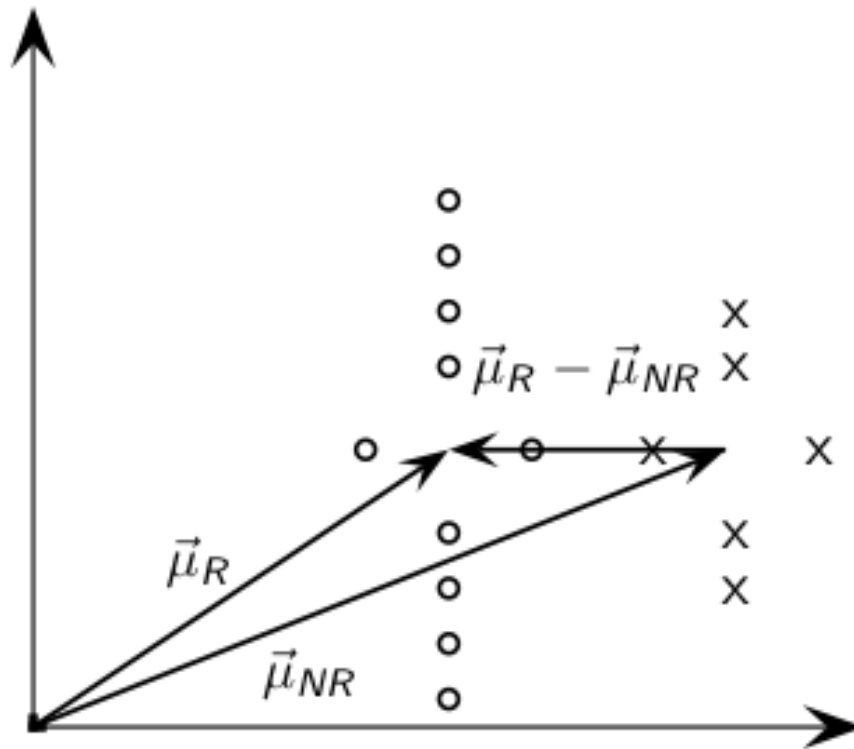
$\vec{\mu}_R$ does not separate relevant / nonrelevant.

Rocchio' illustrated



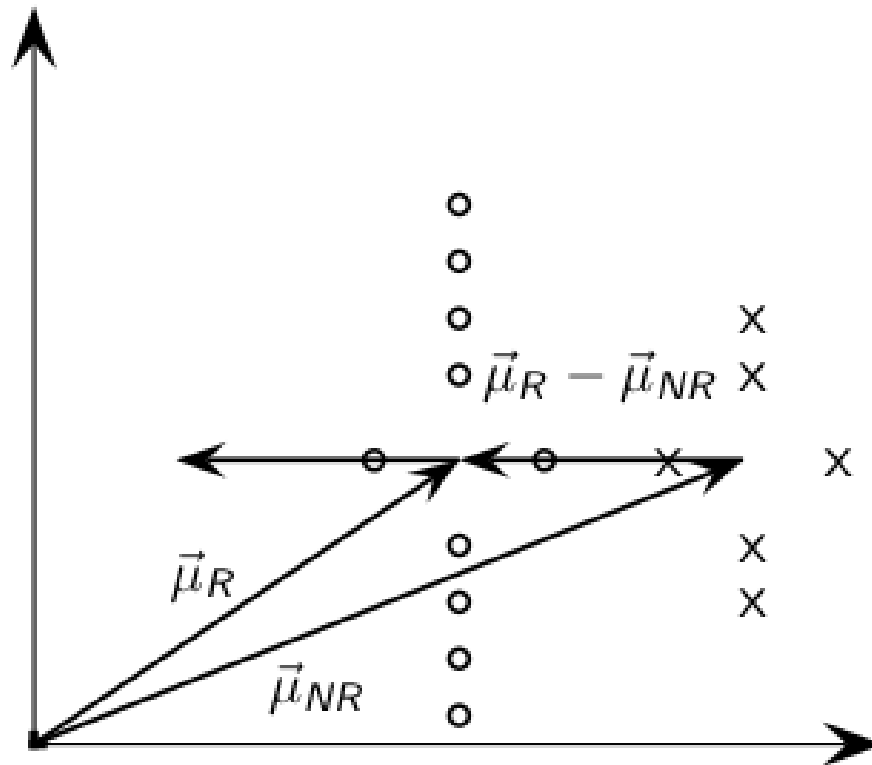
$\vec{\mu}_{NR}$: centroid of nonrelevant documents.

Rocchio' illustrated



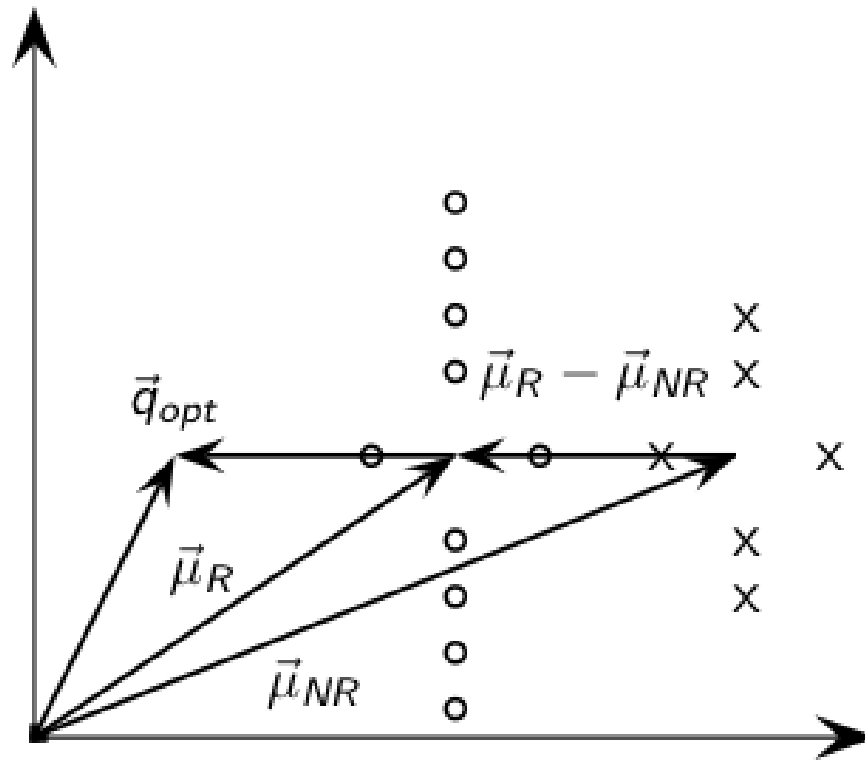
$\vec{\mu}_R$ $\vec{\mu}_{NR}$: difference vector

Rocchio' illustrated



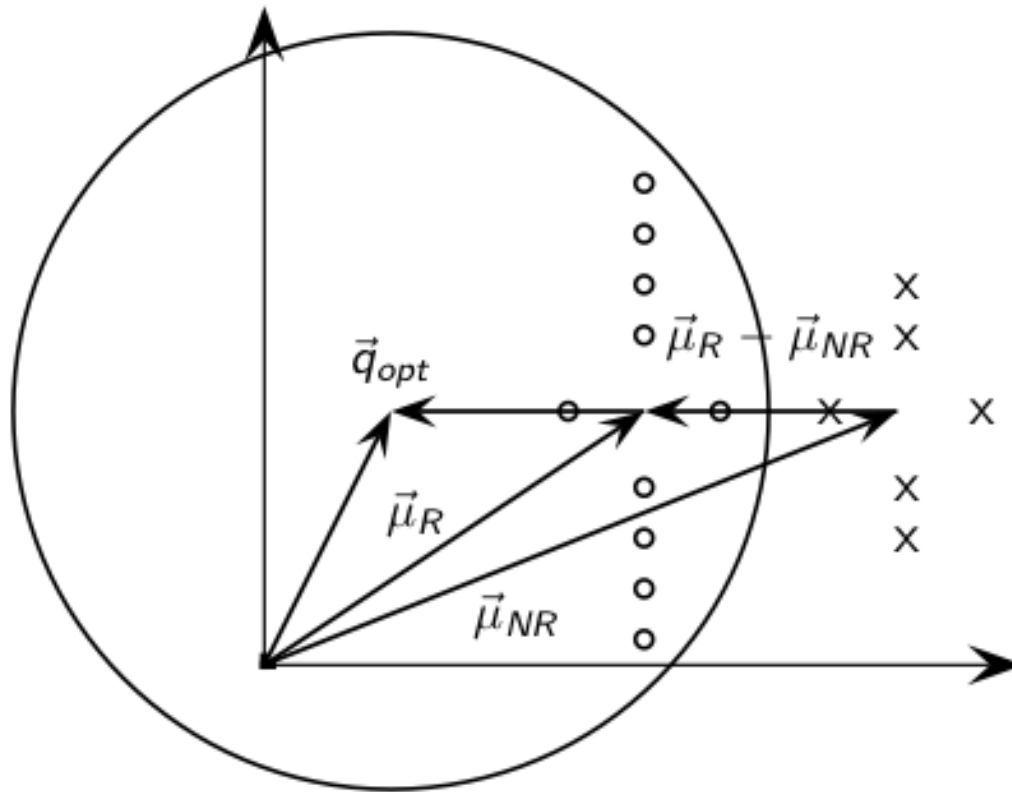
Add difference vector to $\vec{\mu}_R$...

Rocchio' illustrated



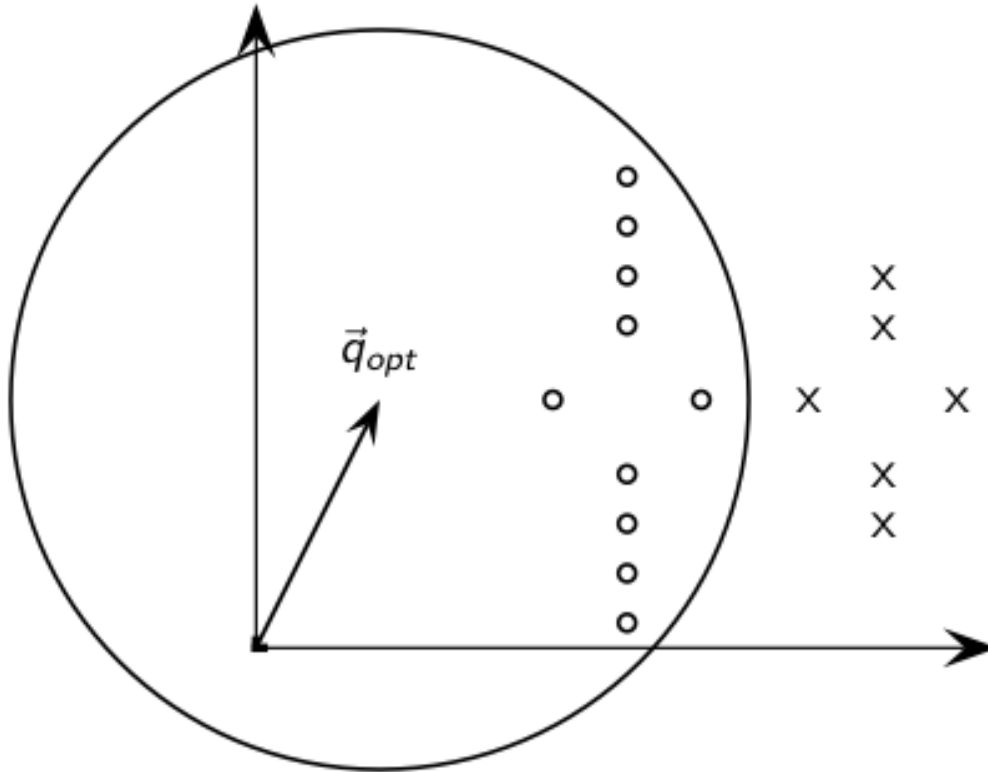
... to get \vec{q}_{opt}

Rocchio' illustrated



\vec{q}_{opt} separates relevant / nonrelevant perfectly.

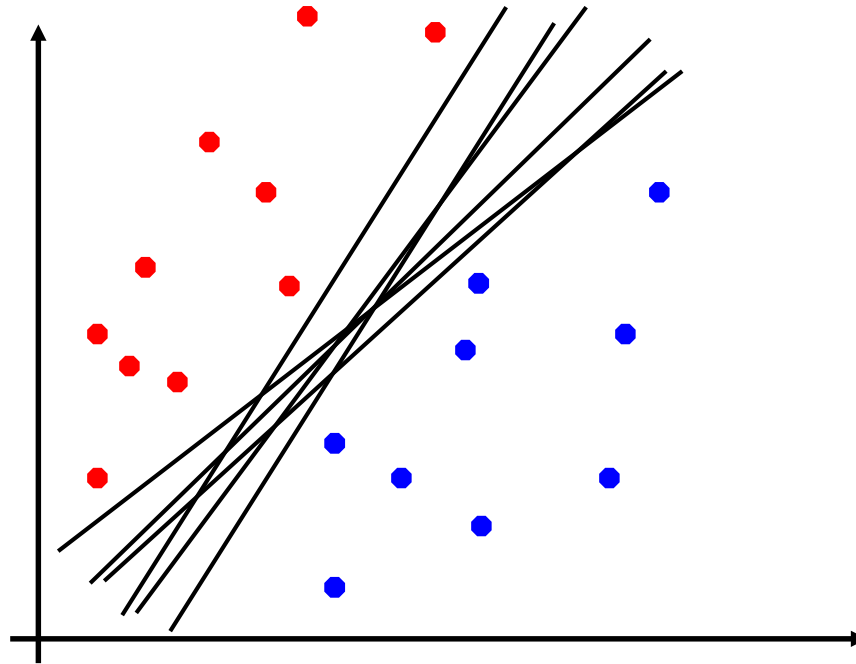
Rocchio' illustrated



\vec{q}_{opt} separates relevant / nonrelevant perfectly.

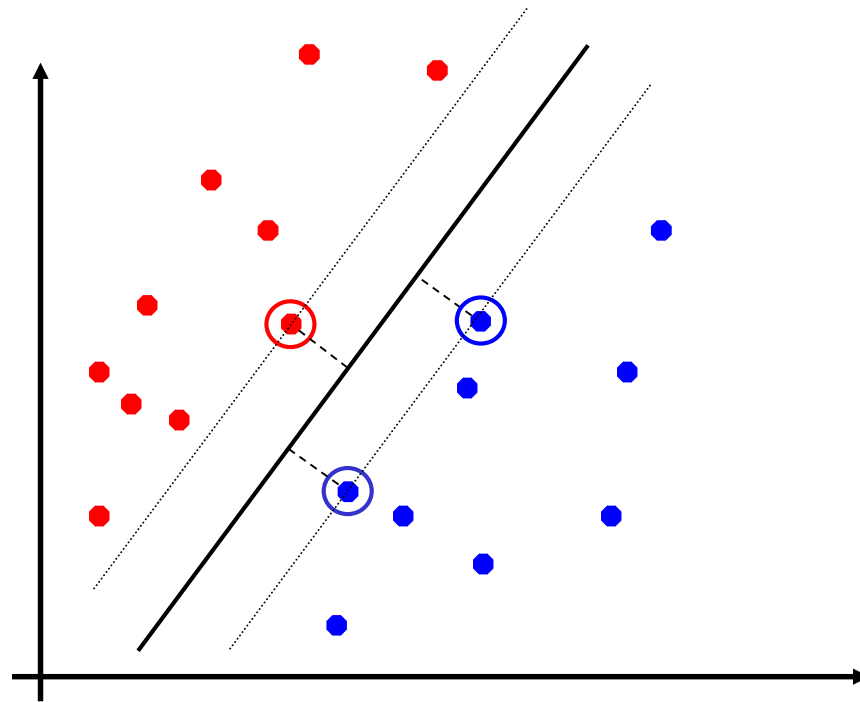
Linear Separators

- Which of the linear separators is optimal?

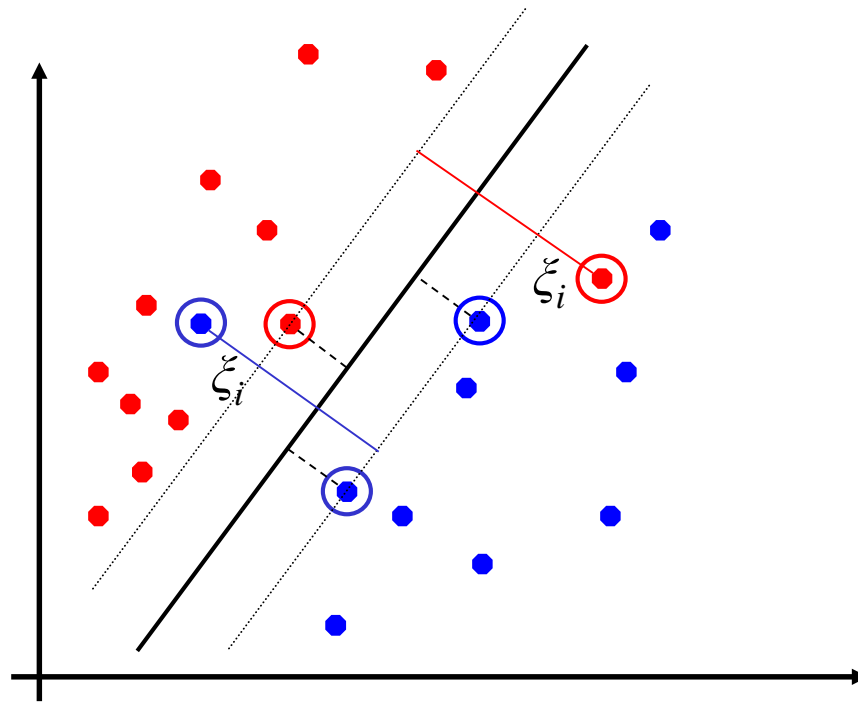


Maximum Margin Classification

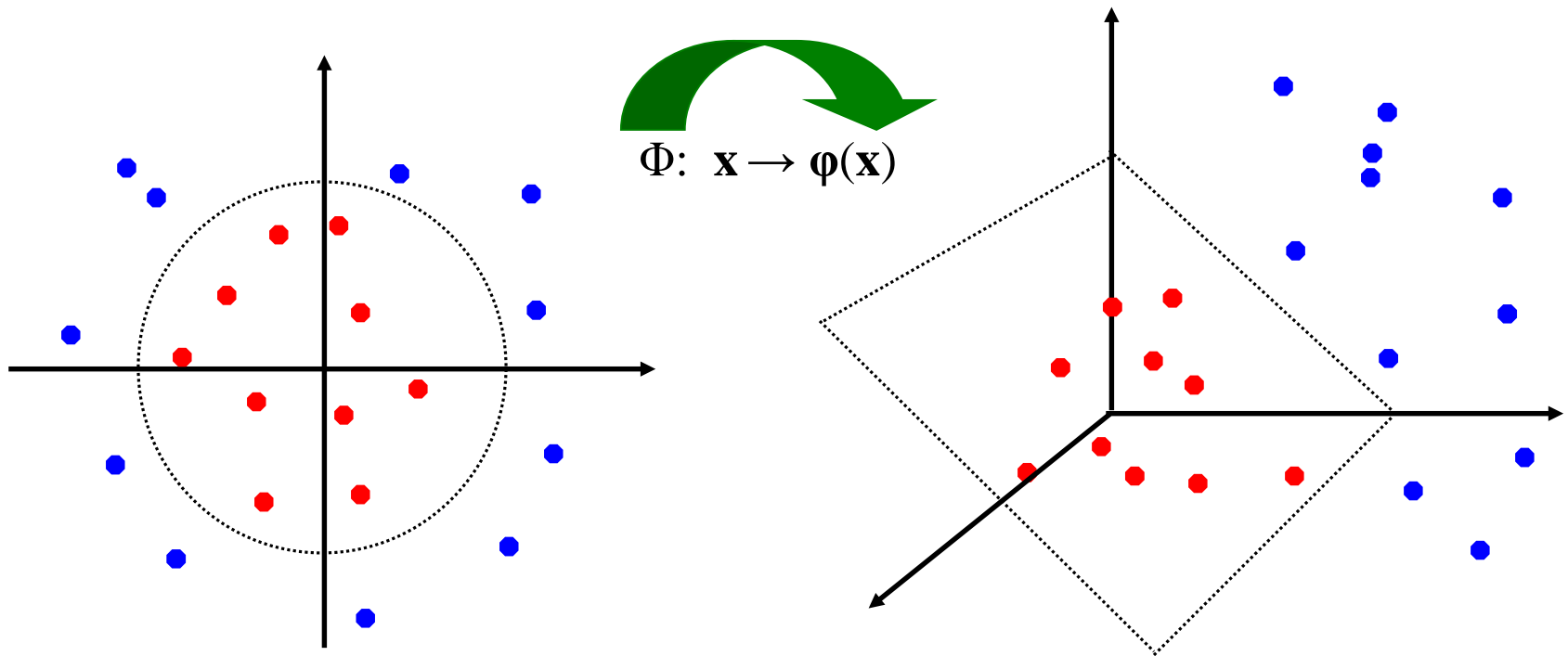
- Implies that only “support vectors” matter; other training examples are ignorable.



Soft-Margin Support Vector Machine



Non-linear SVMs



Gender Classification Example

```
>>> classifier.show_most_informative_features(5)
```

```
Most Informative Features
```

```
last_letter = 'a' female : male = 38.3 : 1.0
```

```
last_letter = 'k' male : female = 31.4 : 1.0
```

```
last_letter = 'f' male : female = 15.3 : 1.0
```

```
last_letter = 'p' male : female = 10.6 : 1.0
```

```
last_letter = 'w' male : female = 10.6 : 1.0
```

```
>>> for (tag, guess, name) in sorted(errors):
```

```
print 'correct=%-8s guess=%-8s name=%-30s'
```

```
correct=female guess=male name=Cindelyn ...
```

```
correct=female guess=male name=Katheryn
```

```
correct=female guess=male name=Kathryn ...
```

```
correct=male guess=female name=Aldrich ...
```

```
correct=male guess=female name=Mitch ...
```

```
correct=male guess=female name=Rich ...
```

Sentiment Classification Example

```
>>> classifier.show_most_informative_features(5)
```

Most Informative Features

contains(outstanding) =	True pos : neg = 11.1 : 1.0
contains(seagal) =	True neg : pos = 7.7 : 1.0
contains(wonderfully) =	True pos : neg = 6.8 : 1.0
contains(damon) =	True pos : neg = 5.9 : 1.0
contains(wasted) =	True neg : pos = 5.8 : 1.0

Some Supervised Learning Methods

- Support Vector Machine
 - High accuracy
- k-Nearest-Neighbor
 - Naturally accommodates multi-class problems
- Decision Tree (a form of Rule Induction)
 - Explainable (at least near the top of the tree)
- Maximum Entropy
 - Accommodates correlated features

Supervised Learning Limitations

- Rare events
 - It can't learn what it has never seen!
- Overfitting
 - Too much memorization, not enough generalization
- Unrepresentative training data
 - Reported evaluations are often very optimistic
- It doesn't know what it doesn't know
 - So it always guesses some answer
- Unbalanced “class frequency”
 - Consider this when deciding what's good enough

Metadata Extraction: Named Entity “Tagging”

- Machine learning techniques can find:
 - Location
 - Extent
 - Type
- Two types of features are useful
 - Orthography
 - e.g., Paired or non-initial capitalization
 - Trigger words
 - e.g., Mr., Professor, said, ...

Your query has finished



Search	Topic		Person	
Clear	Organization		Location	
OR	Speaker		Text	
AND	Story	Jewish-Arab relations : Politics and government : Palestinian Arabs : Middle East : Israel : Terrorism		

- 5 stories about: Jewish-Arab relations : Politics and government : Palestinian Arabs : Middle East : Israel : Terr
- Jewish-Arab relations : Politics and government : Palestinian Arabs : Middle East : Israel : Terrorism : Pale
- Jewish-Arab relations : Israel : Middle East : Middle East peace negotiations : Politics and government : P

male 5

Well as all work during president Clinton's trip to New York tonight and he enjoys the performance of the opera Carmen at Lincoln Center and see the scene there is a lot of Broadway. Now earlier today Mr. Clinton announced that the UN united Nations general assembly that he plans to send a nuclear test ban treaty to the Senate the treaty bans all nuclear test explosions and is regarded as a milestone in the arms control. Two israeli security guards were wounded in an early morning shooting in Jordan a government official says three men and a car opened fire on the guard's car wounding both before Skipping guards were treated at a hospital and released it is real several West Bank villages were sealed by israeli soldiers who search for the islamic militants behind two recent suicide bombings in Jerusalem palestinian leader Yasser Arafat says that he believes those was counsel for the bombing case and abroad.

- Jewish-Arab relations
- Middle East peace negotiations
- Middle East
- Palestinian self-rule areas
- Israel
- Politics and government
- Arafat, Yasir
- Palestinian Arabs

Features Engineering

- Topic
 - Counts for each word
- Sentiment
 - Counts for each word
- Human values
 - Counts for each word
- Sentence splitting
 - Ends in one of .!?
 - Next word capitalized
- Part of speech tagging
 - Word ends in -ed, -ing, ...
 - Previous word is a, to, ...
- Named entity recognition
 - All+only first letters caps
 - Next word is said, went, ...

Normalization

- Variant forms of names (“name authority”)
 - Pseudonyms, partial names, citation styles
- Acronyms and abbreviations
- Co-reference resolution
 - References to roles, objects, names
 - Anaphoric pronouns
- Entity Linking

Entity Linking

0.47

فوفقاً لأرقام مضابط البرلمان الم
زيارة إسرائيلية الصنع المضادة
للدبابات وأكدت المصادر أن
الصفقة كانت أحد الموضوعات
الرئيسية على مائدة المفاوضات
بين شارون ونظيره البريطاني
توني بلير.
كانت وزارة الدفاع البريطانية
قد أبرمت صفقة مبدئية مع
الحكومة الإسرائيلية في عام
2001 اشترت بمقتضاها عدداً

0.62

WIKIPEDIA
The Free Encyclopedia

Tony Blair
From Wikipedia, the free encyclopedia

For other uses, see [Tony Blair \(disambiguation\)](#).

Anthony Charles Lynton Blair (born 6 May 1953)^[1] is a former British Labour Party politician who served as the Prime Minister of the United Kingdom from 2 May 1997 to 27 June 2007. He was the Member of Parliament (MP) for Sedgefield from 1983 to 2007 and Leader of the Labour Party from 1994 to 2007. He resigned from all of these positions in June 2007.

Tony Blair was elected Leader of the Labour Party in the leadership election of July 1994, following the sudden death of his predecessor, John Smith. Under his leadership, the party adopted the term "New Labour"^[2] and moved away from its traditional left wing position towards the centre ground.^{[3][4]} Blair subsequently led Labour to a landslide victory in the 1997 general election. At 43 years old, he became the youngest Prime Minister since Lord Liverpool in 1812. In the first years of the New Labour government, Blair's government implemented a number of 1997 manifesto pledges, introducing the minimum wage, Human Rights Act and Freedom of Information Act, and carrying out regional devolution, establishing the Scottish Parliament, the National Assembly for Wales, and the Northern Ireland Assembly.

Blair's role as Prime Minister was particularly visible in foreign and security policy, including in Northern Ireland, where he was involved in the 1998 Good Friday Agreement. From the start of the War on Terror in 2001, Blair strongly

The Right Honourable
Tony Blair

Blair at the World Economic Forum in Davos, Switzerland (29 January 2006)

Prime Minister of the United Kingdom
In office
2 May 1997 – 27 June 2007

Monarch Elizabeth II
Deputy John Prescott
Preceded by John Major
Succeeded by Gordon Brown

Leader of the Opposition
In office

Example: Bibliographic References

15. Faloutsos, C., Oard, D. (1995). "A Survey of Information Retrieval and Filtering Methods," avail. As UMIACS-TR-95-33, College Park: U of MD.

[11] Faloutsos, C. and Oard, D. W., "A Survey of Information Retrieval and Filtering Methods", University of Maryland, Technical Report CS-TR-3514, August 1995.

[47] Christos Faloutsos and Douglas W. Oard. A survey of information retrieval and filtering methods. Technical Report CS-TR-3514, University of Maryland, August 1995. <http://www.enee.umd.edu/medlab/filter/papers/survey.ps>.

[Faloutsos] Christos Faloutsos and Dougtas Oard, A Survey of Information Retrieval and Filtering Method,
<[URL:http://www.glue.umd.edu/enee/medlab/filter/papers/survey.ps](http://www.glue.umd.edu/enee/medlab/filter/papers/survey.ps)>

When **Lisa's** mother **Marge Simpson** went to a weekend getaway at Rancho Relaxo, ...

After two years in the academic quagmire of **Springfield Elementary**, **Lisa** finally has a teacher that she connects with. But she soon learns that the problem with being middle-class is that



Marge Simpson



Homer Simpson



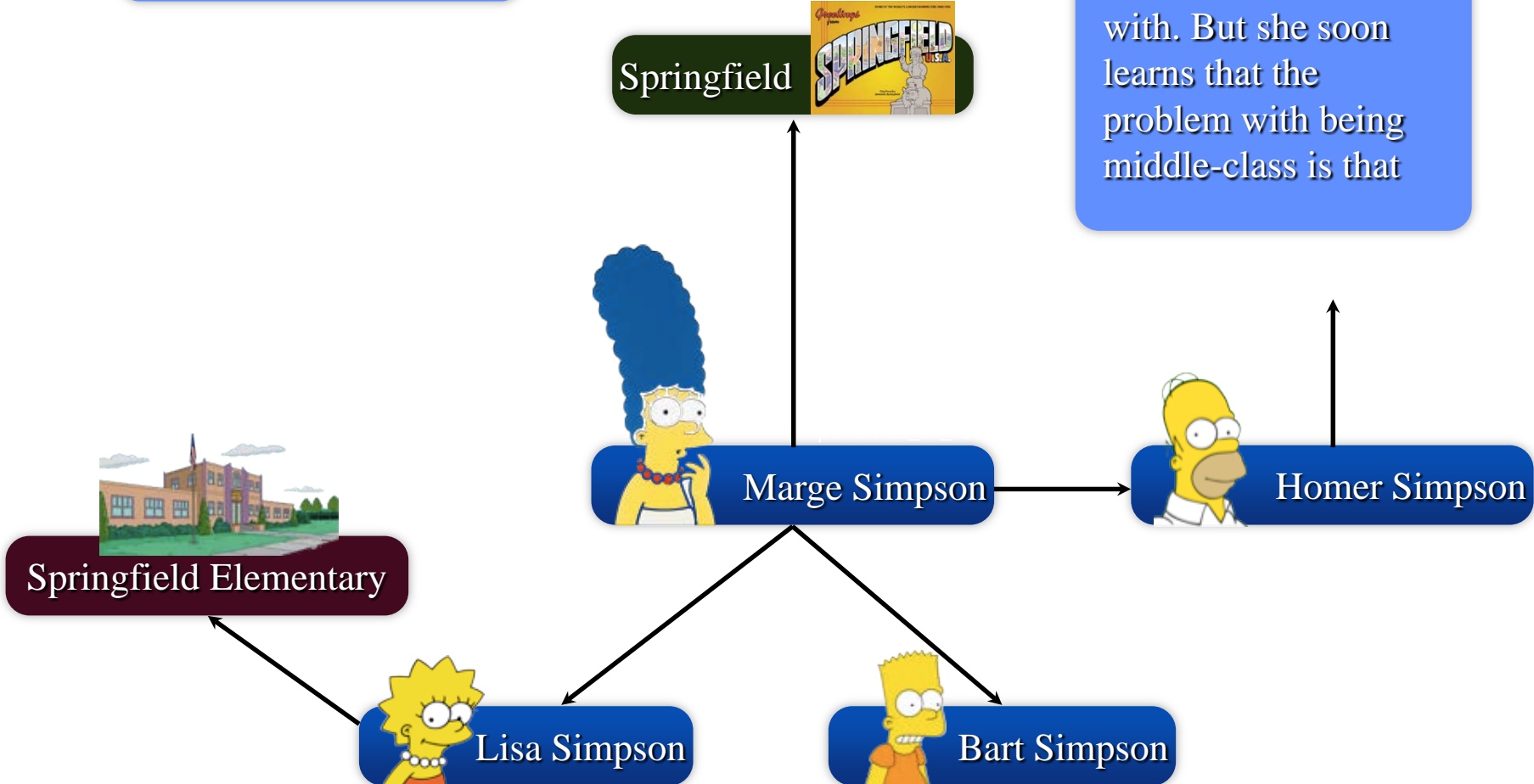
Springfield Elementary



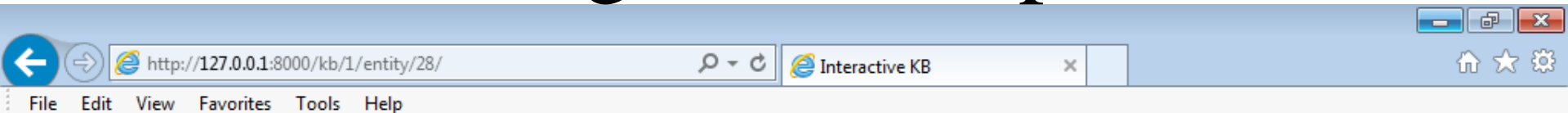
Lisa Simpson



Bart Simpson



Knowledge-Base Population



- **Entity ID:** e_XIN_ENG_20100312_0139_27
- **Type:** PER
- **Canonical mention strings:**
 - Vijitha Herath (x1)
- **Mention strings:**
 - Herath (x2)
 - Vijitha Herath (x1)
- **Mentioned in Documents:**
 - [Roundup: Sri Lanka's war hero to face trial before key polls](#) (x3)

	Subject	Predicate	Object	Sentence
Annotate	Vijitha Herath	per:employee_or_member_of	Sri Lanka	Herath also said as he was the senior most military officer of the country and the junior officer could not be in the bench.

[Roundup: Sri Lanka's war hero to face trial before key polls](#) (x3)

by Amanda Sri

COLOMBO, March 12 (Xinhua) -- The glorious days where he plied on Colombo roads escorted by hundreds of elite Commandos were over.

KB summary:


- **Run ID:** Protest over arrest of Sri Lanka reporter linked to Fonseka [AFP_ENG_20100318.0623]
- [Annotations](#)
- [Entities](#) **34**
 - 14 people
 - 17 orgs
 - 3 GPEs
- [Facts](#) **32**
 - [gpe:employees_or_members](#) **3**
 - [gpe:residents_of_country](#) **1**
 - [org:alternate_names](#) **3**
 - [org:employees_or_members](#) **4**
 - [org:top_members_employees](#) **1**
 - [per:age](#) **1**
 - [per:charges](#) **1**
 - [per:countries_of_residence](#) **1**
 - [per:employee_or_member_of](#) **7**
 - [per:siblings](#) **2**
 - [per:title](#) **7**
 - [per:top_member_employee_of](#) **1**
- [Source Documents](#) **3**
 - [Protest over arrest of Sri Lanka reporter linked to Fonseka](#)
 - ['No democracy' in S.Lanka, says top Fonseka supporter](#)
 - [Roundup: Sri Lanka's war hero to face trial before key polls](#)

CLiMB: Metadata from Description

Title: National Gallery of Art: Collection Tour

- 1: The Calling of the Apostles Peter and A...
- 2: Enthroned Madonna and Child
- 3: Madonna and Child with Saint Peter and...
- 4: Scenes from the Life of Saint John the B...
- 5: The Flight into Egypt
- 6: Madonna and Child
- 7: The Presentation and Marriage of the Vi...
- 8: Andrea and Alabaster on the Libyan Sho...
- 9: The Holy Family
- 10: The Adoration of the Shepherds
- 11: The Feast of the Gods
- 12: The Small Cowper Madonna
- 13: The Alba Madonna
- 14: Saint George and the Dragon
- 15: A Young Woman and her Little Boy
- 16: Christy
- 17: Portrait of a Man
- 18: The Holy Family
- 19: Field
- 20: Elijah Fed by the Raven
- 21: Portrait of a Man
- 22: The Baptism of Christ
- 23: Rinaldo Ferrero
- 24: Saint John the Evangelist on Patmos
- 25: Doge Andrea Gritti
- 26: Cephala Hiding the Jewels
- 27: Cephala Punished at the Hunt
- 28: Madonna and Child with Saint Martin
- 29: Leonardo
- 30: Christ Cleansing the Temple
- 31: Saint Blaise
- 32: Saint Lucy
- 33: Saint Jerome with Saint Paula and Jan...
- 34: The Martyrdom of Saint Bartholomew
- 35: Madonna and Child
- 36: The Presentation of the Virgin
- 37: The Nativity of the Virgin
- 38: Joachim and the Beggar
- 39: Countess Ebba Sparre
- 40: The Plague Doctors and Colosse
- 41: The Assumption of the Virgin
- 42: Still Life with Fruit and Canals
- 43: Christ at the Sea of Galilee
- 44: Saint Ambrose

Image
Image Information



Text

Mary and Joseph's flight to protect Jesus from Herod's slaughter of Hebrew babies is recounted by Matthew in the bible. The subject often decorated predella (small stones at the base of altapeices), but this painting is too large to be a predella panel. It most likely was not the central section of an altapeice either, since those were usually meditative, devotional images rather than narrative ones like this. Perhaps it was made for a religious confraternity. Such scuole were among the most important patrons of Venetian **painters**. Their commissions accounted for Carpaccio's best-known works - large, bustling scenes that are full of detail and provide valuable information about life in renaissance Venice. Here, the distant village and covered boat gliding can't offer a hint of Carpaccio's delight in storytelling.

While Bellini began to use layered of glaze to soften the edges of his forms, Carpaccio continued to favor a harder (and increasingly old-fashioned) use of line, which in this case enhanced his narrative purpose. Hard contours accentuate the gait of the ass and the long stride of Joseph, and they help frame the Virgin and Child in a way that almost enthralls them on their humble mount. In contrast, the luminous underside of the clouds reveal the influence of Bellini's treatment of light.

Linked Terms

Terms Display Consideration

painters

Terms Assigned

Term	Normalized Term	Select ID

AAI Browser(2)
Web Browser(3)
LAN Browser(174)

Search Terms: painters Show Partial Match

painters artists

painters (people in crafts and trades by material)

Selected Record Description

People who coat the surfaces of walls, furniture, vehicles, or other things with paint, which is pigment suspended in liquid, with the primary goal of protecting or giving simple color to the surface. For people who apply paint to a surface to create an expressive or communicative image, see "painters (artists)."

Selected Record Hierarchy

Top of the AAI hierarchy

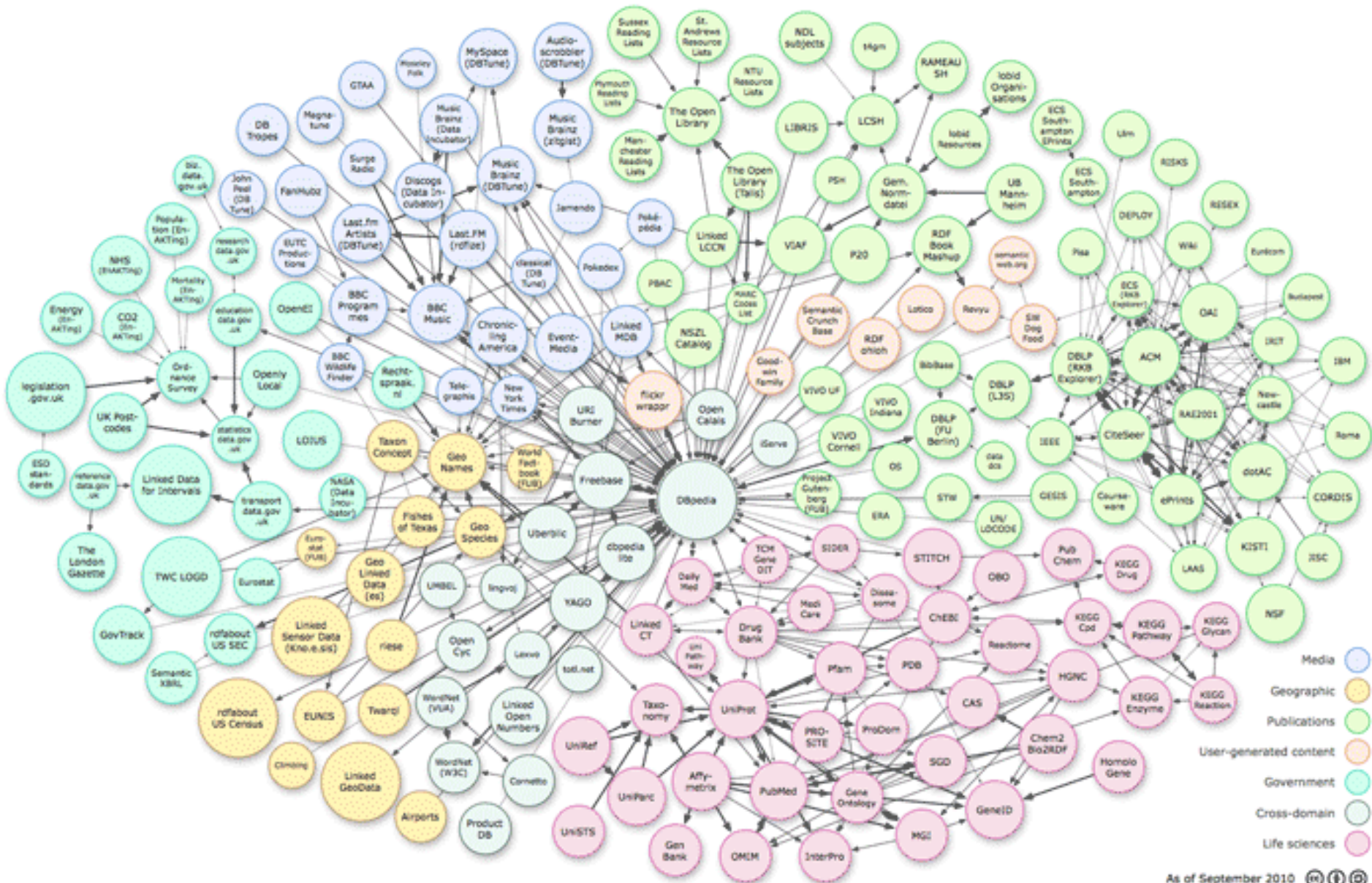
- Agents Facet
 - People
 - people
 - people by occupation
 - people in crafts and trades
 - people in crafts and trades by material
 - painters

Legend: Selected Terms Terms with OADR

Web Ontology Language (OWL)

```
<owl:Class rdf:about="http://dbpedia.org/ontology/Astronaut">  
  <rdfs:label xml:lang="en">astronaut</rdfs:label>  
  <rdfs:label xml:lang="de">Astronaut</rdfs:label>  
  <rdfs:label xml:lang="fr">astronaute</rdfs:label>  
  <rdfs:subClassOf  
    rdf:resource="http://dbpedia.org/ontology/Person">  
  </rdfs:subClassOf>  
</owl:Class>
```

Linked Open Data



Semantic Web Search



[First](#) | [Previous](#) | [Next](#) | [Last](#)

▼ **item type**

- Person (1)
- Astronaut (1)

▼ **nationality**

- Switzerland (1)

▼ **born in year year**

- 1944 (1)

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Your Filters

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Results 1 to 1 of 1

nationality Switzerland✕ **text search for** astronaut✕



Claude Nicollier



Claude Nicollier is the first astronaut from Switzerland and has flown on several Space Shuttle missions. He was appointed full professor of Spatial Technology at the École Polytechnique Fédérale de Lausanne on 28 March 2007.

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Before You Go!

- On a sheet of paper (no names), answer the following question:

What was the muddiest point in today's class?