

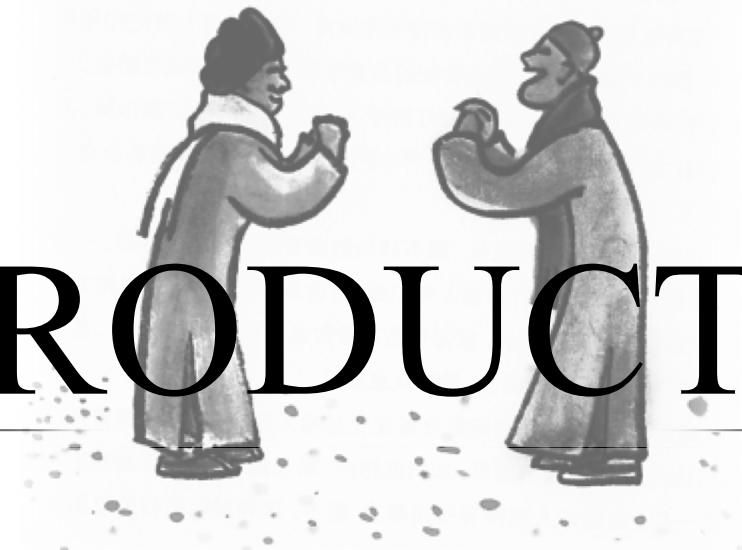
# WEB SCIENCE

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Peng Wang

# INTRODUCTION

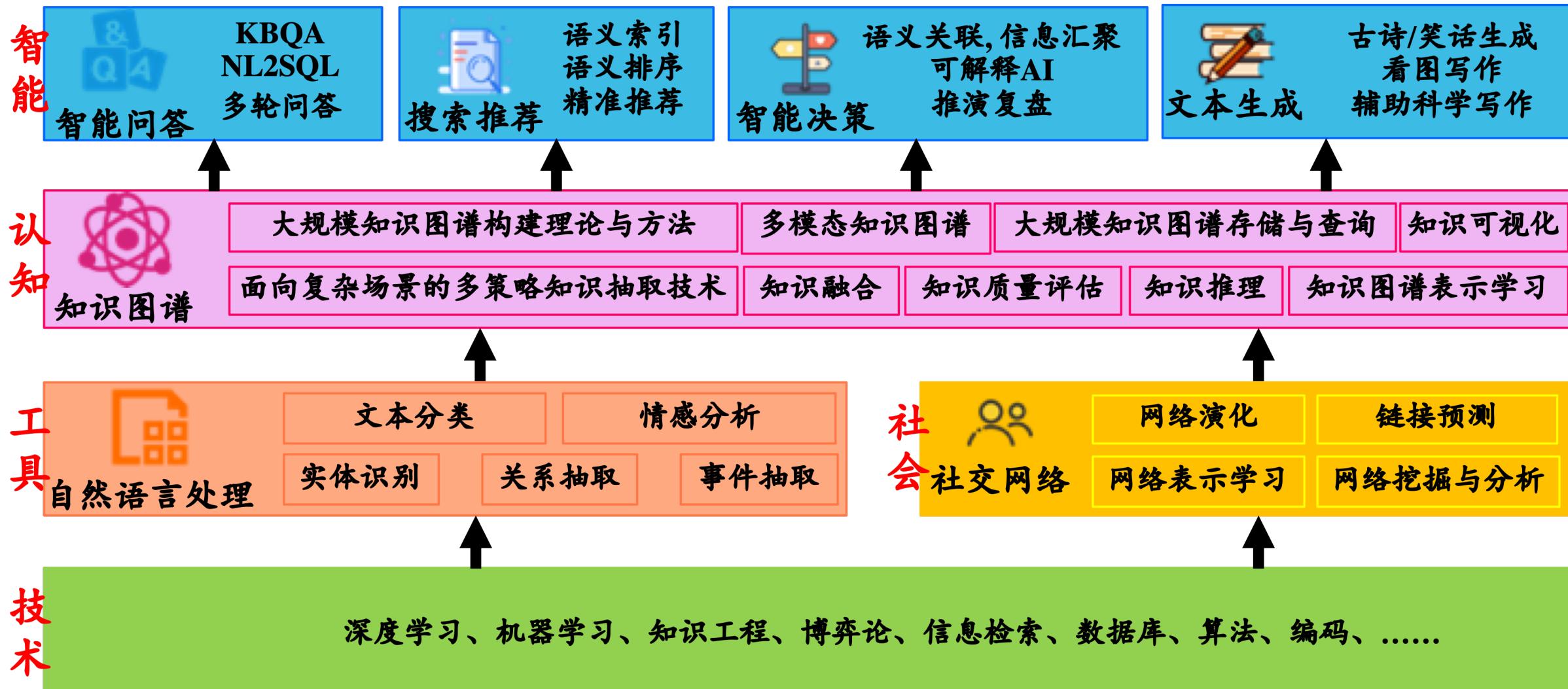
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# Instructor

- Peng Wang 汪鹏
  - email: [pwang@seu.edu.cn](mailto:pwang@seu.edu.cn)
  - office: 217 room, computer science building, jiulonghu campus

# Research interests



# Course Homepage

**<https://github.com/npubird/WebScienceCourse>**

# Schedule

- Lecture 1
  - Introduction, Teaming, Web, Semantic Web, Knowledge Graph
  - Assignment 1, Self-study materials
- Lecture 2
  - Graph Analysis and Visualization, Student Presentations & Discussion
  - Assignment 2
- Lecture 3
  - Community Detection, Student Presentations & Discussion
  - Assignment 3
- Lecture 4
  - Social Networks, Link Prediction, Student Presentations & Discussion

# Schedule

- Lecture 5
  - Knowledge Graph: Concepts and Applications
  - Assignment 4, Self-study materials
- Lecture 6
  - Knowledge Graph Techniques: Knowledge Representation, Knowledge Storage, Knowledge Graph Construction, Semantic Search, KBQA
  - Assignment 5
- Lecture 7
  - Course project: presentation and demo

# Teaming

- 3-5 students in a team
- One team leader
- Clear team roles
- Each enrolled student MUST be in one team
- No intersections among teams
- Due time: Oct. 15

# Student Presentations

- All teams will present their work from Lecture 2
- No more than 10 min for one presentation

# Grading

- Teamwork (10%)
- Presentations (10%)
- Paper Writing (10%)
- Personal Report (10%)
- \*Final exam (Team Project: Code, Document, System, Demo, Presentation) (60%)

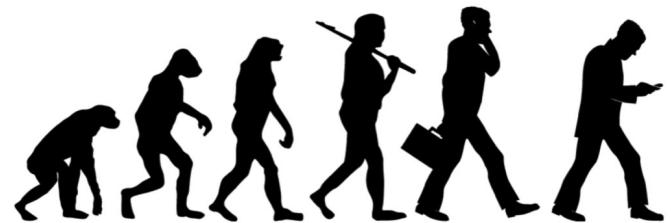
# Assignment Submission

- Mail to: seucosest@qq.com
- File type: \*.PDF for reports, compress other materials into one zip file.
- Title rules:

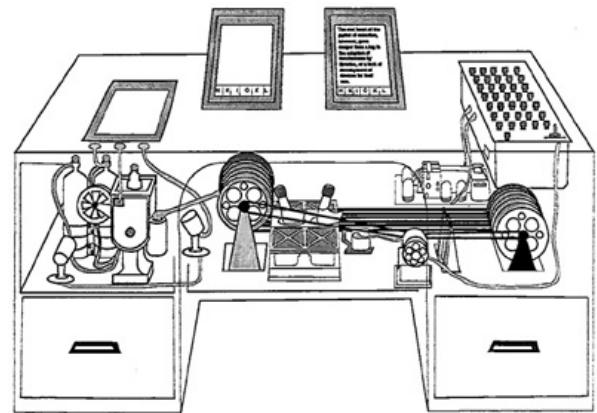


# EVOLUTION OF THE WEB

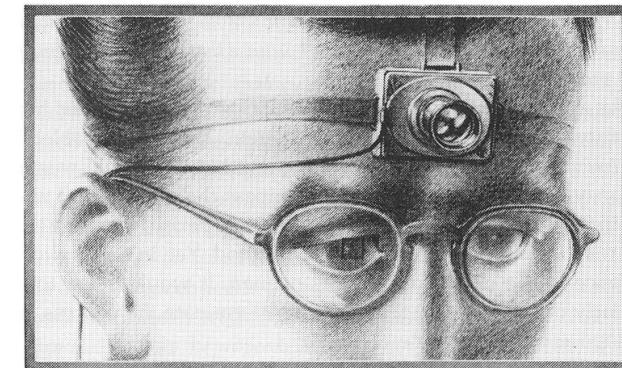
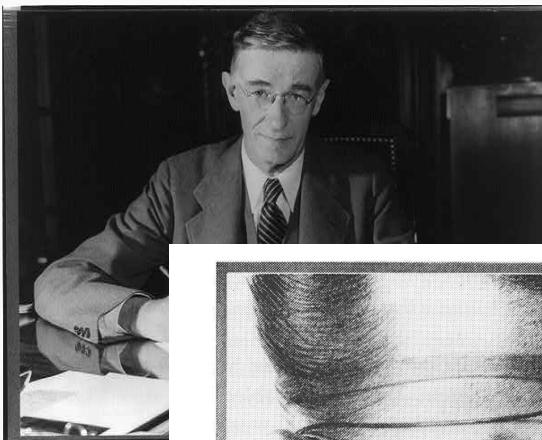
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# As We May Think - 1945



*"A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory."*

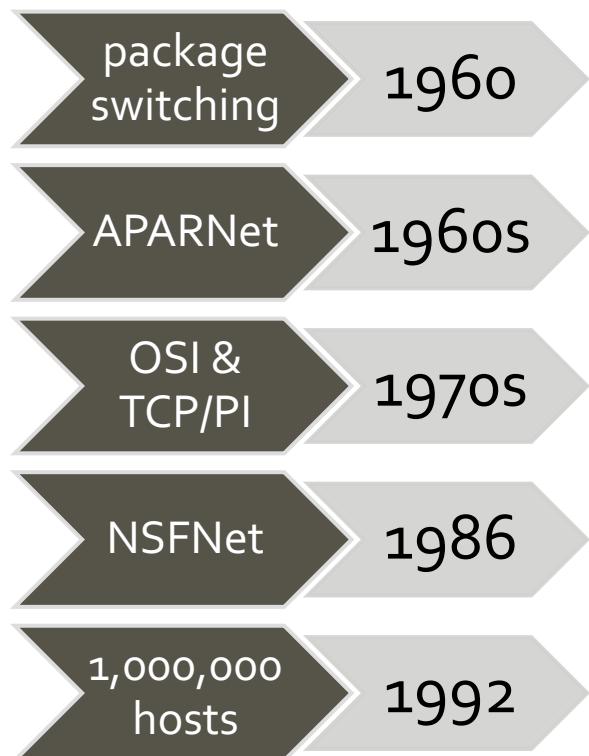


A scientist of the future records experiments with a tiny camera fitted with universal-focus lens. The small square in the eyeglass at the left sights the object (*LIFE* 19(11), p. 112).

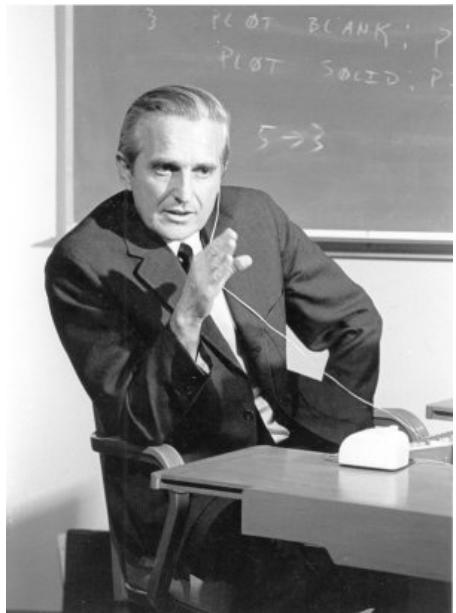
# Building Internet – 1960s



# Developing Internet



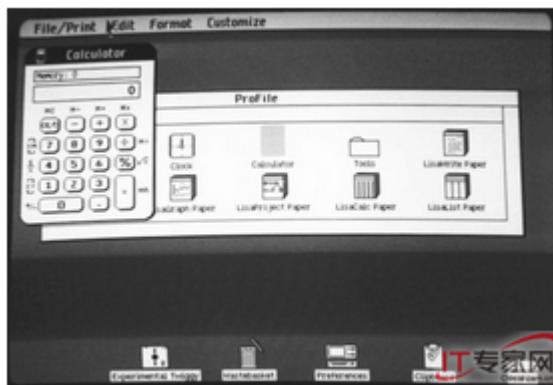
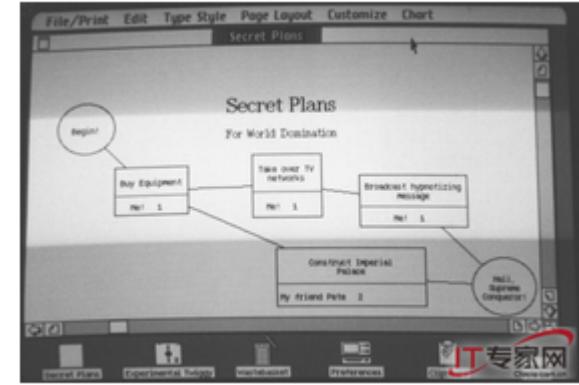
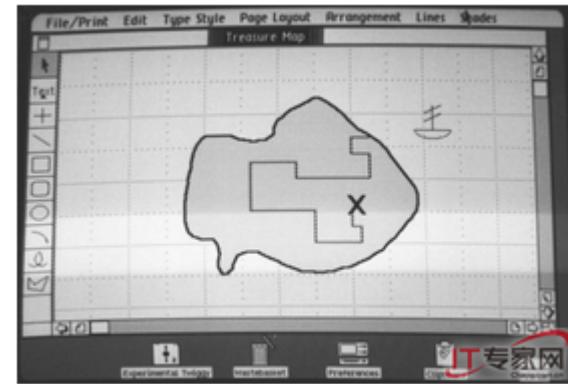
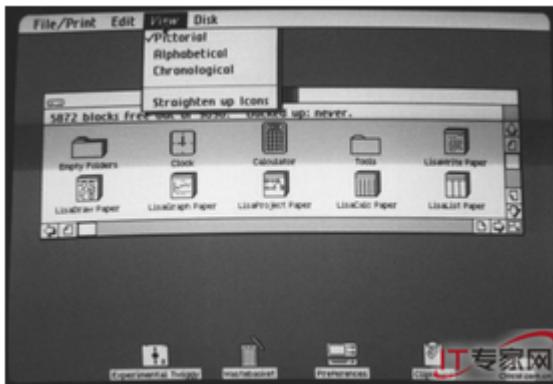
# Doug Engelbart and His... - 1968



# Steve Jobs and His... - 1983



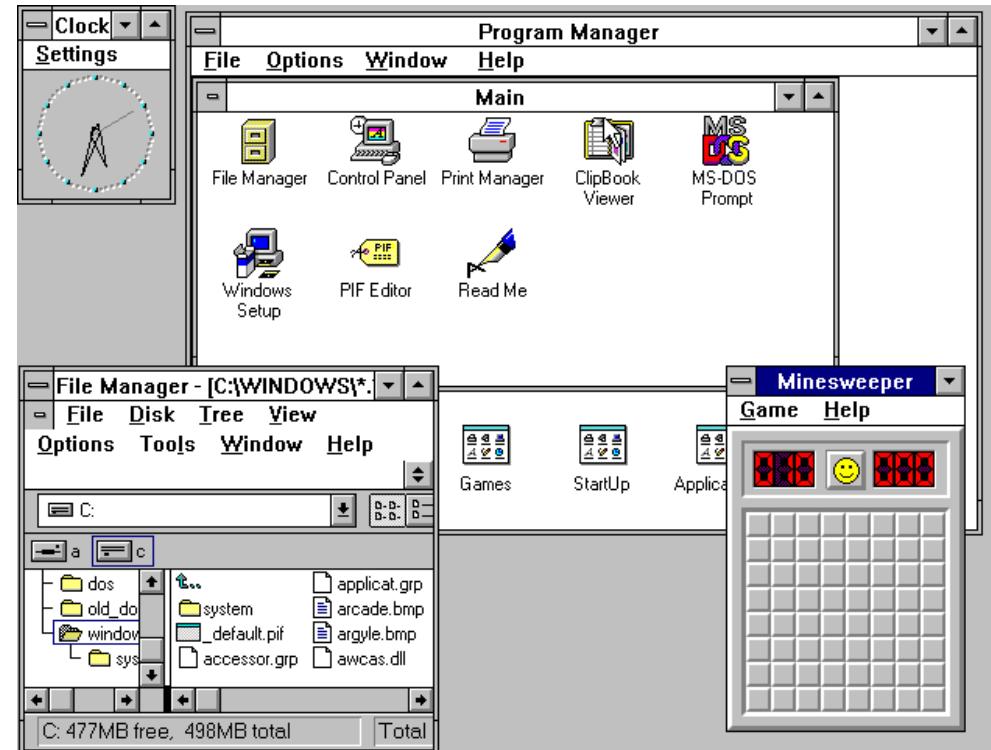
# And His LISA



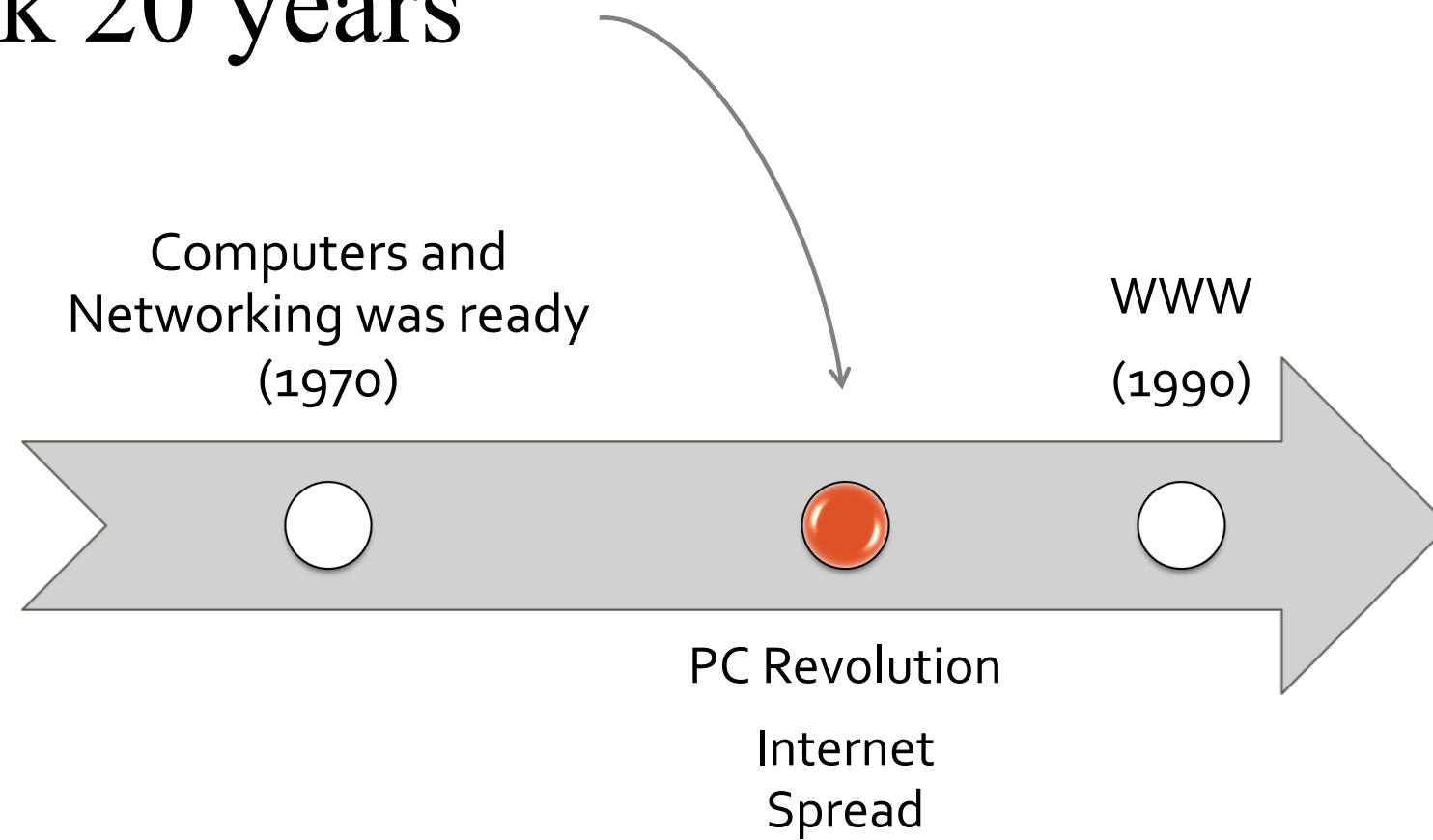
IT专家网

IT专家网

# Bill Gates and His Windows 3.1 - 1992



# It took 20 years



# More and More People had PCs

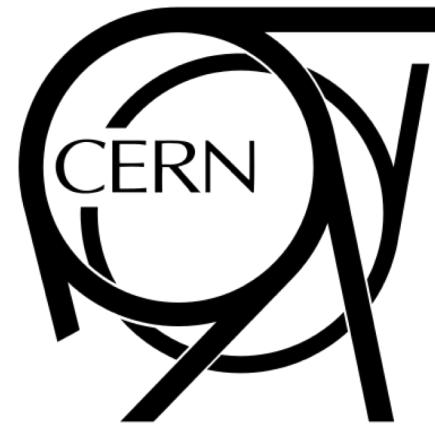
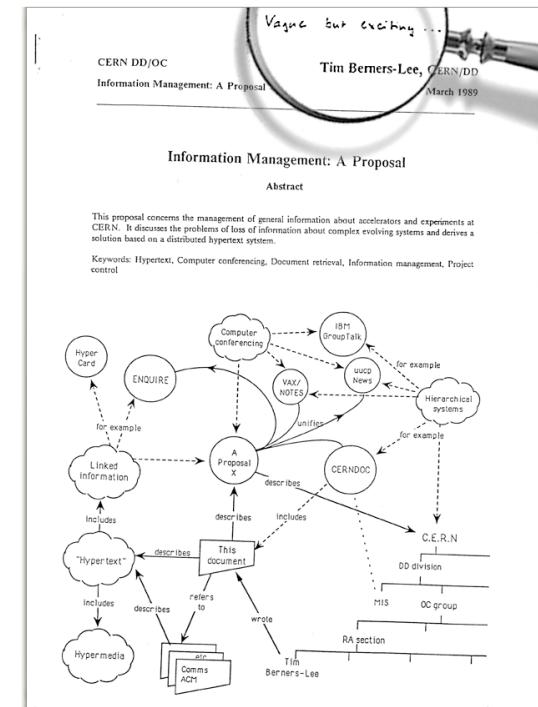
Apple II: \$9,935



# Something Happened in 1989



# Sir Tim Berners-Lee



# And Now...



## **2017 Turing Award Winner**

“I'M PLEASED AND HUMBLED TO RECEIVE THE TURING AWARD. THE 28 YEARS SINCE THE WEB'S INVENTION HAVE BROUGHT A MIX OF DELIGHTS, CHALLENGES AND OPPORTUNITIES, AND I REMAIN COMMITTED TO ENSURING THE WEB DELIVERS BENEFITS TO EVERYONE, EVERYWHERE.”

**SIR TIM BERNERS-LEE**

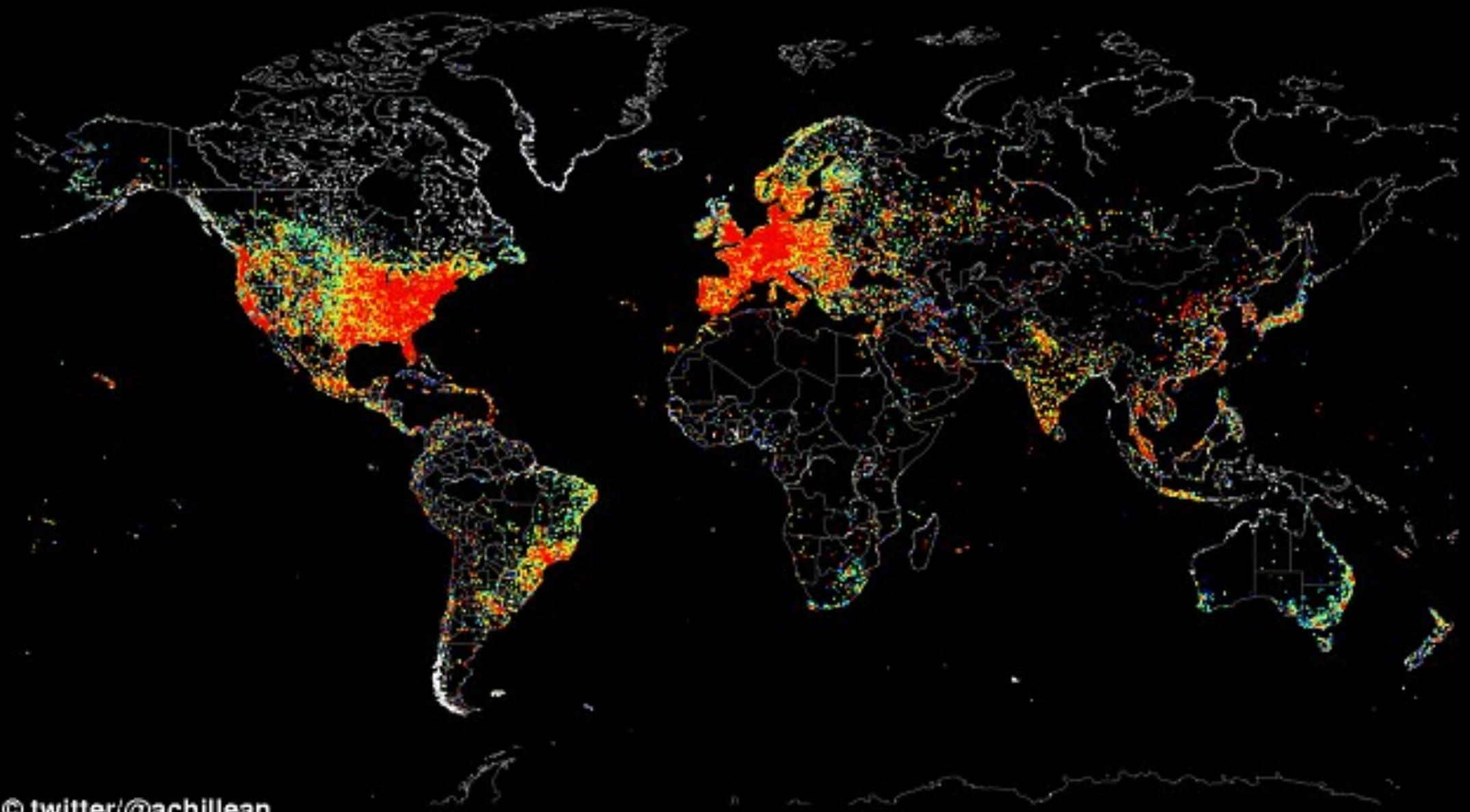
INVENTOR OF THE WEB  
RECIPIENT OF THE 2016 A.M. TURING AWARD

# WWW is great



学术中国

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# Discussion 1:

## Why HTML not XML is adopted in WWW?

```
<html>
  <title>I am Zhang Xiang </Title>
  <body>
    <p>This is a paragraph
    <p>This is another pararaph</p>
  </html>
```

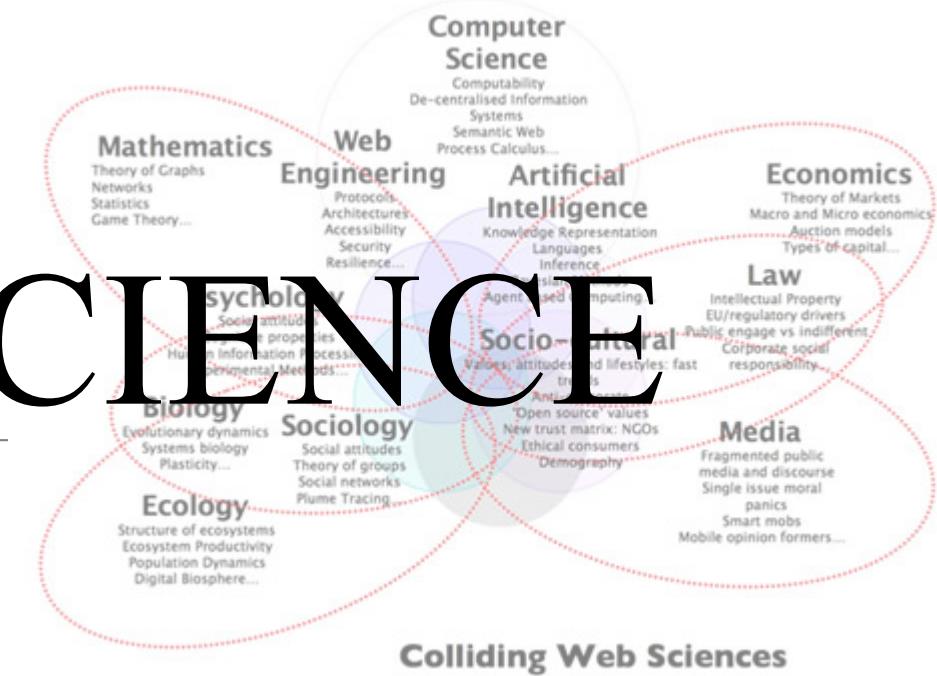
VS.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<note>
  <to>George</to>
  <from>John</from>
  <heading>Reminder</heading>
  <body>Don't forget the meeting!</body>
</note>
```

# Discussion 2:

**How to estimate the volume of WWW?**

# WEB SCIENCE



# Impact of Web

- Economy
  - Bust effect of .com bubble in 2000/2001
- Politics
  - US president election
- Business
  - B2C, B2B, O2O
- Social Collaboration
  - Wikipedia
- Media
  - Twitter, Facebook, Instagram, YouTube...

# What is Web Science

## **broader definition**

“the process of **designing things** in a **very large space**” – Tim Berners-Lee, 2007.

## **narrower definition**

The process of enabling **computers** to **understand** the web.

# Our View of Web Science

**Web Intelligence**

Web 3.0

Semantic Web, Linked Data,  
Knowledge Graph, ...

**Web Applications**

Web 2.0

Blog, Social Network,  
Dynamic pages, E-commerce, ...

**Web Data**

Web 1.0

World Wide Web, HTML, Hyperlink,  
Website, homepage, Search Engine, ...

The **11th International ACM Web Science Conference 2019** will be held from **Sunday, June 30 to Wednesday, July 3, 2019** in **Boston, MA, USA**.

The WebSci conference series is overseen by the [Web Science Trust](#); previous editions took place in [Athens](#), [Raleigh](#), [Koblenz](#), [Evanston](#), [Paris](#), [Indiana](#), [Oxford](#), [Hannover](#), [Troy, NY](#), and [Amsterdam](#).

The Web Science conference brings together researchers from multiple disciplines, including computer science, sociology, economics, information science, anthropology, and psychology. Web Science is the emergent study of the people, technologies, applications, processes, and practices that shape and are shaped by the World Wide Web. WebSci19 draws together theories, methods, findings, and critiques from across academic disciplines, and collaborates with industry, business, government, and civil society, to develop our knowledge and understanding of the web: the largest socio-technical network in human history.

“ **The Web Science conference brings together researchers from multiple disciplines, including computer science, sociology, economics, information science, anthropology, and psychology.**



WebSci'20

# Making the Web Human-Centric? New Directions in the Web and AI

Thirty years have passed since Tim Berners-Lee's inception of the World Wide Web. Today, an increasing range of voices are calling for reflection on how well the Web is serving society.

As Berners-Lee put it in his 2019 open letter on the future of the Web, while the Web has created some wonderful opportunities, giving marginalised groups a voice and making our daily lives easier, it has also created opportunities for the spreading of misinformation, hate and crime, and the construction of systems which are more about process than people.

It is time to ask: can the Web be reimaged for the public good? Can it be made more human-centric, and if so, how?

The 12th International ACM Conference on Web Science in 2020 (#WebSci20) is a unique interdisciplinary conference facilitating creative and critical dialogue with the aim of understanding the Web and its impacts and reflecting on the most pressing questions facing the Web. It will take place online 6-10 July.

#WebSci20 welcomes participation from diverse fields including (but not limited to) art, anthropology, computer and information sciences, communication, criminology, economics, geography, health sciences, humanities, informatics, international relations, law, linguistics, philosophy, political science, psychology, and sociology. Following the tradition of earlier conferences, we encourage contributions that cross traditional disciplinary boundaries.

>> [Link to all papers at ACM WebSci'20 proceedings <<](#)

>> [Link to the companion proceedings \(workshops\) <<](#)

>> [Link to Best Papers and Best Presentations <<](#)



Tweets by @WebSciConf



**WebSciConf**

@WebSciConf

A list of the best papers from #websci20 is also now available on our website:  
[websci20.webscience.org/paper-sessions/](http://websci20.webscience.org/paper-sessions/)



27 Jul 2020



WebSciConf Retweeted



**Tim O'Riordan**

@tjorphd

Links to #websci20 workshop and conference recordings are now available for delegates:  
[websci20.webscience.org/provisional-pr...](http://websci20.webscience.org/provisional-pr...)  
@WebSciConf



21 Jul 2020



WebSciConf Retweeted



**Tim O'Riordan**

# THE WEB CONFERENCE 2019

30 years of the web

## RESEARCH TRACKS

### Crowdsourcing and Human Computation

Omar Alonso  
Microsoft, US

Edith Law  
University of Waterloo, Canada

### Economics, Monetization, and Online Markets

Tie-Yan Liu  
Microsoft Research, China

Sergei Vassilvitskii  
Google, US

### Health on the Web

Ingemar Cox  
University College London, UK

Emre Kiciman  
Microsoft Research, US

### Intelligent Systems and Infrastructure

Arun Iyengar  
IBM Research, US

Michael Rabinovich  
Case Western Reserve University, US

### Security, Privacy, and Trust

Elisa Bertino  
Purdue University, US

Ashish Kundu  
IBM Research, US

### Search

Nick Craswell  
Microsoft, US

Hang Li  
Bytedance Technology, China

Yoelle Maarek  
Amazon Research, Israel

### Semantics and Knowledge

Peter Mika  
Independent Consultant, Spain

Cong Yu  
Google, US

### Social Network Analysis and Graph Algorithms

Karl Aberer  
EPFL, Switzerland

Paolo Boldi  
Università degli Studi di Milano, Italy

Aristides Gionis  
Aalto University, Finland

### User Modeling, Personalization, and Experience

Debora Donato  
Mix, US

Filip Radlinski  
Google, UK

Pavel Serdyukov  
Yandex, Russia

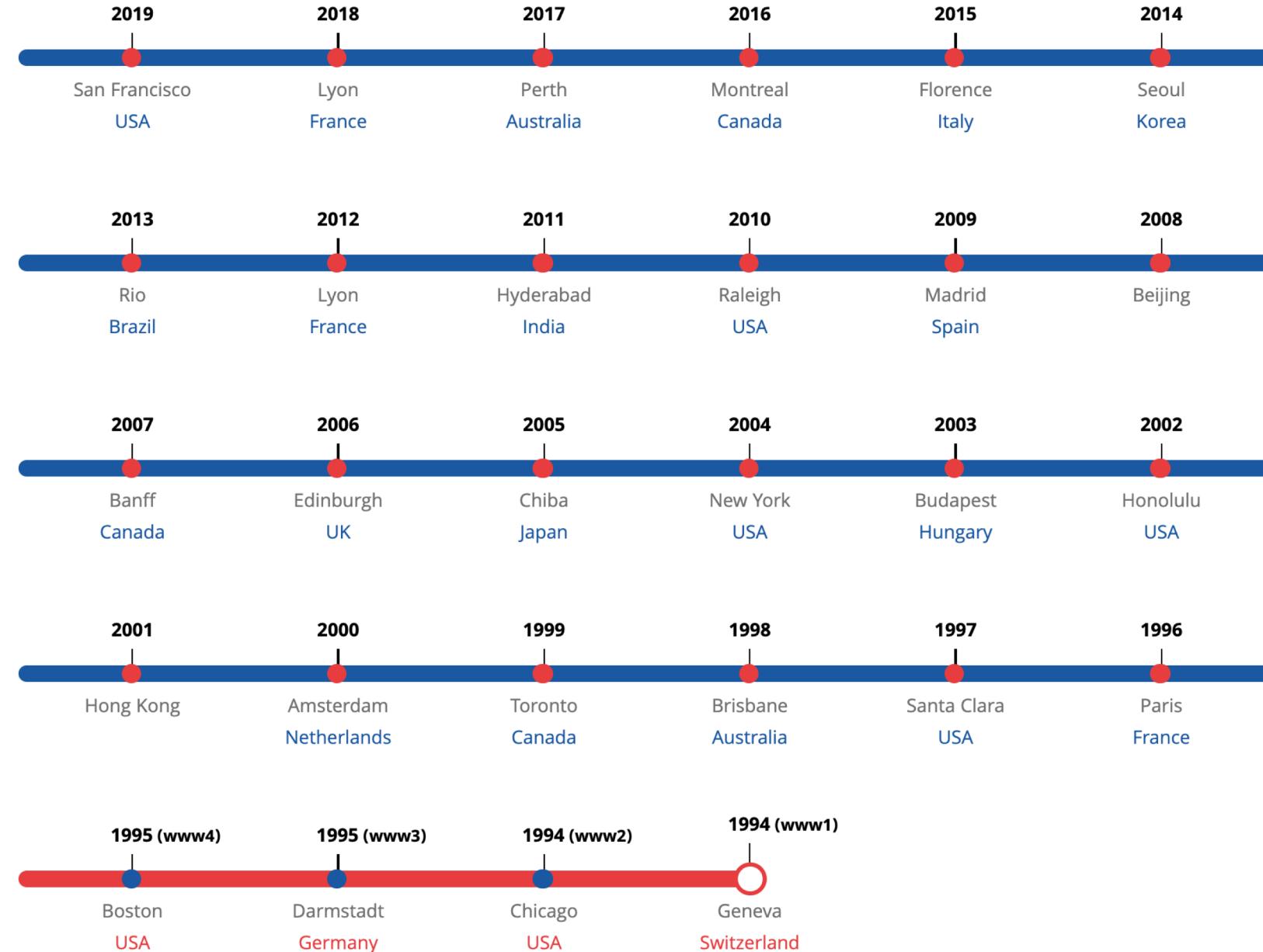
### Web and Society

Carlos Castillo  
Universitat Pompeu Fabra, Spain

Munmun De Choudhury  
Georgia Institute of Technology, US

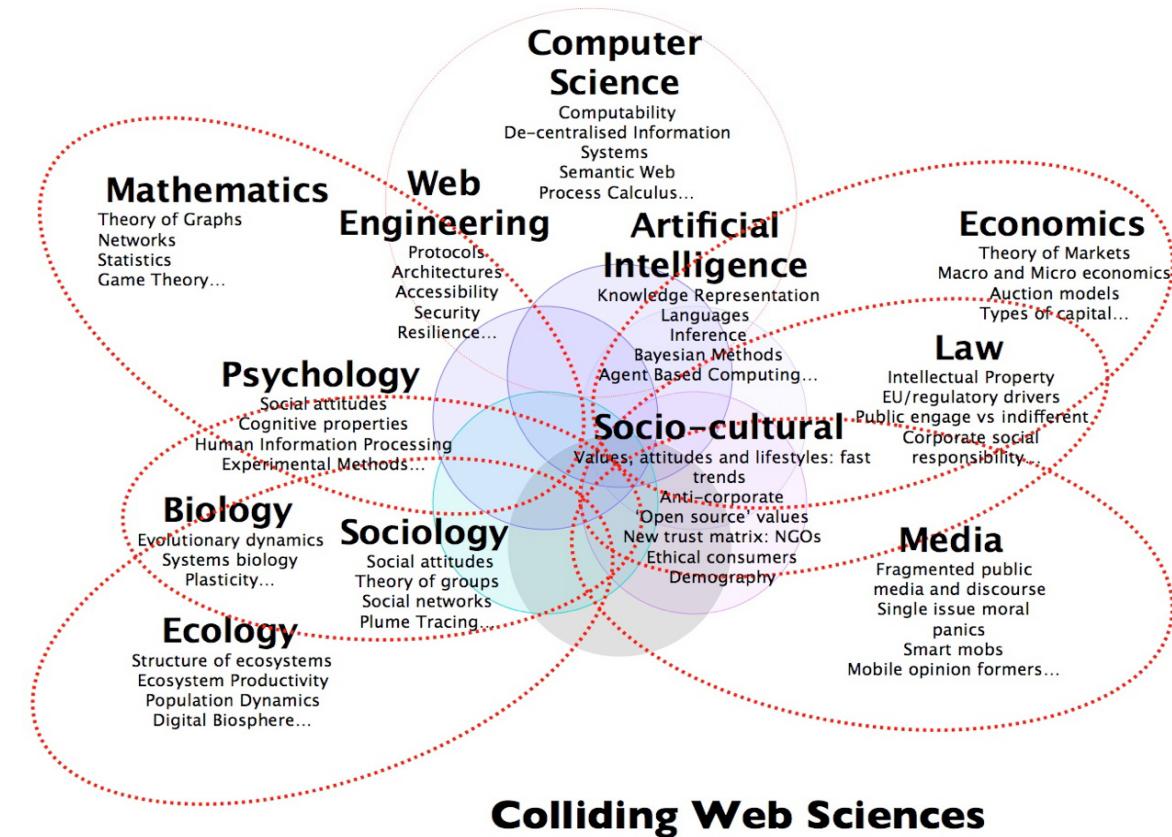
### Web Mining and Content Analysis

### Web of Things, Ubiquitous and Mobile Computing

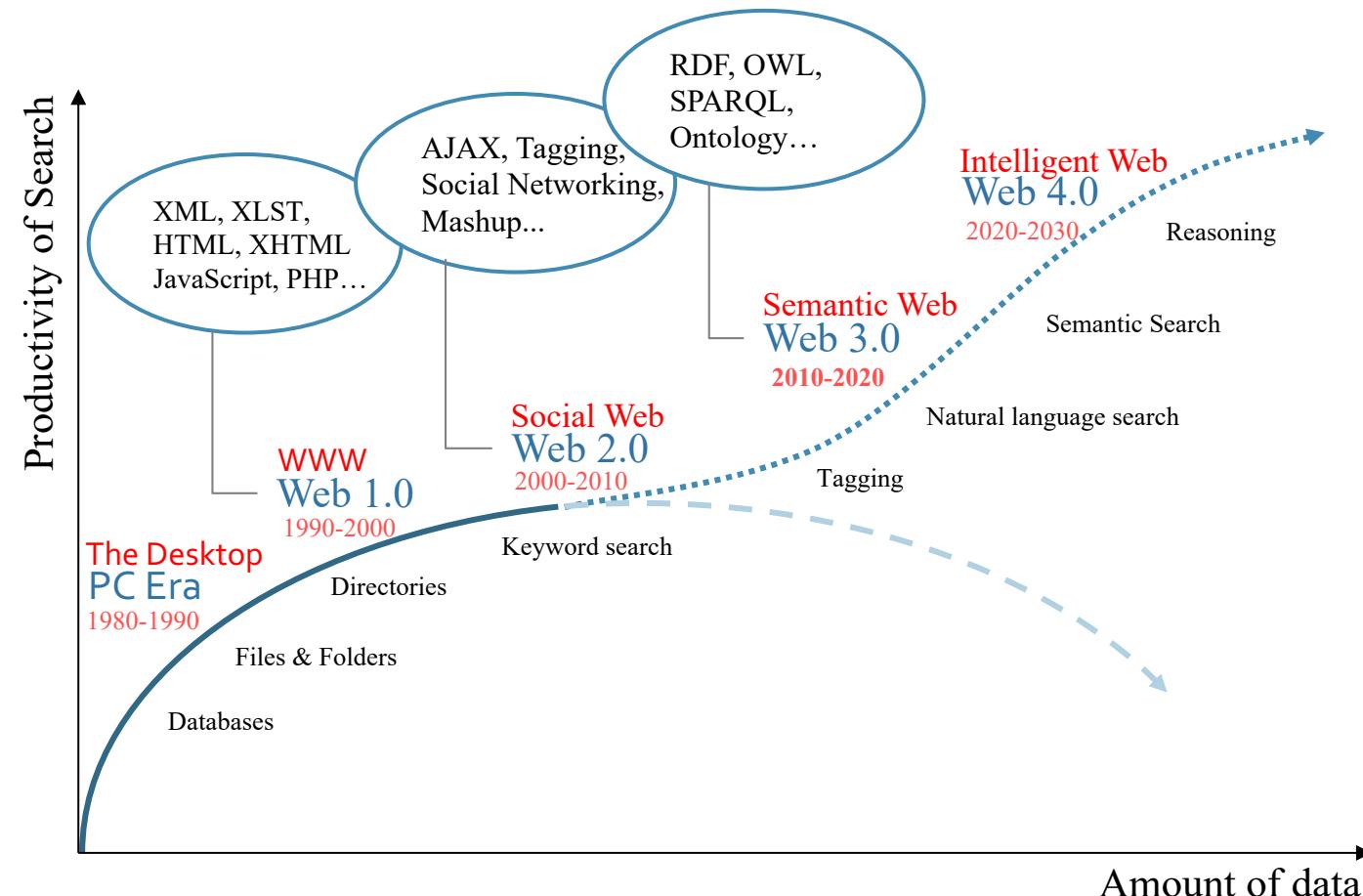




# Colliding Web Science



# Trend of Web [Nova Spivack 2008]



# Web 1.0 vs 2.0

Web 1.0	Web 2.0
Publishing	Participation
Personal Websites	Blogging, Social Networking
Read Only	Read and Write
Content Management Systems	Wikis
Britannica Online	Wikipedia
Directories (taxonomy)	Tagging (folksonomy)

# Limitations

- Too much information vs. Too little structure
- Heterogeneous content
- Hidden information

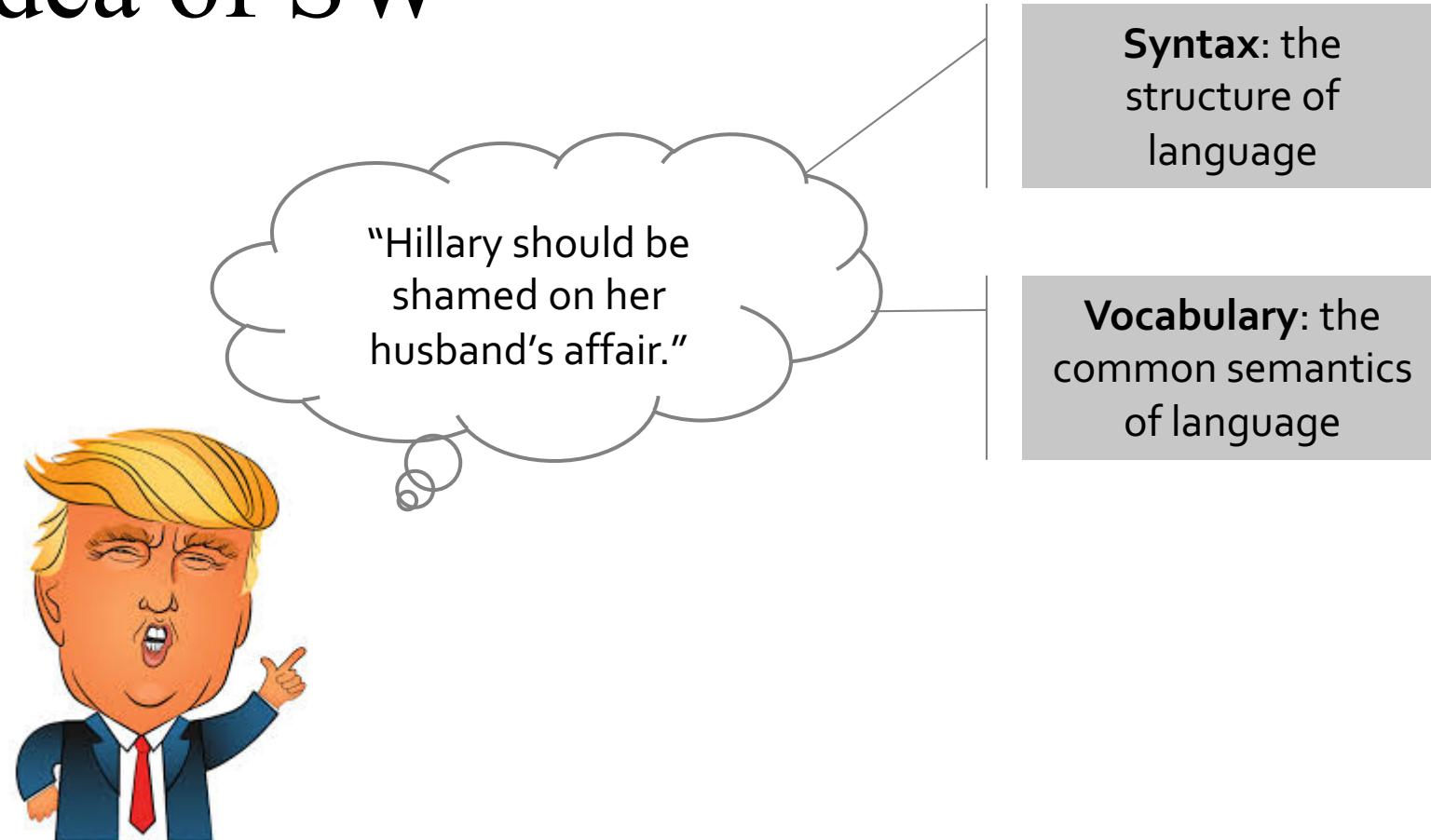
# SEMANTIC WEB



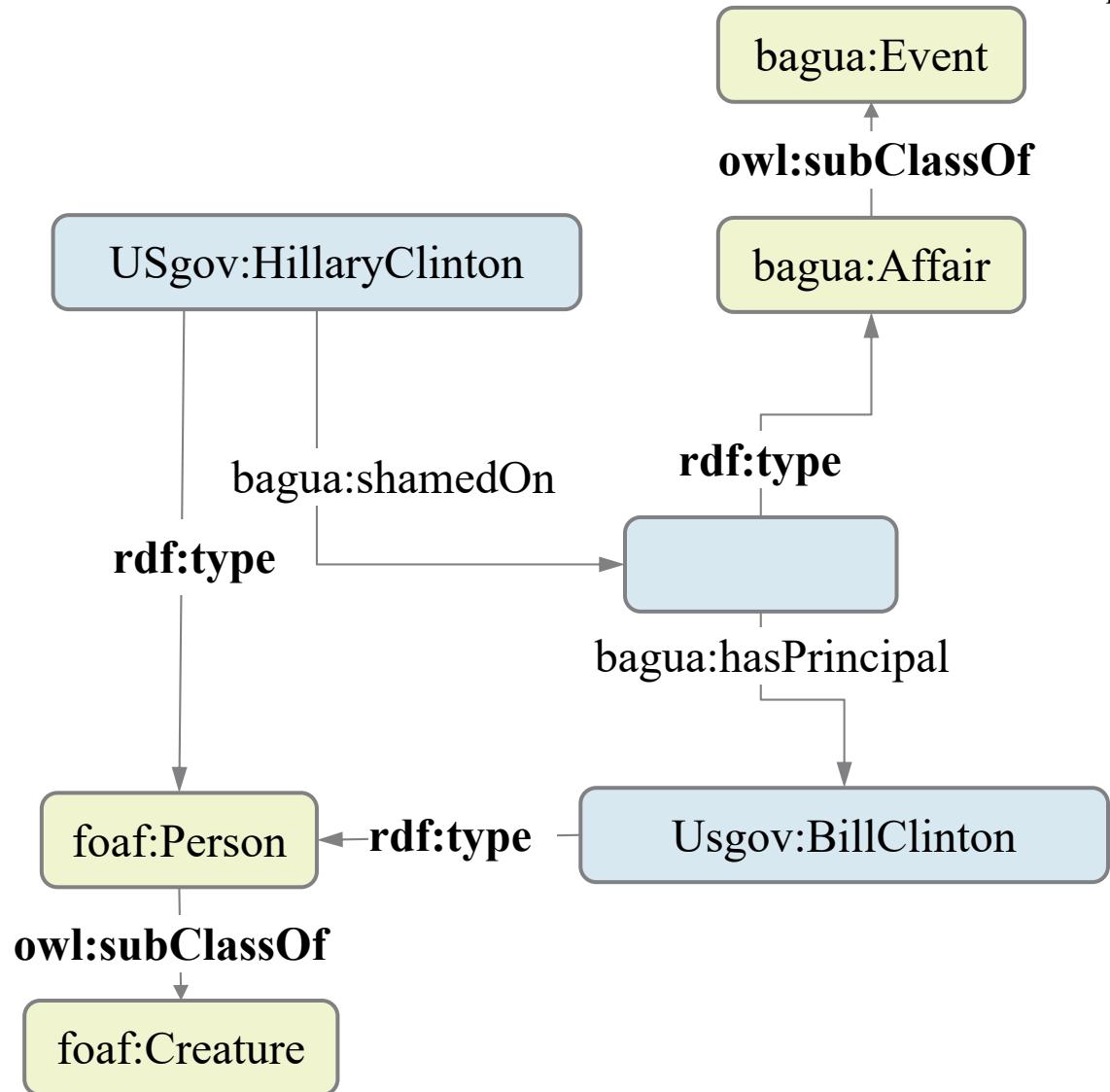
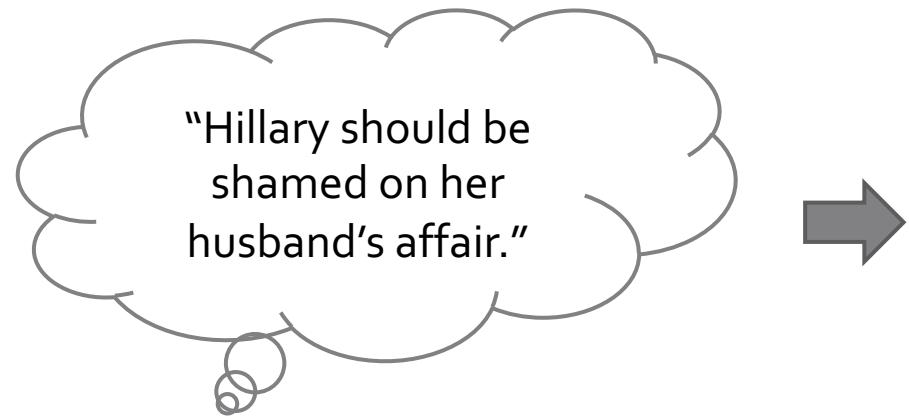
# From WWW to Semantic Web

	WWW	Semantic Web
Analogy	A global file system	A global database
Designed for	Human consumption	Machine 1st, Human 2nd
Primary objects	Documents	Things
Links between	Documents	Things
Structure	Fairly low	High

# Basic Idea of SW



# Basic Idea of SW



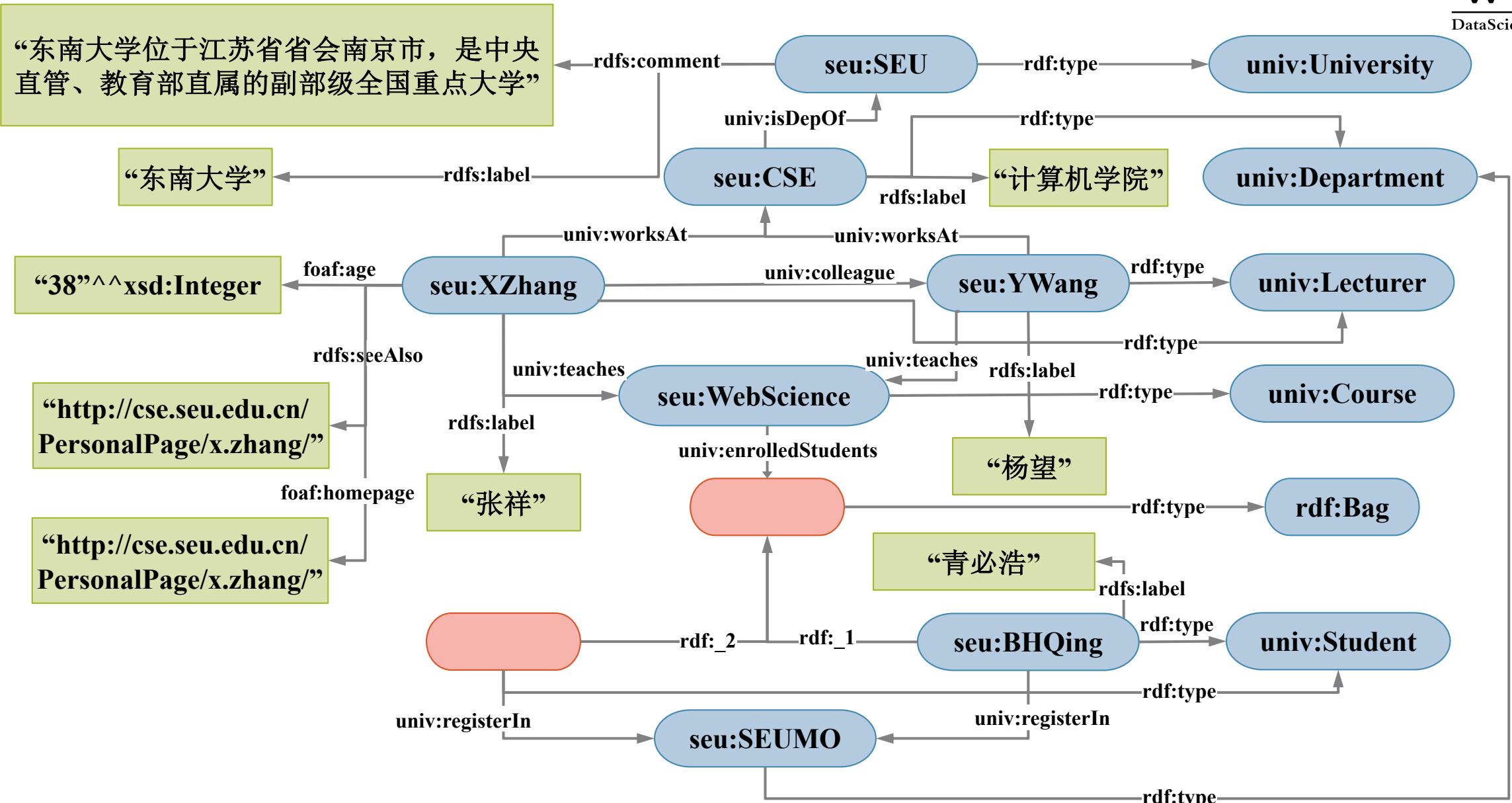
# Syntax: RDF

- RDF: Resource Description Framework
- Graph Model
- Nodes: objects, identified by URI(IRI) / blank node / literal
- Edges: relations or attributes, identified by URI(IRI)
- A triple or statement is a <subject, predicate, object> structure similar to natural language.

# Vocabulary: OWL

- Provides a language to define terms(concepts) in a vocabulary(ontology)
- Terms can be categorized into:
  - Classes
  - Properties
- The semantics in a vocabulary(ontology) defined in OWL is represented by description logic





# Resource and Triples

- Resource: nodes in RDF graph
- Triple =  $\langle subject, predicate, object \rangle$  is an edge in RDF graph
- Triples = Statements
- #triples represents the scale of RDF graph
- For example: for Bio2RDF(Life Science), #triple is over 11 Billion



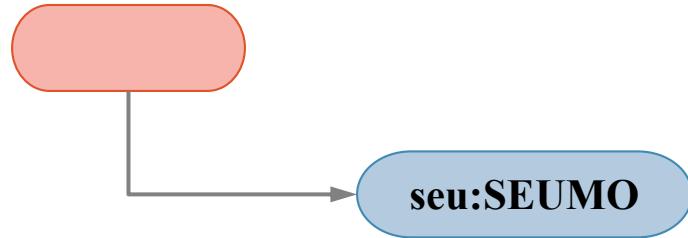
# URI

- Universal Identification for Resources
- URI ≠ URL
- Accessible and non-accessible URI
- “<http://www.seu.edu.cn/XZhang>”
  - prefix/namespace: “<http://www.seu.edu.cn/>”
  - **localname**: “XZhang”
- Abbr: seu:XZhang



# Blank nodes

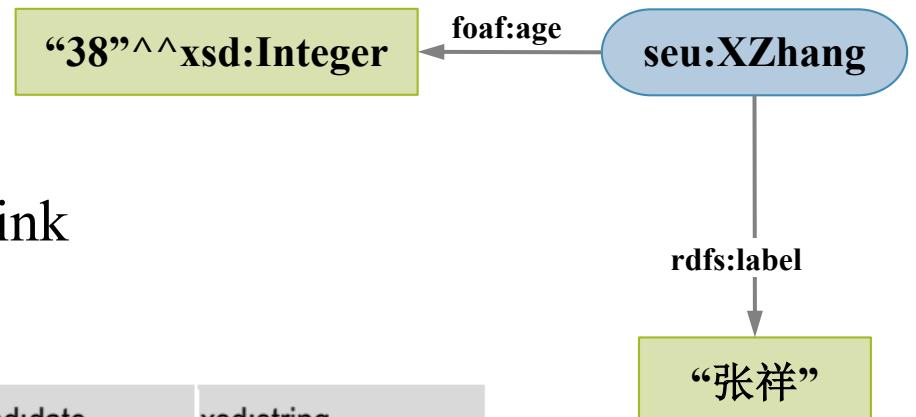
- “There is a student from SEUMO, *who* enrolled in the course of Web Science.”
- A resource without a URI
- Usually has an inner id: `_:xxx`



# Literals and XML datatypes

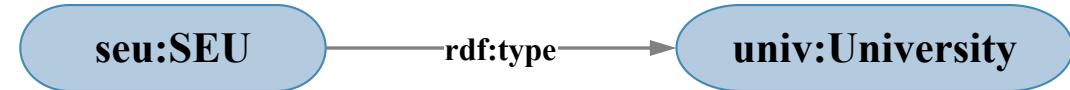
- Like primary data types in Java and C++
- A text or data description of resources
- always have **1** in-coming link and **no** out-going link
- A literal could be
  - plain text
  - typed literals

xsd:decimal	xsd:negativeInteger	xsd:anyURI	xsd:date	xsd:string
xsd:double	xsd:positiveInteger	xsd:base64Binary	xsd:dateTime	xsd:normalizedString
xsd:float	xsd:nonPositiveInteger	xsd:boolean	xsd:time	xsd:token
xsd:int	xsd:nonNegativeInteger	xsd:byte	xsd:gYearMonth	xsd:language
xsd:integer	xsd:unsignedLong	xsd:hexBinary	xsd:gYear	xsd:NMTOKEN
xsd:long	xsd:unsignedInt	xsd:unsignedByte	xsd:gMonthDay	xsd:Name
xsd:short	xsd:unsignedShort		xsd:gDay	xsd:NCName
			xsd:gMonth	



# *rdf:type*

- The most important predicate
- $\langle \text{instance}, \text{rdf:type}, \text{class} \rangle$



# *rdfs:label*

- An easy-to-read name of resources



# *rdfs:comment*

- A textual description of resources

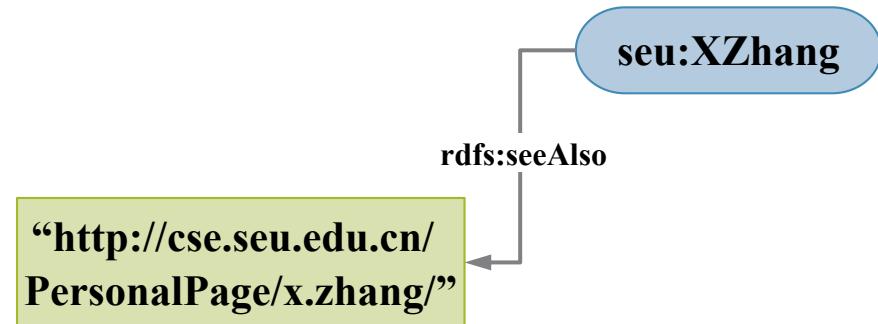
“东南大学位于江苏省省会南京市，是中央直管、教育部直属的副部级全国重点大学”

← rdfs:comment →

seu:SEU

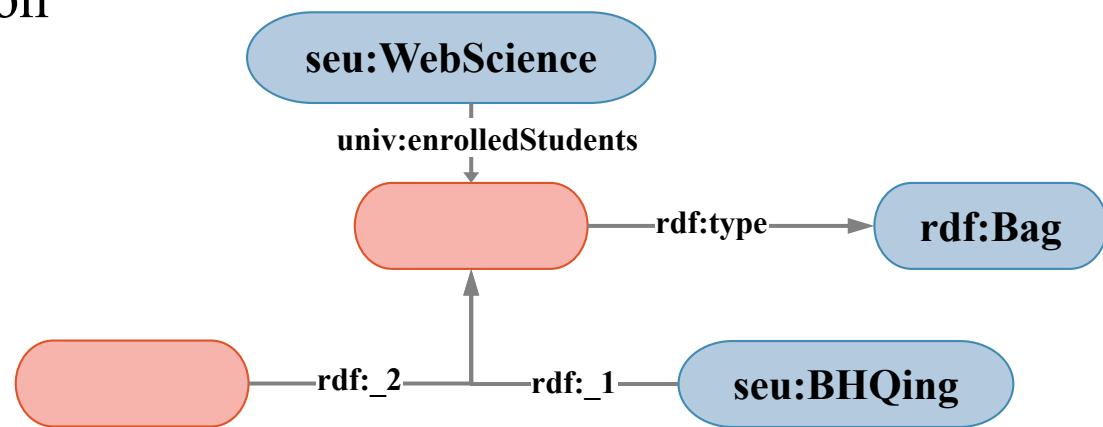
# *rdfs:seeAlso | rdfs:isDefinedBy*

- *rdfs:seeAlso*
  - “Please refer to...”
  - provides more information or citation of a resource
  
- *rdfs:isDefinedBy*
  - *sub-property of rdfs:seeAlso*
  - “Please refer to the definition from...”



# RDF Container

- Like `java.util.Collection`
- `rdf:Bag`
  - non-ordered
- `rdf:Seq`
  - ordered
- `rdf:Alt`



# Writing RDF Graphs 1: N-triple

```
<http://example.org/bob#me> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://xmlns.com/foaf/0.1/Person> .  
<http://example.org/bob#me> <http://xmlns.com/foaf/0.1/knows> <http://example.org/alice#me> .  
<http://example.org/bob#me> <http://schema.org/birthDate> "1990-07-04"^^<http://www.w3.org/2001/XMLSchema#date> .  
<http://example.org/bob#me> <http://xmlns.com/foaf/0.1/topic_interest> <http://www.wikidata.org/entity/Q12418> .  
<http://www.wikidata.org/entity/Q12418> <http://purl.org/dc/terms/title> "Mona Lisa" .
```

# Writing RDF Graphs 2: Turtle

```
BASE <http://example.org/>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX schema: <http://schema.org/>
PREFIX dcterms: <http://purl.org/dc/terms/>
PREFIX wd: <http://www.wikidata.org/entity/>

<bob#me>
  a foaf:Person ;
  foaf:knows <alice#me> ;
  schema:birthDate "1990-07-04"^^xsd:date ;
  foaf:topic_interest wd:Q12418 .
```

<https://www.w3.org/TR/turtle/>

# Writing RDF Graph 3: JSON

```
{  
  "@context": "example-context.json",  
  "@id": "http://example.org/bob#me",  
  "@type": "Person",  
  "birthdate": "1990-07-04",  
  "knows": "http://example.org/alice#me",  
  "interest": {  
    "@id": "http://www.wikidata.org/entity/Q12418",  
    "title": "Mona Lisa",  
    "subject_of": "http://data.europeana.eu/item/04802/243FA86",  
    "creator": "http://dbpedia.org/resource/Leonardo_da_Vinci"  
  }  
}
```

# Writing RDF Graph 3: RDF/XML

```
<?xml version="1.0" encoding="utf-8"?>
<rdf:RDF
    xmlns:dcterms="http://purl.org/dc/terms/"
    xmlns:foaf="http://xmlns.com/foaf/0.1/"
    xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns: schema="http://schema.org/">
    <rdf:Description rdf:about="http://example.org/bob#me">
        <rdf:type rdf:resource="http://xmlns.com/foaf/0.1/Person"/>
        <schema: birthDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1990-07-04</schema: birthDate>
        <foaf: knows rdf:resource="http://example.org/alice#me"/>
        <foaf: topic_interest rdf:resource="http://www.wikidata.org/entity/Q12418"/>
    </rdf:Description>
    <rdf:Description rdf:about="http://www.wikidata.org/entity/Q12418">
        <dcterms: title>Mona Lisa</dcterms: title>
        <dcterms: creator rdf:resource="http://dbpedia.org/resource/Leonardo_da_Vinci"/>
    </rdf:Description>
    <rdf:Description rdf:about="http://data.europeana.eu/item/04802/243FA8618938F4117025F17A8B813C5F9AA4D619">
        <dcterms: subject rdf:resource="http://www.wikidata.org/entity/Q12418"/>
    </rdf:Description>
</rdf:RDF>
```

# Parsing RDF using RDFLib



```
import rdflib

g = rdflib.Graph()
result = g.parse("http://www.w3.org/People/Berners-Lee/card")
# parse a given RDF graph in a remote file

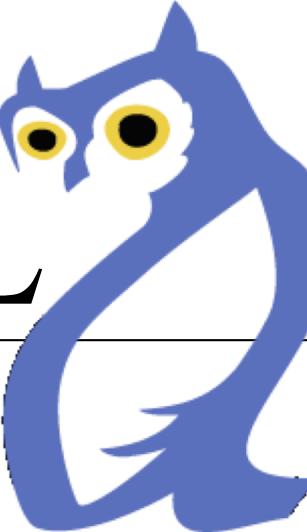
print("graph has %s statements." % len(g))
# shows the number of triples in this graph

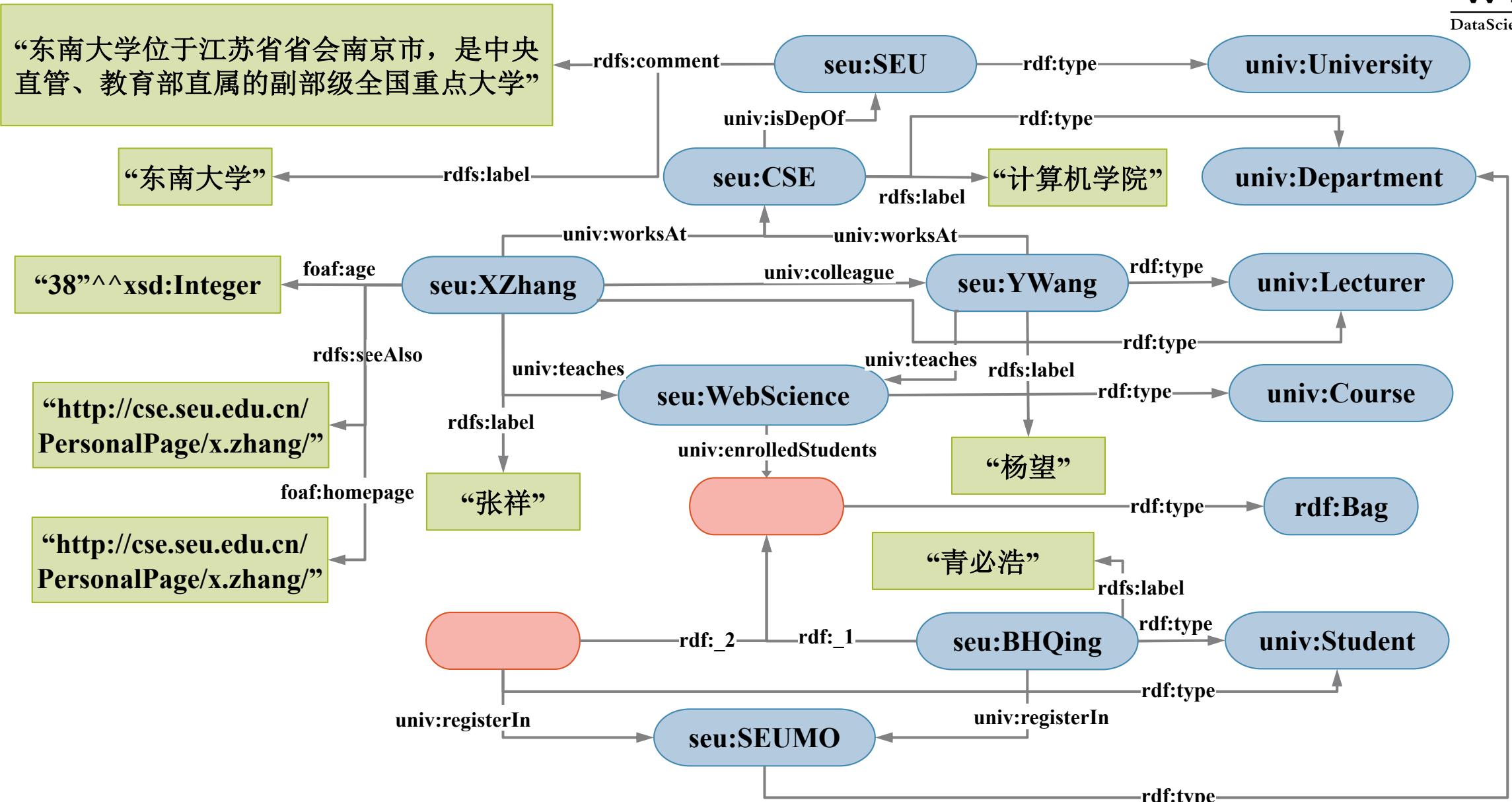
s = g.serialize(format='n3')
print s
# print all the triples in this graph
```

**RDFLib:**  
<http://rdflib.readthedocs.io/en/stable/>

# RDFS&OWL

---

A stylized blue owl logo with large yellow eyes and a white wing-like shape on its chest.



# How many vocabularies?

- *rdf:type*
- *rdf:Bag*
- *rdf:\_1*
- *rdf:\_2*
- *rdfs:label*
- *rdfs:comment*
- *rdfs:seeAlso*
- *foaf:age*
- *foaf:homepage*

RDF/RDFS/FOAF

**Building Vocabularies**

- *univ:University*
- *univ:Department*
- *univ:Lecturer*
- *univ:Course*
- *univ:Student*
- *univ:colleague*
- *univ:isDepOf*
- *univ:worksAt*
- *univ:enrolledStudents*
- *univ:registerIn*

University

**User Defined Vocabularies**

# General Build-in Vocabularies

- RDF / RDFS
- OWL (Web Ontology Language) – vocabulary of description logic (描述逻辑)
- FOAF (Friend of a Friend) – vocabulary of social networking, personal information
- DC (Dublin Core) – vocabulary of web resources
- SKOS (Simple Knowledge Organization System) – a simplified vocabulary of things

# Defining Vocabularies

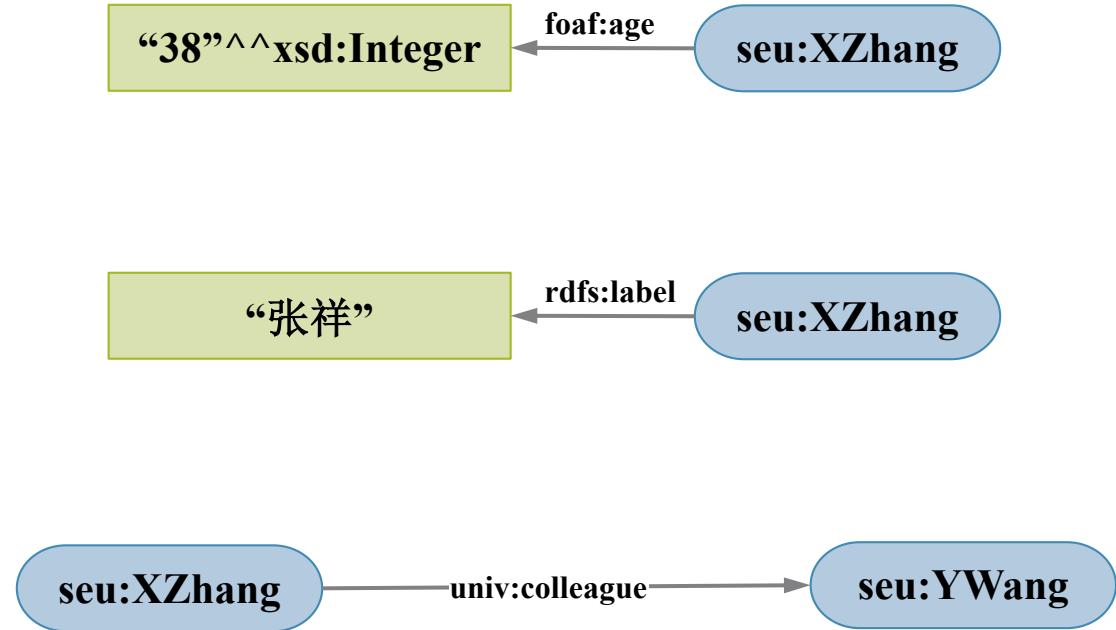
- Class
  - Defining hierarchical concepts
- *Property*
  - *Defining hierarchical relations or attributes*
- Instance
  - individuals

# Defining Classes

- *rdfs:subClassOf*
  - <univ: Lecturer, *rdfs: subClassOf*, foaf: Person>
  - <univ: University, *rdfs: subClassOf*, foaf: Organization>
- *owl:equivalenClass*
  - <univ: University, *owl:equivalenClass*, yago: University>
- *owl:disjointWith*
  - <univ: MaleStudent, *owl:disjointWith*, univ: FemaleStudent>
- Others: *owl:one of*, *owl:intersectionOf*, *owl:unionOf*, *owl:complementOf*...

# Data / Annotation/ Object Properties

- Predicates in RDF graph
- Data Property
  - properties whose objects are typed literals
  - also called: “[data attributes](#)”
  - *foaf:age*
- Annotation Property
  - properties whose objects are literals
  - also called: “[annotation attributes](#)”
  - *rdfs:label* / *rdfs:comment*
- Object Property
  - properties whose objects are URI / Bnodes
  - also called: “[relations](#)”
  - *univ:colleague*



# Defining Properties

- *rdfs:subPropertyOf*
  - $\langle \text{univ:isDepOf}, \text{rdfs:subPropertyOf}, \text{skos:isPartOf} \rangle$
- *rdfs:domain / rdfs:range*
  - $\langle \text{univ:registerIn}, \text{rdfs:domain}, \text{univ:Student} \rangle$
  - $\langle \text{univ:registerIn}, \text{rdfs:range}, \text{univ:Department} \rangle$
- *owl:inverseOf*
  - $\langle \text{univ:registerIn}, \text{owl:inverseOf}, \text{univ:hasRegisteredStudent} \rangle$

# Thing and *owl:sameAs*

- Thing is a super class of all classes
  - like java.lang.Object
- *owl:sameAs*: equivalence of instances
  - $\langle w3c:TimBL, \textcolor{blue}{owl:sameAs}, dbpedia:TimBernersLee \rangle$

# Special Types of Properties

- Functional Property

- $\langle a, p, b \rangle, \langle a, p, c \rangle \rightarrow \langle b, \text{owl: sameAs}, c \rangle$  “我只有一个身份证”

- Symmetric Property

- $\langle a, p, b \rangle \rightarrow \langle b, p, a \rangle$  “我和你成婚， 所以你也和我成婚”

- Transitive Property

- $\langle a, p, b \rangle, \langle b, p, c \rangle \rightarrow \langle a, p, c \rangle$  “先人之先人亦为先人”

# Advanced Topic 1: Complex Class

```
<family: Mother, owl:intersectionOf, _:001>
  <_:001, rdf:first, family: Female>
  <_:001, rdf:rest, family: Parent>
```

# Advanced Topic 2: Property Restriction

```
<family: Parent, owl: equivalentClass, _: 001>
  <_: 001, rdf: type, owl: Restriction>
    <_: 001, owl: onProperty, family: hasChild>
    <_: 001, owl: someValuesFrom, family: Children>
```

# Advanced Topic 3: Cardinality Restriction

```
<univ: hasRegisteredStudents, rdfs: domain, univ: Department>
  <univ: hasRegisteredStudents, rdfs: range, univ: Student>
  <univ: hasRegisteredStudents, owl: minCardinality, "10">
  <univ: hasRegisteredStudents, owl: maxCardinality, "150">
```

# Reasoning in Description Logic

Actor  $\sqsubseteq$  Artist

married  $\sqsubseteq$  loves

married(angelina, brad)

Polygamist  $\sqsubseteq \geqslant 2.\text{Married}.\top$

$\exists \text{Married.}\{\text{brad}\} \sqsubseteq \{\text{angelina}\}$

# Comparing SW with OOP

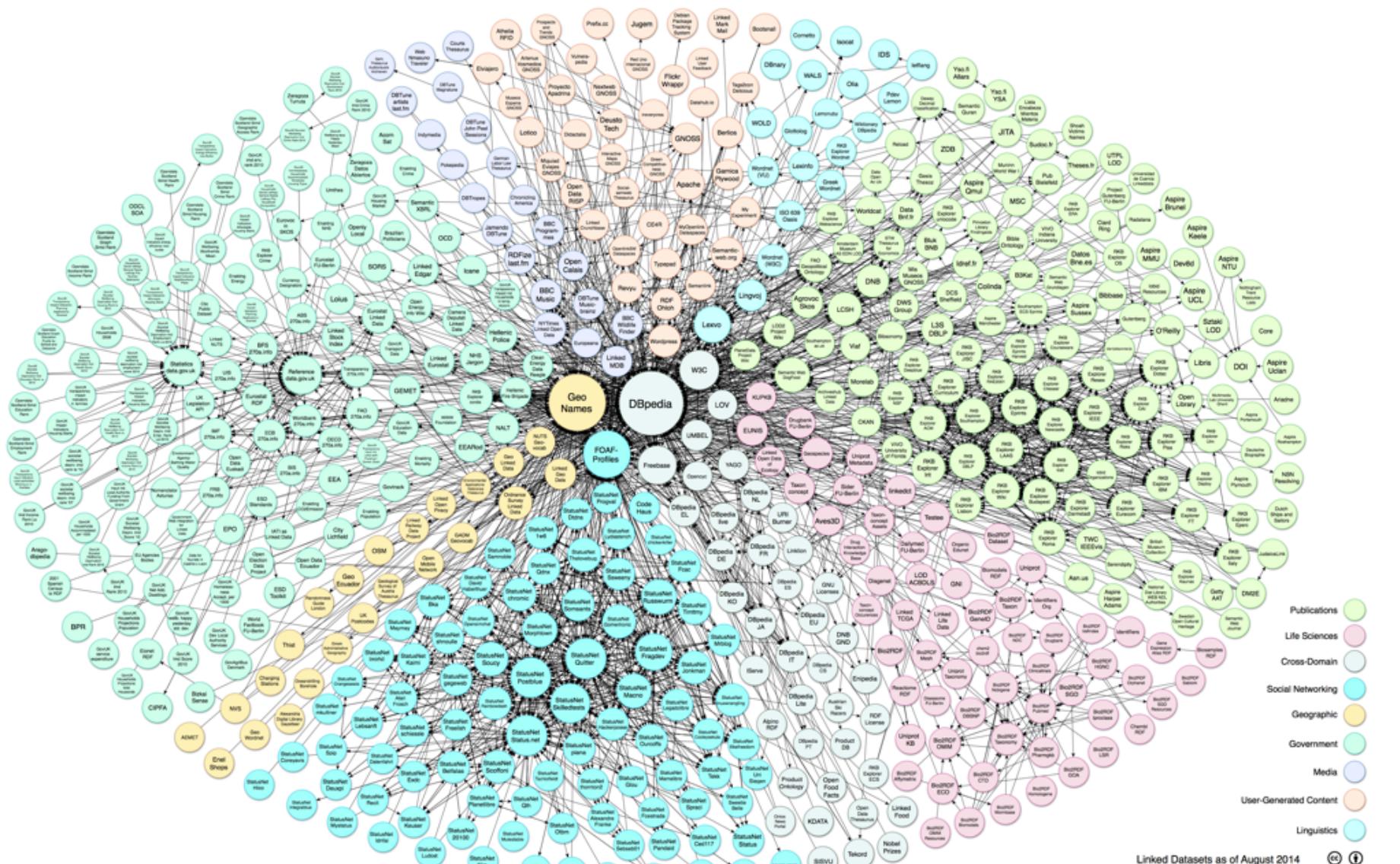
SW	≈	OOP
instance	≈	object
Class	≈	Class
Property	≈?	methods
Thing	≈	java.lang.Object
Literal	≈	primary data type
RDF Container	≈	java.util.Collection

# Two data models using RDF and OWL

- Linked Data
  - proposed by academic community
- Knowledge Graph
  - proposed by industry

# Linked Data

- Data is collected from database or knowledge base
- Four principles
  - use [URIs](#) as names for things
  - use [HTTP URIs](#) so that people can look up those names
  - when someone looks up a URI, provide [useful information](#), using the standards (RDF\*, SPARQL)
  - include [links](#) to other URIs. so that they can discover more things.



# Knowledge Graph

Google Brad Pitt

全部 图片 新闻 视频 地图 更多

设置 工具

找到约 49,200,000 条结果 (用时 0.64 秒)

**墨·彼特- 维基百科, 自由的百科全书**  
<https://zh.wikipedia.org/zh/%E5%9B%BD-%E6%88%91> 转为简体网页

威廉·布萊德利·彼特 (英语: William Bradley Pitt, 1963年12月18日 – )，暱稱布萊德·彼特 (Brad Pitt)，美國男演員及電影制片人。憑科幻片《十二只猴子》(1995)首次奪 ...

**Brad Pitt - Wikipedia**  
[https://en.wikipedia.org/wiki/Brad\\_Pitt](https://en.wikipedia.org/wiki/Brad_Pitt) 翻译此页

William Bradley Pitt (born December 18, 1963) is an American actor and producer. He has received multiple awards and nominations including an Academy ...

Angelina Jolie · Brad Pitt filmography · List of awards and ... · Douglas Pitt

**Brad Pitt - IMDb**  
[www.imdb.com/name/nm0000093/](http://www.imdb.com/name/nm0000093/) 翻译此页

Brad Pitt, Actor: Inglourious Basterds. An actor and producer known as much for his versatility as he is for his handsome face, Golden Globe-winner Brad Pitt's ...

**布拉德·皮特 (美国电影男演员) - 百度百科**  
<https://baike.baidu.com/item/布拉德·皮特>

布拉德·皮特 (Brad Pitt)，1963年12月18日出生于美国俄克拉荷马州，美国电影演员、制片人。1987年，皮特以临时演员的身份参加了他的第一部电影《无主地》的 ...

早年经历 · 演艺经历 · 个人生活 · 参演电影



布拉德·皮特

演员

威廉·布萊德利·彼特，暱稱布萊德·皮特，美國男演員及電影制片人。凭科幻片《十二只猴子》首次夺得金球奖最佳电影男配角及奥斯卡最佳男配角提名、剧情片《燃情岁月》、《通天塔》等亦获金球奖最佳电影男主角和最佳电影男配角提名。[维基百科](#)

生于: 1963 年 12 月 18 日 (53 岁)，美国俄克拉荷马州肖尼

身高: 1.8 米

配偶: 安吉丽娜·朱莉 (结婚时间: 2014 年), 珍妮佛·安妮斯顿 (结婚时间: 2000 年-2005 年)

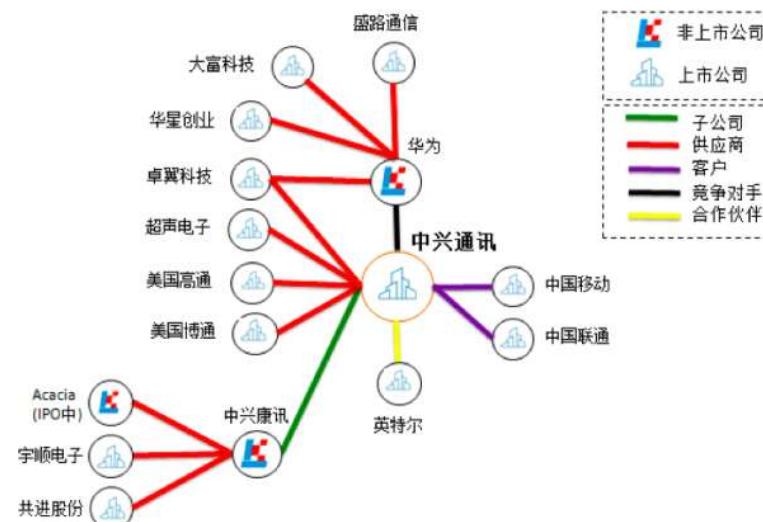
子女: 希洛·努维尔·朱莉·皮特, 麦多克斯·奇万·朱莉·皮特, [更多](#)

# Knowledge Graph

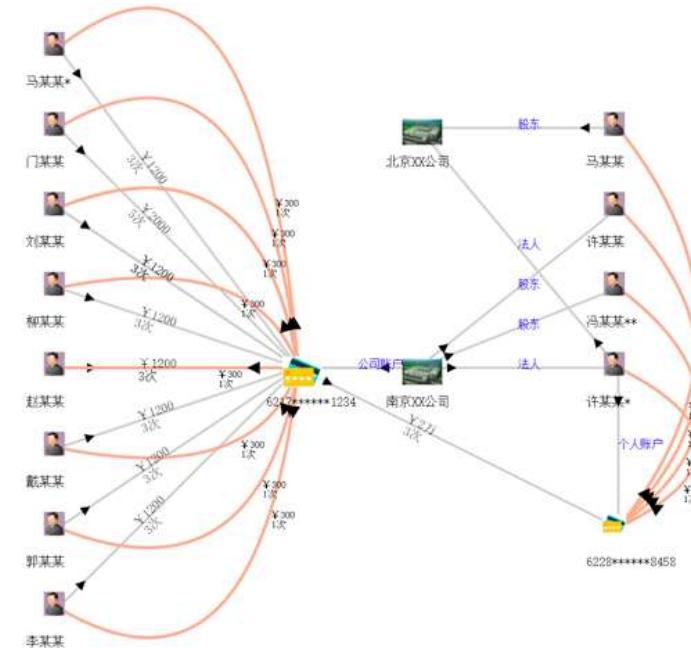
- proposed by Google
- extracted from un-structured or semi-structured data

# Applications of Knowledge Graph

股票投资分析



公安情报分析

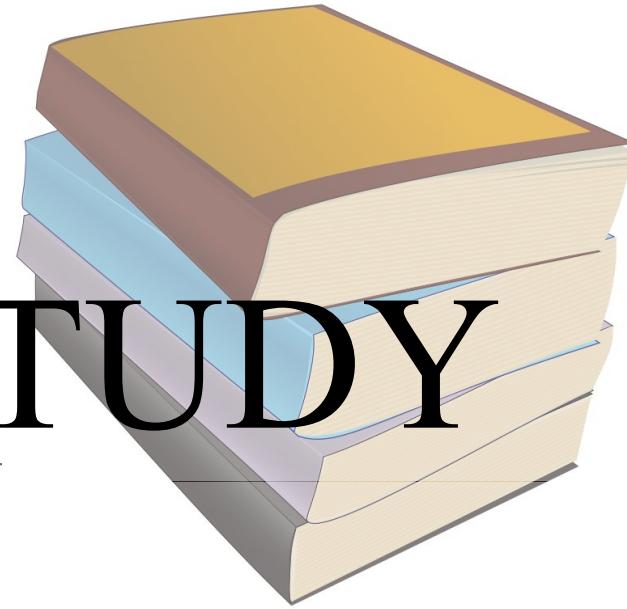


credit to:漆桂林

In the Future...

**Everything is graph.**

# SELF-STUDY



# Python

- “笨办法”学Python（零基础）
  - <https://book.douban.com/subject/26264642/>
- Python基础教程（入门）
  - <https://book.douban.com/subject/25880388/>
- 利用Python进行数据分析
  - <https://book.douban.com/subject/25779298/>

# Data Science

- 机器学习实战
  - <https://book.douban.com/subject/24703171/>
- 周志华: 机器学习
  - <https://book.douban.com/subject/26708119/>
- 网络科学引论
  - <https://book.douban.com/subject/25970086/>

# Web and Semantic Web (1)

- CCTV Documentary “互联网时代”
- TED Talk Playlist: Internet Origin Stories
  - [https://www.ted.com/playlists/365/internet\\_origin\\_stories](https://www.ted.com/playlists/365/internet_origin_stories)
- TED Talk – Tim Berners-Lee: The Next Web (2009)
  - [https://www.ted.com/talks/tim\\_berners\\_lee\\_on\\_the\\_next\\_web](https://www.ted.com/talks/tim_berners_lee_on_the_next_web)
- TED Talk - Tim Berners-Lee: The Year Open Data Went Worldwide (2010)
  - [https://www.ted.com/talks/tim\\_berners\\_lee\\_the\\_year\\_open\\_data\\_went\\_worldwide](https://www.ted.com/talks/tim_berners_lee_the_year_open_data_went_worldwide)
- TED Talk - Tim Berners-Lee: A Magna Carta for the Web (2014)
  - [https://www.ted.com/talks/tim\\_berners\\_lee\\_a\\_magna\\_carta\\_for\\_the\\_web](https://www.ted.com/talks/tim_berners_lee_a_magna_carta_for_the_web)

# Web and Semantic Web (2)

- TED Talk – Larry Page: Where is Google Going Next?
  - [https://www.ted.com/talks/larry\\_page\\_where\\_s\\_google\\_going\\_next](https://www.ted.com/talks/larry_page_where_s_google_going_next)
- IBM Watson and Jeopardy in 2011
  - How Watson works? | Jeopardy 2011 contest footage
- TED Talk – Stephen Wolfram and WolframAlpha
  - [https://www.ted.com/talks/stephen\\_wolfram\\_computing\\_a\\_theory\\_of\\_everything](https://www.ted.com/talks/stephen_wolfram_computing_a_theory_of_everything)
  - <http://www.wolframalpha.com/>



# Semantic Web

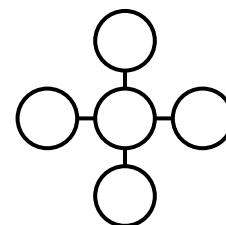
- RDF / RDFS
  - RDF Primer (in Chinese): <http://zh.transwiki.org/cn/rdfprimer.htm>
  - RDF Primer 1.1 (in English): <https://www.w3.org/TR/2014/NOTE-rdf11-primer-20140624/>
- OWL
  - OWL2 Primer (in Chinese): <http://nkos.lib.szu.edu.cn/OWL2/OWL2PrimerSimplifiedChinese.htm>
- SPARQL
  - SPARQL Overview(in Chinese): <http://www.chinaw3c.org/REC-sparql11-overview-20130321-cn.html>
- RDFLib / Jena
- DBpedia / YAGO

# ASSIGNMENT

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# Distance Measurement



- Given two strings representing two entities, for example “LeBron James” and “Dwyane Wade”,
- How to **automatically** measure their distance  $\mathcal{D}(x, y) \in [0,1]$ ?
- Preserving  $\mathcal{D}(x, y) < \mathcal{D}(y, z)$  if  $x$  is more related to  $y$  than  $z$ .
- Paper writing: a team paper can be collaborated written including:
  - abstract / problem definition / approach overview
  - details of algorithms / experiments / related works / reference
- Latex Format: Springer Lecture Notes in Computer Science (LNCS)
- Due: Lecture 2
- Some teams will be randomly selected to present their work and demo in Lecture 2.

# The history of [Web/Web Language/Social Networks/Web Browser]

- Select one subject in: Web, Web language, social networks, web browser.
- Give a presentation about the history of [your selection].
- Due: Lecture 2
- Some teams will be randomly selected to present their work and demo in Lecture 2.

# Google Scholar and Web Library

## Find and Manage Your Reference

Google 学术搜索

**文章** 找到约 5,720,000 条结果 (用时 0.12 秒)

**时间不限**

2019以来  
2018以来  
2015以来  
自定义范围...

**按相关性排序**  
按日期排序

**不限语言**  
中文网页  
简体中文网页

**包括专利**  
**包含引用**

**创建快讯**

[\[PDF\] Internet: Diameter of the world-wide web](#)  
R Albert, H Jeong, AL Barabási - nature, 1999 - nature.com  
Despite its increasing role in communication, the **World-Wide Web** remains uncontrolled: any individual or institution can create a website with any number of documents and links. This unregulated growth leads to a huge and complex **web**, which becomes a large directed ...  
☆ 49 被引用次数: 5529 相关文章 所有 41 个版本

[\[图书\] Weaving the Web: The original design and ultimate destiny of the World Wide Web by its inventor](#)  
T Berners-Lee, M Fischetti - 2001 - dl.acm.org  
Tim Berners-Lee, the inventor of the **World Wide Web**, has been hailed by Time magazine as one of the 100 greatest minds of this century. His creation has already changed the way people do business, entertain themselves, exchange ideas, and socialize with one ...  
☆ 49 被引用次数: 4902 相关文章 所有 9 个版本

[\[PDF\] World Wide Web](#)  
T Berners-Lee, D Dimitroyannis... - Computers in ..., 1994 - aip.scitation.org  
Clean Fortran 90 introduces a wealth of new features that make programs easier to design, write and maintain, and provides many previously unavailable capabilities. VAST-90 brings you all the way into the new world of Fortran 90 by giving you both a full Fortran 90 compiler ...  
☆ 49 被引用次数: 1897 相关文章 所有 15 个版本

[\[PDF\] Extending the TAM for a World-Wide-Web context](#)  
JW Moon, YG Kim - Information & management, 2001 - Elsevier  
Ease of use and usefulness are believed to be fundamental in determining the acceptance and use of various, corporate ITs. These beliefs, however, may not explain the user's behavior toward newly emerging ITs, such as the **World-Wide-Web** (WWW). In this study, we ...  
☆ 49 被引用次数: 4153 相关文章 所有 9 个版本

东南大学图书馆 Southeast University Library

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总表 按字母 按学科 按文献类型 按语种

外文数据库

ACM (美国计算机学会)	ACS (美国化学会) / 期刊全文
AIP (美国物理联合会)	AMA (美国医学会)
AMS (美国数学会)	Annual Reviews自然科学包 <small>new</small>
APS (美国物理学会)	ASCE (美国土木工程师学会)
ASME (美国机械工程师学会)	ASM (美国微生物学会) <small>new</small>
ASTM (美国材料与测试协会) / 标准等	BEP电子教材
Best Practice (BMJ循证医学库)	BMJ电子期刊
CADIC力学中工教材	CALIC机械工程与力学教材