

Open Science enabled by Text Mining

Sophia Ananiadou

National Centre for Text Mining

www.nactem.ac.uk

School of Computer Science

The University of Manchester

Science Ouverte et Fouille de Textes

“Les mots nous cachent davantage les choses invisibles qu’ils ne nous révèlent les visibles” (Camus)

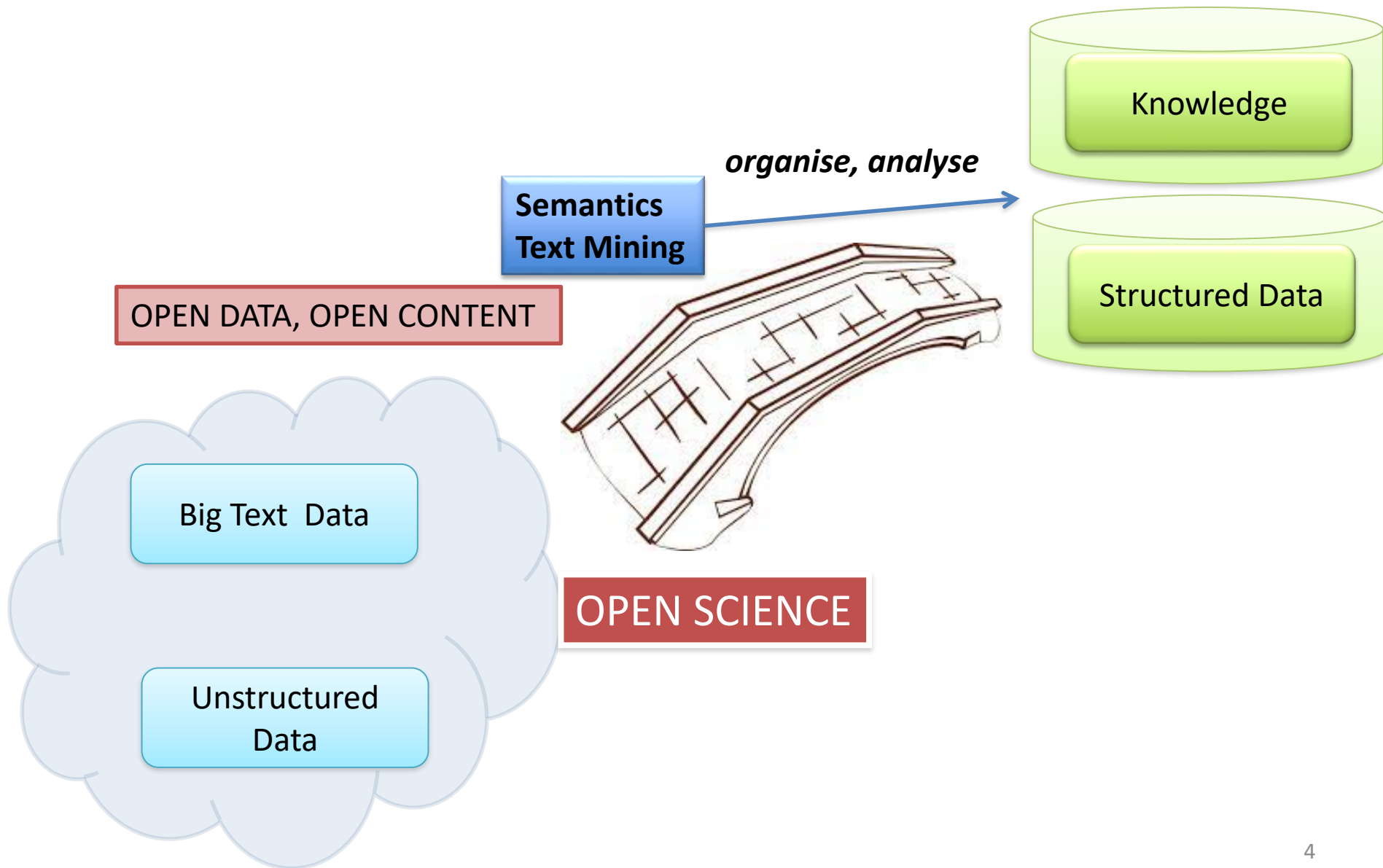
*“ [...] on a des instruments à portée de main qui, si correctement développés, donneront accès aux et la maîtrise des connaissances héritées des âges.” (Préface à l’article de Vannevar Bush “As we may think”, *The Atlantic*, juillet 1945)*

What hinders Open Science?

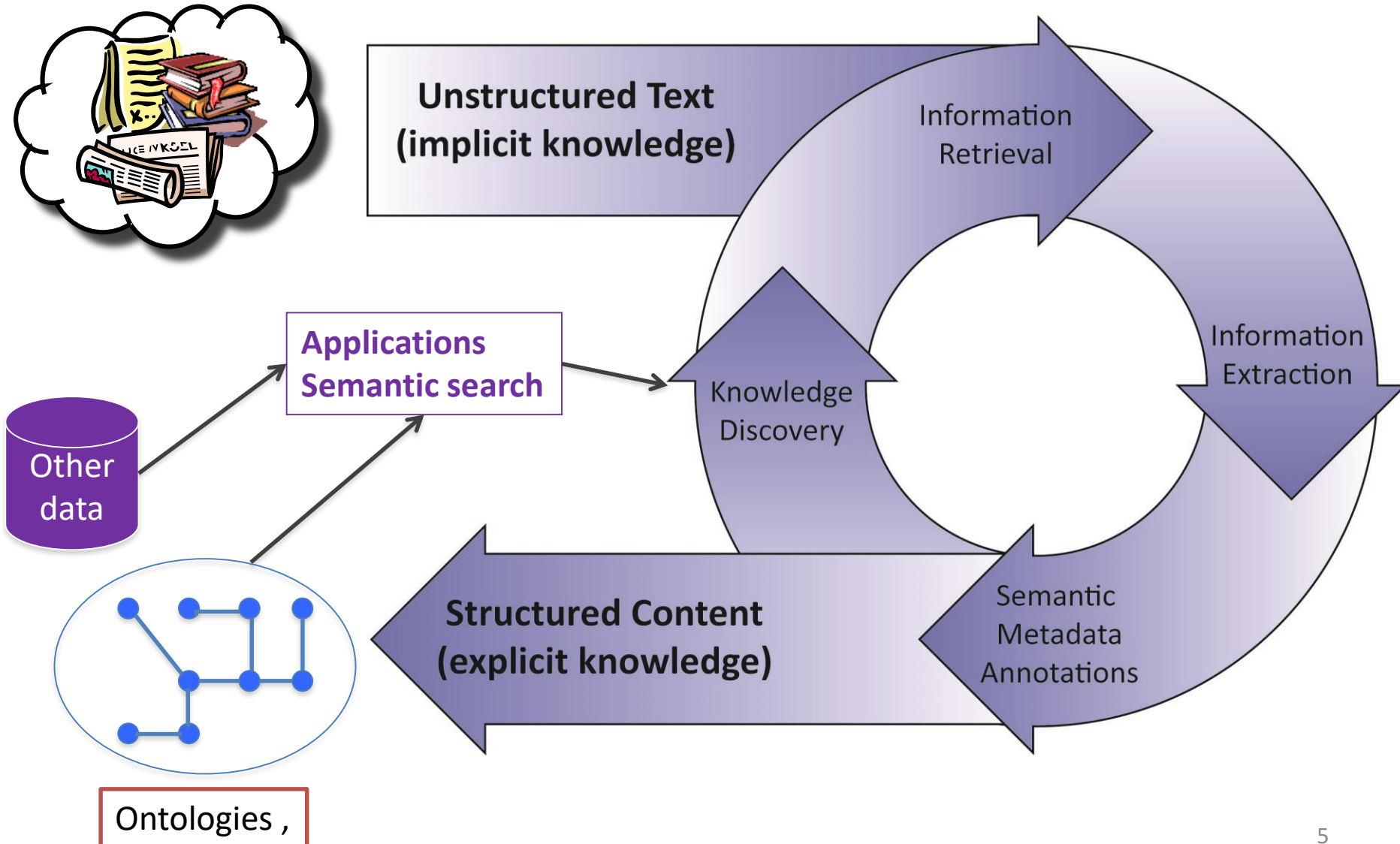
- Silos, fragmentations, literature grows daily
- We cannot read faster, we read more narrowly..
- Reductionist approaches, incomplete and uncertain information, complex problem space
- We cannot make **links** between disciplines

Scientific discovery by serendipity?

Big Textual Data



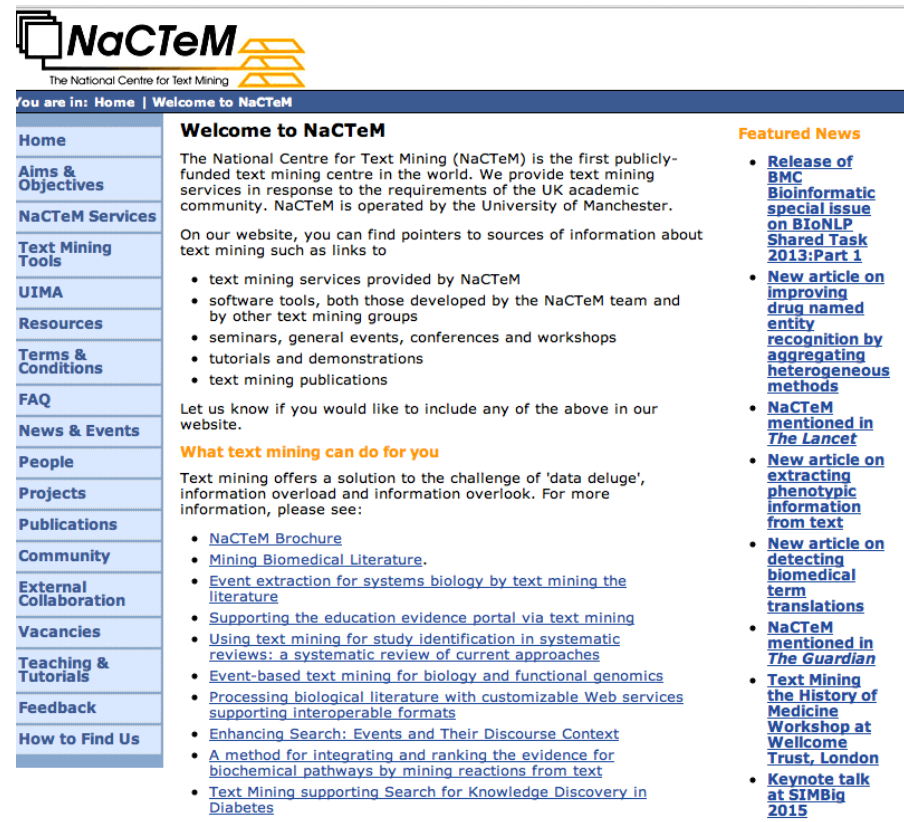
Text Mining



UK National Centre for Text Mining

- 1st publicly funded national text mining centre
- Location: Manchester Institute of Biotechnology
- Phase I - Biology (2005-2008)
- Phase II - Biology, Medicine, Social Sciences (2008-2011)
- Phase III – Biology, Medicine, Health, Biodiversity, Humanities, Social Sciences; Fully sustainable centre (2011-)

www.nactem.ac.uk



The screenshot shows the NaCTeM website homepage. The header features the NaCTeM logo and the tagline 'The National Centre for Text Mining'. Below the header is a navigation bar with links: 'You are in: Home | Welcome to NaCTeM'. A left sidebar contains a list of links: Home, Aims & Objectives, NaCTeM Services, Text Mining Tools, UIMA, Resources, Terms & Conditions, FAQ, News & Events, People, Projects, Publications, Community, External Collaboration, Vacancies, Teaching & Tutorials, Feedback, and How to Find Us. The main content area is titled 'Welcome to NaCTeM' and contains a paragraph about the center's mission, a list of services provided, and a section titled 'What text mining can do for you' with a list of links to various resources. A right sidebar titled 'Featured News' lists several recent publications and events, including a release of a BMC Bioinformatic special issue, a new article on improving drug named entity recognition, NaCTeM mentioned in The Lancet, a new article on extracting phenotypic information, NaCTeM mentioned in The Guardian, and a text mining workshop at Wellcome Trust, London.

NaCTeM
The National Centre for Text Mining

You are in: Home | Welcome to NaCTeM

Welcome to NaCTeM

The National Centre for Text Mining (NaCTeM) is the first publicly-funded text mining centre in the world. We provide text mining services in response to the requirements of the UK academic community. NaCTeM is operated by the University of Manchester.

On our website, you can find pointers to sources of information about text mining such as links to

- text mining services provided by NaCTeM
- software tools, both those developed by the NaCTeM team and by other text mining groups
- seminars, general events, conferences and workshops
- tutorials and demonstrations
- text mining publications

Let us know if you would like to include any of the above in our website.

What text mining can do for you

Text mining offers a solution to the challenge of 'data deluge', information overload and information overlook. For more information, please see:

- [NaCTeM Brochure](#)
- [Mining Biomedical Literature.](#)
- [Event extraction for systems biology by text mining the literature](#)
- [Supporting the education evidence portal via text mining](#)
- [Using text mining for study identification in systematic reviews: a systematic review of current approaches](#)
- [Event-based text mining for biology and functional genomics](#)
- [Processing biological literature with customizable Web services supporting interoperable formats](#)
- [Enhancing Search: Events and Their Discourse Context](#)
- [A method for integrating and ranking the evidence for biochemical pathways by mining reactions from text](#)
- [Text Mining supporting Search for Knowledge Discovery in Diabetes](#)

Featured News

- [Release of BMC Bioinformatic special issue on BioNLP Shared Task 2013:Part 1](#)
- [New article on improving drug named entity recognition by aggregating heterogeneous methods](#)
- [NaCTeM mentioned in The Lancet](#)
- [New article on extracting phenotypic information from text](#)
- [New article on detecting biomedical term translations](#)
- [NaCTeM mentioned in The Guardian](#)
- [Text Mining the History of Medicine Workshop at Wellcome Trust, London](#)
- [Keynote talk at SIMBig 2015](#)

Text Mining for Open Science

Tools, Resources, Infrastructure, Services

- **Tools** for extracting concepts, relations, events, epistemic knowledge
- **Resources:** lexical repositories, annotated data stores
- Supporting semantic search, developing models, experiments, knowledge discovery, hypothesis generation
- Interoperable **infrastructure**

Communities

- Biology
- Medicine
- Digital Humanities
- Computational Social Science
- Biodiversity
- Chemistry
- Public Health
- Pharmacovigilance
-

Semantic search from PubMed

Thalia: Text Mining for Highlighting, Aggregating, and Linking Information in Articles

- Eight different types: chemicals, diseases, drugs, genes, metabolites, proteins, species and anatomical entities
- Covers entire PubMed
 - Over 26M abstracts
 - Automatic daily updates

Nactem-copious.man.ac.uk

Soto, Przybyla, Ananiadou
2018 Bioinformatics

Beyond keyword search

Thalia

cat

125679 abstracts found in 0.22 seconds

▼ Year

▼ Journal

▼ Author

▼ Type

▼ MeSH

▼ Chemical

▼ Metabolite

▼ Protein

▼ Species

▼ Anatomical

Ovarian tissue culture in the presence of TGF- β and fetuin stimulates follicle growth and steroidoge...
The Journal of endocrinology - 2017
... + VEGFA165 groups, we observed a high level of total antioxidant capacity, and an increase in SOD1 and CAT ...

Oxidative stress of imidaclothiz on earthworms (Eisenia fetida) ...
Comparative biochemistry and physiology - 2017
... Oxidative stress of imidaclothiz on earthworms (Eisenia fetida) ...

ITRAQ-based proteomic analysis of the effect of oxidative stress on the liver of earthworms (Eisenia fetida) ...
Journal of proteomics - 2017
... of action against Bacillus cereus.H, reactive oxygen species (ROS), the activities of catalase (CAT) ... resulting from downregulation of antioxidant proteins, especially CAT and SOD. BIOLOGICAL SIGNIFICANCE ...

Mechanisms underlying toxicity and stimulatory role of single-walled carbon nanotubes in Hyoscyamus...
Journal of hazardous materials - 2017
... of changes in the expression of various antioxidant enzymes including SOD, POD, CAT, and APX, and also ...

Physiological and biochemical effects of nickel on rainbow trout (Oncorhynchus mykiss) tissues: Ass...
Chemosphere - 2017
... of superoxide dismutase (SOD), catalase (CAT) enzyme activity and of lipid peroxidation (LPO), and glutathione ... in LPO indicating peroxidative damage and antioxidant enzymes SOD and CAT activity in tissues (p ... < 0.05), but 2 mg/Ni concentration caused a significant decrease in CAT activity in kidney tissues (p ...

Chronic effects of triclocarban in the amphipod Gammarus locusta: Behavioural and biochemical impai...
Ecotoxicology and environmental safety - 2017
... markers of oxidative stress (catalase (CAT), glutathione-s-transferase (GST) and lipid peroxidation ...

Molecular detection of severe fever with thrombocytopenia syndrome virus (SFTSV) in feral cats from...
Ticks and tick-borne diseases - 2017
... Molecular detection of severe fever with thrombocytopenia syndrome virus (SFTSV) in feral cats from ... Seoul, Korea.This study tested serum samples of feral cats from a highly urbanized habitat, Seoul ... 126 samples tested, SFTSV was detected by RT-PCR in 22 (17.5%) cats from various sites of Seoul ...

This search strategy returns 125,679 abstracts
Unnecessary workload

Search based on semantic types

Thalia



Article meta-data

Year

Journal

Author

Type

MeSH

Named entities

Chemicals

Diseases

Drugs

Genes

Metabolites

Proteins

Species

Anatomic

CAT (UniProt:Q6IB77) x

Q Search

18457 abstracts found in 0.34 seconds

[Ovarian tissue culture in the presence of](#)

[The Journal of endocrinology - 2017](#)

... VEGFA165 groups, we observed a high level of oxidative stress and lipid peroxidation levels and increased number of apoptotic cells

[Oxidative stress of imidacloprid on earthworms](#)

[Comparative biochemistry and physiology. Toxicology and Pharmacology - 2017](#)

... Oxidative stress of imidacloprid on earthworm Eisenia fetida to those of the control during the acute phase of exposure

[ITRAQ-based proteomic analysis of LI-F type peptides produced by Paenibacillus polymyxa JSA-9 mode](#)

[Journal of proteomics - 2017](#)

... mode of action against *Bacillus cereus*. H₂O₂, reactive oxygen species (ROS), the activities of catalase (CAT) and superoxide dismutase (SOD), and the relative expression of target genes by quantitative real-time PCR. Impairment of cellular functions, resulting from downregulation of antioxidant proteins, especially CAT and SOD. BIOLOGICAL SIGNIFICANCE: The mode of action of LI-F type antimicrobial peptides (AMP-*jsa9*) ...

[Mechanisms underlying toxicity and stimulatory role of single-walled carbon nanotubes in Hyoscyamus...](#)

[Journal of hazardous materials - 2017](#)

... was a consequence of changes in the expression of various antioxidant enzymes including SOD, POD, CAT, and APX, and also biosynthesis of proteins, phenolics, and specific metabolites such as proline. R₂ ...

Faceted search

Specify the semantic category of query terms

Search results narrowed down to 18,457

Using faceted search, we reduced number of papers that we need to read by 85%

▼ Year

▼ Journal

▼ Author

▼ Type

▼ MeSH

▼ Gene

▼ Metabolite

▲ Protein

CAT

18457

UniProt:Q6IB77

GPx

2574

Disambiguation

Thalia



GAD



7387 abstracts found in 0.18 seconds

[GAD antibodies seldom disappear in slowly progressing IDDM.](#)

Diabetes care - 1996

... **GAD** antibodies seldom disappear in

[Malaysian GAD-7 less sensitive than GAD-65](#)

Journal of primary health care - 2012

... Malaysian **GAD**-7 less sensitive than

[Anti-GAD antibody-positive myoclonus](#)

Neurological sciences : official journal of the Italian Society of Neurology - 2012

... Anti-**GAD** antibody-positive myoclonus

[Failure to find GAD antibodies at birth in children with diabetes.](#)

Diabetes care - 1998

... Failure to find **GAD** antibodies at birth in children with diabetes. ...

[Has GAD a central role in type 1 diabetes?](#)

Journal of autoimmunity - 2000

... Has **GAD** a central role in type 1 diabetes? ...

[Does GAD have a unique role in triggering IDDM?](#)

Journal of autoimmunity - 2000

... Does **GAD** have a unique role in triggering IDDM? ...

[Antibodies to GAD in elderly patients with previously diagnosed NIDDM.](#)

Diabetes care - 1998

... Antibodies to **GAD** in elderly patients with previously diagnosed NIDDM. ...

[Miller Fisher syndrome with positivity of anti-GAD antibodies.](#)

Clinical neurology and neurosurgery - 2013

... Miller Fisher syndrome with positivity of anti-**GAD** antibodies. ...

[Monoclonal antibodies to glutamic acid decarboxylase.](#)

Proceedings of the National Academy of Sciences of the United States of America - 1986

... chicken brain glutamic acid decarboxylase (**GAD**) have been selected and designated **GAD**-1 to -5. **GAD**-1 ... to -5 were selected on the basis of their ability to immunoprecipitate active **GAD** from crude brain ... extracts. **GAD**-1 recognizes an epitope that is conserved in many vertebrates; the epitope recognized

- ☐ We used the acronym 'GAD' to search for 'Generalised Anxiety Disorder'
- ☐ Search engine returned 7387 documents

▼ Year

▼ Journal

▼ Author

▼ Type

▼ MeSH

▼ Chemical

▼ Disease

▼ Drug

▼ Gene

▼ Metabolite

▼ Protein

▼ Species

▼ Anatomical

Dealing with Acronyms

^ Gene		
glutamic acid decarboxylase	2466	HGNC:4093
glutamate decarboxylase	1853	HGNC:4092
(gad)	1721	NA
Insulin	856	HGNC:8081
GABA(A) receptor	256	HGNC:4070
human	240	HGNC:2347
Abeta	236	HGNC:23
Show more...		

^ Disease		
GAD	2491	UMLS:C0270849
generalized anxiety disorder	1674	UMLS:C0178704
anxiety disorders	829	UMLS:C0003499
panic disorder	377	UMLS:C0008111
diabetes mellitus	354	UMLS:C0011849
MDD	264	UMLS:C1289883
major depressive disorder	253	UMLS:C0339017
Show more...		

- ❑ Thalia allows acronym disambiguation
- ❑ 'GAD' has two main possible full forms, i.e.,
'glutamic acid decarboxylase' (gene) and
'generalized anxiety disorder' (disease)

Dealing with Acronyms

Thalia

GAD



Article meta-data

Year

Journal

Author

Type

MeSH

Named entities

Chemicals

Diseases

Drugs

generalized anxiety disorder (UMLS:C0175704) x

❑ By disambiguating the acronym in our search strategy we reduced the number of articles from 7,387 to 1,674 (increased specificity)

Search

Year

Journal

Author

Type

MeSH

1674 abstracts found in 3.49 seconds

[Which medications should be prescribed to treat generalized anxiety disorder \(GAD\)?.](#)

Journal of psychiatry & neuroscience : JPN - 1999

... Which medications should be prescribed to treat generalized anxiety disorder (GAD)? ... Which medications should be prescribed to treat generalized anxiety disorder (GAD)? ...

[\[Generalized anxiety disorders \(GAD\)--a neglected illness? Background und aims of the GAD-P study\].](#)

Fortschritte der Medizin. Originalien - 2001

... [Generalized anxiety disorders (GAD)--a neglected illness? Background und aims of the GAD-P study ...].In the past Generalized anxiety disorder (GAD)--previously classified as anxiety neurosis ... --was regarded as not being a separate diagnostic entity. On the basis of new explicit criteria for GAD ...

[Delimiting the boundaries of generalized anxiety disorder: differentiating high worriers with and w...](#)

Journal of anxiety disorders - 2002

... with and without GAD. Investigations of the boundary between generalized anxiety disorder (GAD) and normal ... worry have relied primarily on comparisons of GAD-diagnosed individuals with non-anxious controls. One ... with GAD are unique to the disorder or are typical of severe worry more generally. The present ...

[Assessing generalized anxiety disorder in elderly people using the GAD-7 and GAD-2 scales: results ...](#)

The American journal of geriatric psychiatry : official journal of the American Association for Geriatric Psychiatry - 2014

... Assessing generalized anxiety disorder in elderly people using the GAD-7 and GAD-2 scales: results ... -item Generalized Anxiety Disorder scale

Chemical

Disease

generalized anxiety disorder

1674

UMLS:C0175704

GAD

1446

UMLS:C0270549

anxiety disorders

589

UMLS:C0003499

panic disorder

293

UMLS:C0006111

major depressive disorder

209

UMLS:C0339017

MDD

202

UMLS:C1289683

Thalia: document view

- Each named entity is color-coded
- Multiple-typed entities are visualised with a white rectangle
- Entities are linked to the corresponding URI in the ontology

Full text view

Low-Dose **Farnesyltransferase Inhibitor** Suppresses HIF-1 α and Snail Expression in Triple-Negative **Breast Cancer MDA-MB-231 Cells** In Vitro.

Journal of cellular physiology - 2017

[Go to PubMed](#)

The aggressiveness of **triple-negative breast cancer (TNBC)**, which lacks **estrogen receptor**, **progesterone receptor** and **epidermal growth factor receptor 2** and epidermal growth factor receptor 2 (**HER2**), represents a major challenge in **breast cancer**. Migratory and self-renewal capabilities are integral components of invasion, metastasis and recurrence of **TNBC**. Elevated **hypoxia** **Elevated** hypoxia-inducible factor-1 α (HIF-1 α) expression is associated with **aggressiveness of cancer**. Nonetheless, how HIF-1 α expression is regulated and how HIF-1 α induces aggressive phenotype are not completely understood in **TNBC**. The cytotoxic effects of **farnesyltransferase (FTase)** inhibitors (**FTIs**) have been studied in **cancer** and **leukemia cells**. In contrast, the effect of **FTIs** on HIF-1 α expression has not yet been studied. **we show that clinically relevant low-dose FTI, tipifarnib** (30 μ M) **inhibits** **cell proliferation** and **tumorsphere formation** in **human MDA-MB-231 cells**. **Tipifarnib**-induced **inhibition** of **cell proliferation** and **amelioration of the Warburg effect** is associated with **downregulation of Snail expression and ATP release**, and suppressed **E-cadherin** expression, major contributors to invasion, metastasis and recurrence of **TNBC**. These data suggest that **FTIs** may be capable of ameliorating the aggressive phenotype of **TNBC** by suppressing the HIF-1 α -Snail pathway.

Multiple-typed entity

- Anatomical: leukemia cells (AnEM:Cell)
- Disease: leukemia (UMLS:C0023418)

☒ Chemicals ☒ Diseases ☒ Drugs ☒ Genes

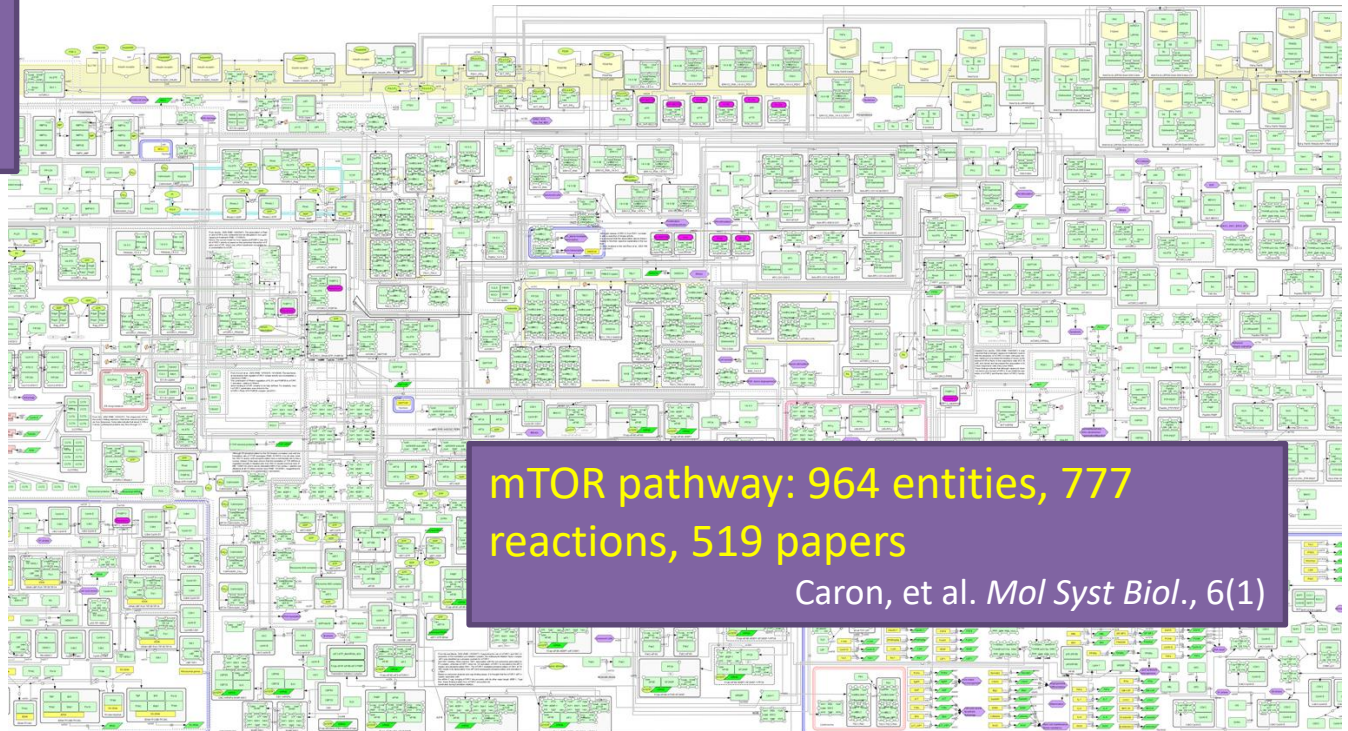
☒ Metabolites ☒ Proteins ☒ Species ☒ Anatomic

Close

Understanding Mechanisms for Pathway Construction and Modelling

- Is it enough to mine just correlations from big data?
- Understanding not only of the components but the system

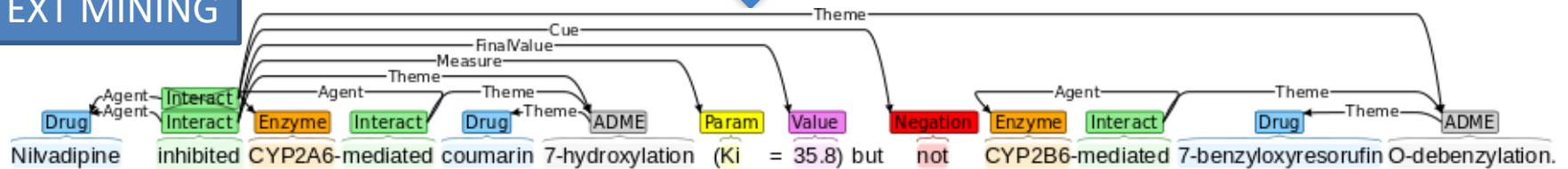
A MANUAL PROCESS
Inevitable gaps building
models



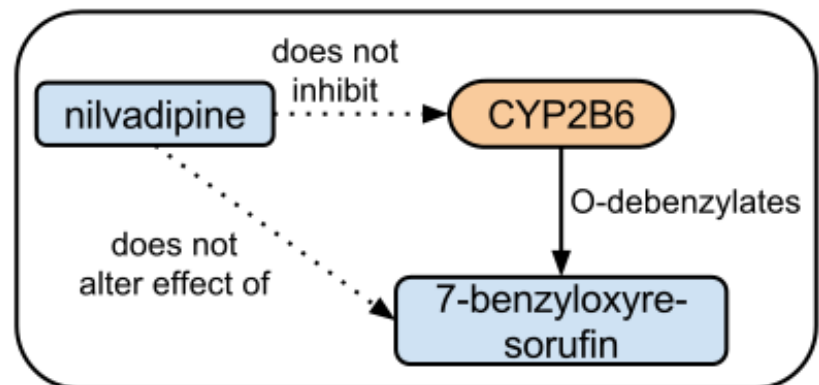
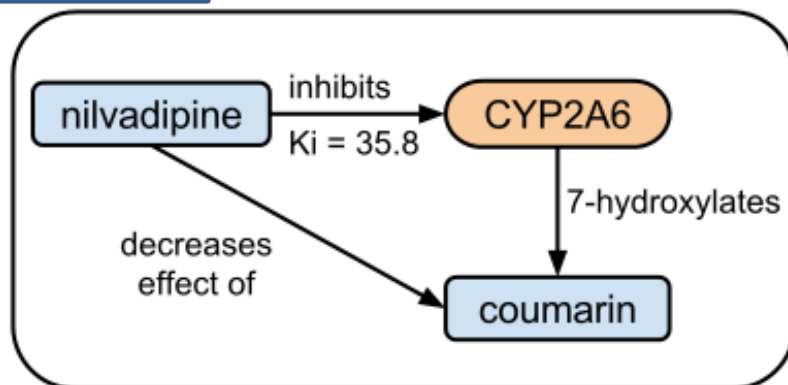
Evidence-based science: linking text with knowledge

Nilvadipine inhibited CYP2A6-mediated coumarin 7-hydroxylation ($K_i = 35.8$) but not CYP2B6-mediated 7-benzyloxyresorufin O-debenzylation

TEXT MINING



KNOWLEDGE

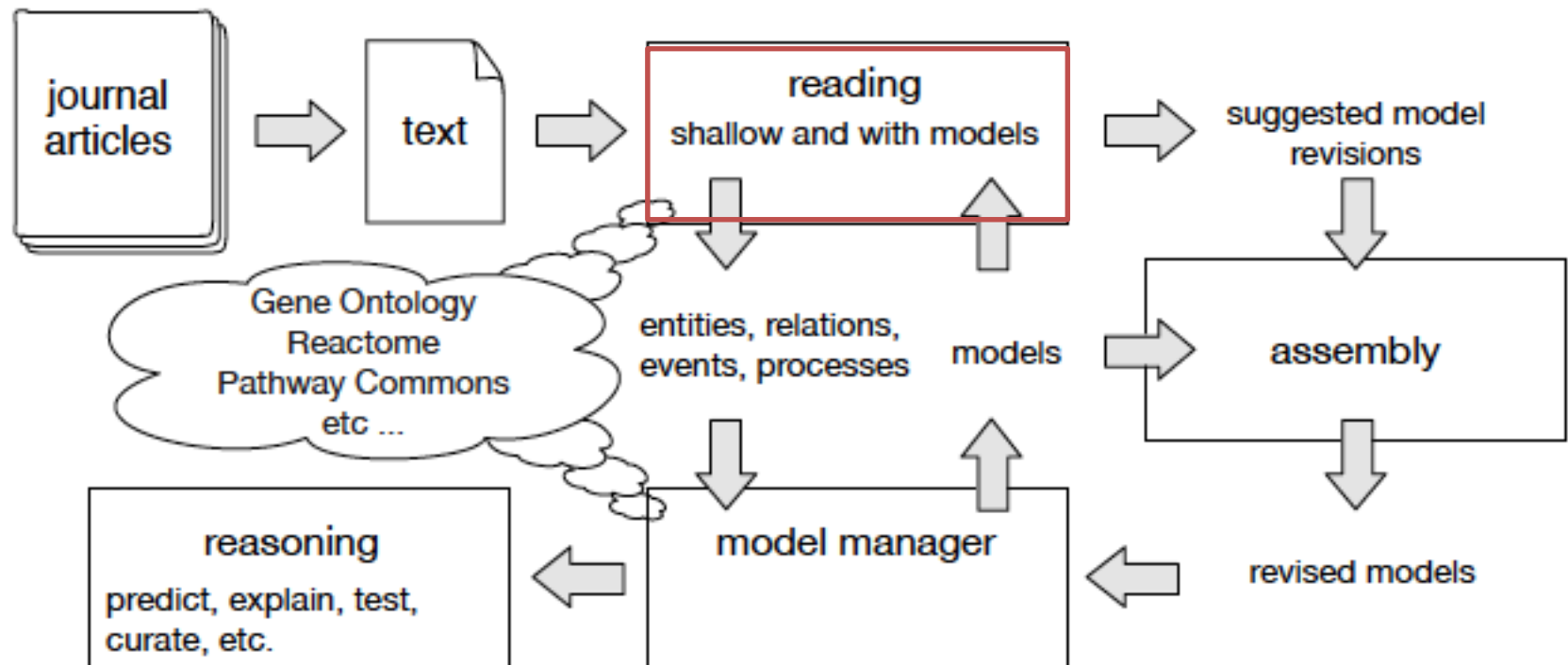


Linking Knowledge with Text *Curation*

Pathways

- Key to understanding biological systems
- Models need verification and maintenance (i.e., annotation/curation)
- Scale and speed of literature challenging
- Annotation/curation remains largely a **manual task** of incorporating knowledge from scientific publications

The Big Mechanism: reading, assembly, experiments



http://nactem.ac.uk/big_mechanism/

From concepts to events

Nilvadipine inhibited CYP2A6-mediated coumarin 7-hydroxylation ($K_i = 35.8$) but not CYP2B6-mediated 7-benzyloxyresorufin O-debenzylation.

1 Concept recognition

Nilvadipine inhibited CYP2A6-mediated coumarin 7-hydroxylation ($K_i = 35.8$) but not CYP2B6-mediated 7-benzyloxyresorufin O-debenzylation.

2 Interaction recognition

Nilvadipine inhibited CYP2A6-mediated coumarin 7-hydroxylation ($K_i = 35.8$) but not CYP2B6-mediated 7-benzyloxyresorufin O-debenzylation.

3 Concept and interaction identification

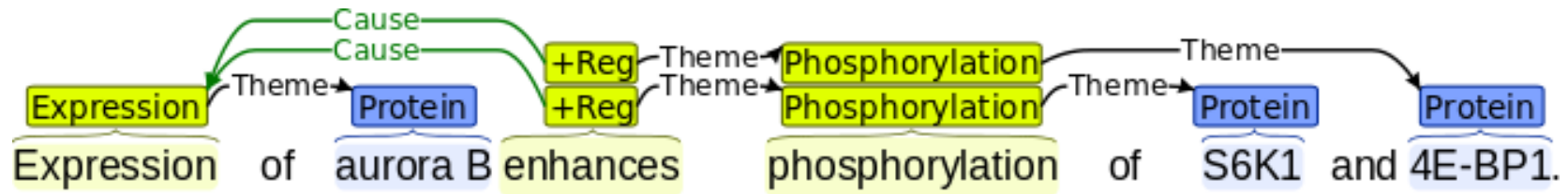
Nilvadipine inhibited CYP2A6-mediated coumarin 7-hydroxylation ($K_i = 35.8$) but not CYP2B6-mediated 7-benzyloxyresorufin O-debenzylation.

DrugBank:DB06712

DrugBank:DB00682

DrugBank:DB04610

Event Extraction



Event E1

Event E2

Event E3

Type: Gene_expression
Trigger: *Expression*
Theme: *aurora B*

Type: Phosphorylation
Trigger: *phosphorylation*
Theme: *S6K1*

Type: Phosphorylation
Trigger: *phosphorylation*
Theme: *4E-BP1*

Event E4

Event E5

Type: Positive_regulation
Trigger: *enhances*
Cause: **E1**
Theme: **E2**

Type: Positive_regulation
Trigger: *enhances*
Cause: **E1**
Theme: **E3**

Uncertainty

Examples from Big Mechanism data

Therefore, AFP **may** interact with STAT3 in the signal pathway for chemotherapeutic efficiency of agents on AFPGC.

Therefore, LiCl **might** inhibit GSK3 β in different ways

These data **suggest** that PI3K and β ARK1 form a macromolecular complex within the cell.

We then **examined whether** netrin-2 enhances the interaction between Cdo and Stim1.

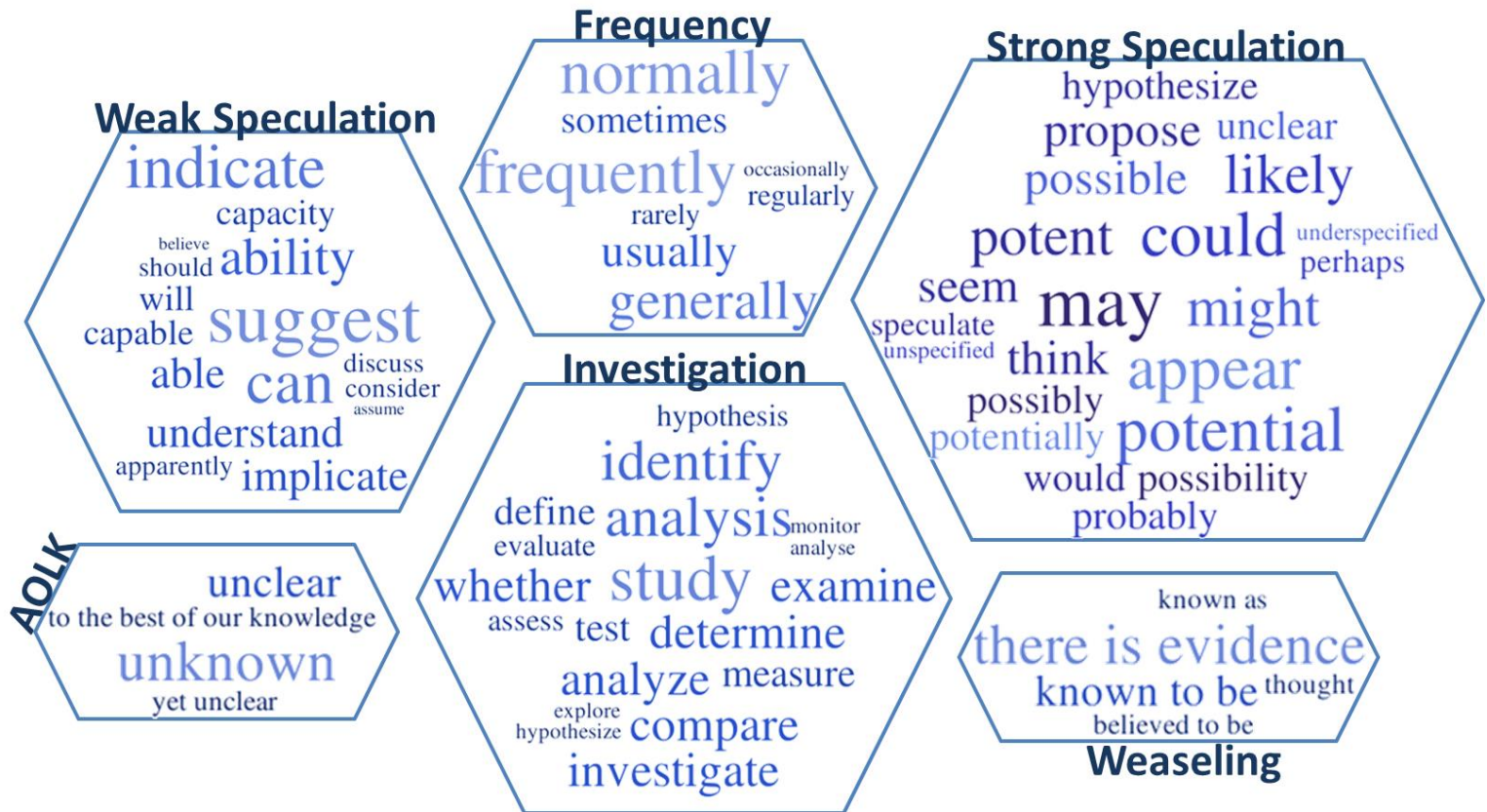
These results **indicate** that FLCN **can** interact directly with RagA via its GTPase domain.

Altogether, these results **show** that cobalt **could** affect both p53 and HIPK2 activity.

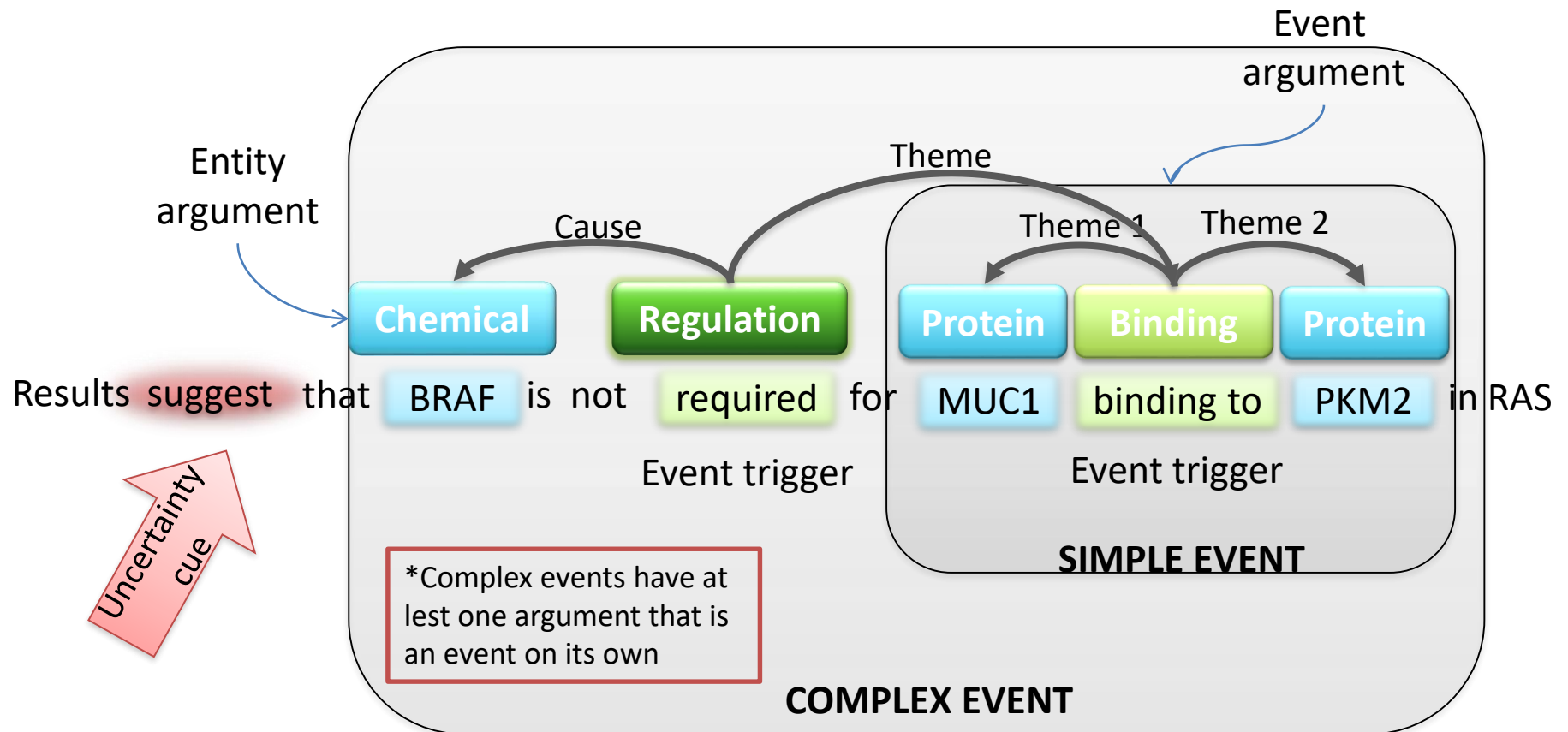
To **test if** endogenous hPGAM5 interacts with hPINK1, we first generated an anti-hPGAM5 antibody

We **hypothesize** that unphosphorylated cdr2 interacts with c-myc to prevent c-myc degradation

Uncertainty cues



Events and their interpretation



Uncertainty for model curation and experiments

- Uncertainty scoring as an expressive **confidence measure**
- Value for each event mentioned in a sentence
 - Consolidated uncertainty values from different papers
- Effort to decrease manual effort and select more certain events


Zerva, C., Batista-Navarro, R., Day, P. and S. Ananiadou (2017) Using uncertainty to link and rank evidence from biomedical literature for model reconstruction, *Bioinformatics*

LitPathExplorer: a confidence-based tool for exploring pathway models

1. Enabling **flexible search** and **exploration** of biomolecular pathway networks
 - different views of the data
 - various interactive functionalities
 2. Provide a means for making existing evidence in the scientific literature available to support **corroboration**
 3. Facilitate the **discovery of new interactions** that are not yet part of a given model
 4. Allow the **user** to become an **active participant** of the analytical process
- } quantify confidence in the events

Video: http://nactem.ac.uk/LitPathExplorer_BI/LitPathExplorer.mp4

Search

LitPathExplorer 

Event

MEK| Role + -

- Complex (Ras/Raf/ MEK/GTP)
- KSR/14-3-3 (dimer)/MEK1-2-active
- MEKK1/4
- MEK2
- Complex (Ras/GTP/ Raf/MEK)
- Activated RAF1 complex:MEK
- MEK1-2-active
- MEKK1
- MEKK1-5
- p-S218,222-MEK1
- MEK1-2
- MEK
- MEK1
- MEK inhibitor
- Ras/Raf/MEK/ERK
- MEKS271
- MEKi
- MEK-1
- DNEE-MEK1

AND ▼


Event

Entity Role + -

- A pathway model can be searched by providing:
 - event types,
 - entities,
 - and/or roles for each entity in the reaction
- Multiple queries can be combined in a Boolean search

Inspector, quantifying the confidence

Inspector

Node clicked: Event 

Protein_catabolism (E5163)



Confidence
breakdown

Entities related:

GeneOrProtein:

ERK (PANTHER PATHWAY COMPONENT:P00371)

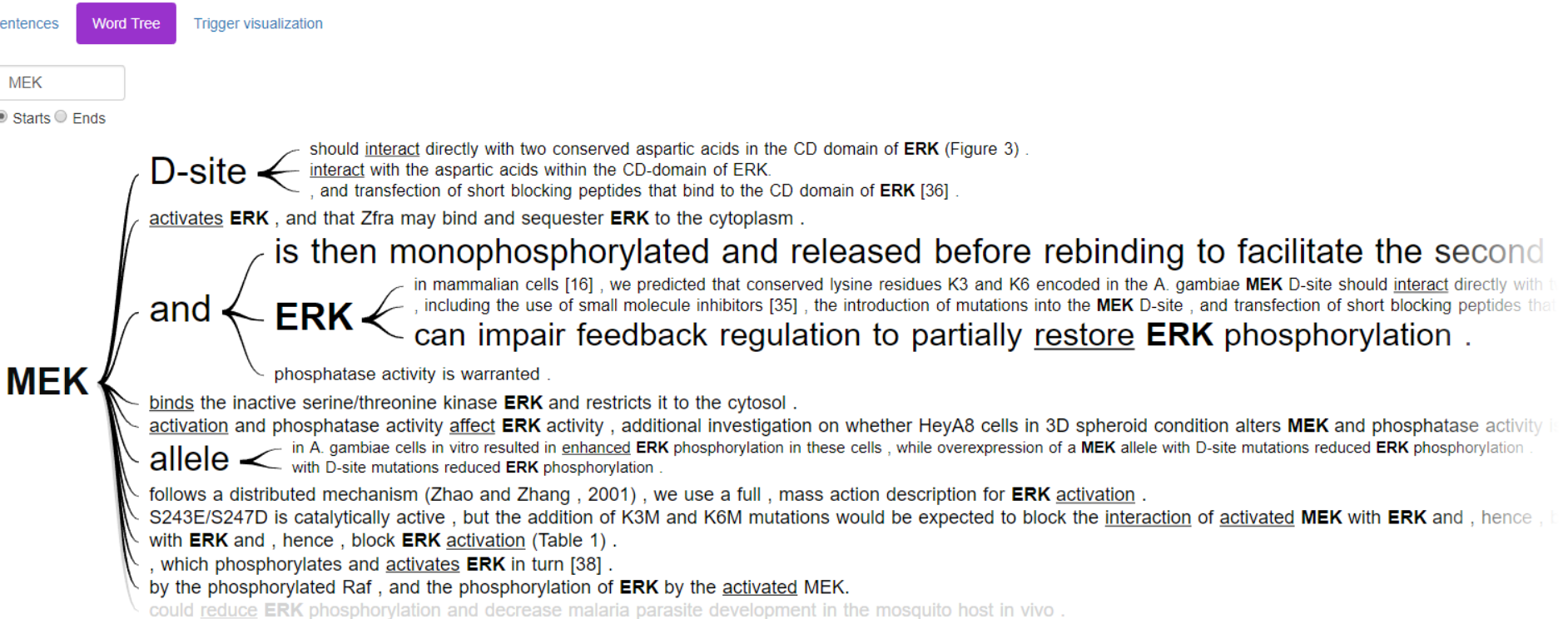
Role: theme

GeneOrProtein:

MEK (PANTHER PATHWAY COMPONENT:P00225)

Role: agent

Word tree visualisation: Contrast event mentions across the corpus

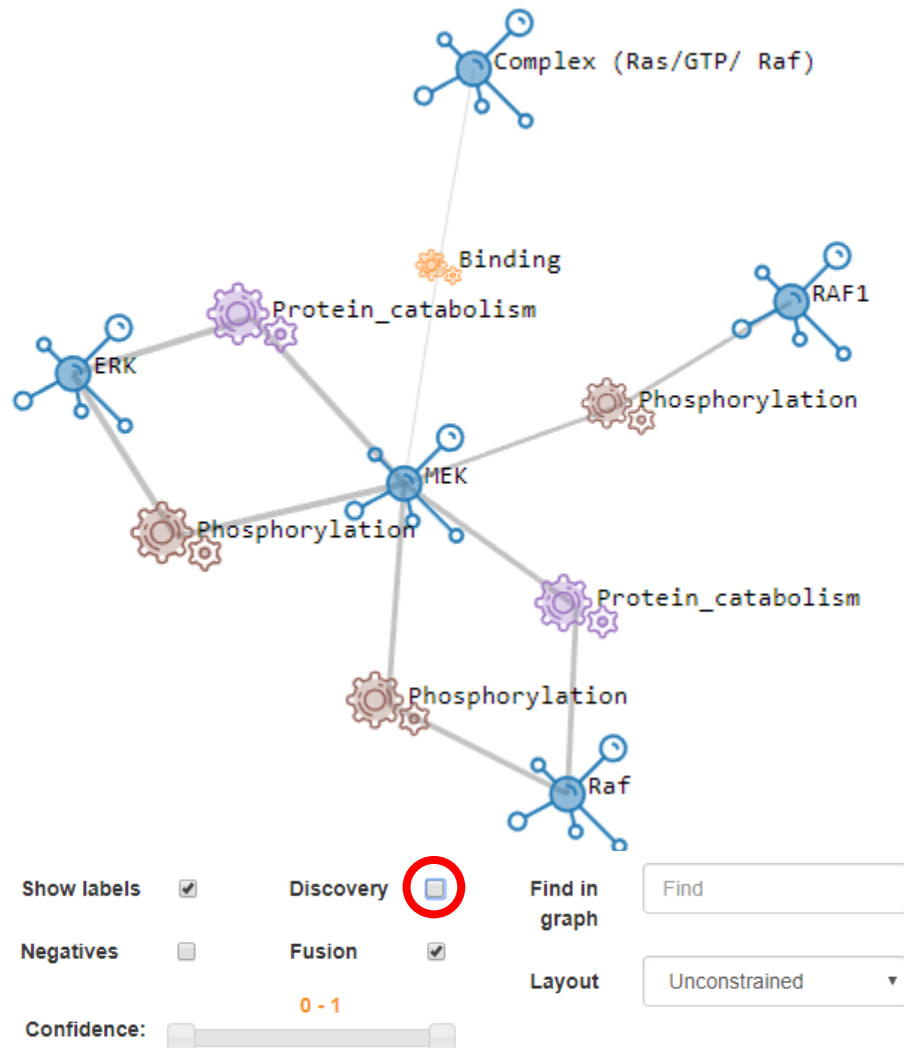


Vertical arrangement and gray scale denotes event confidence

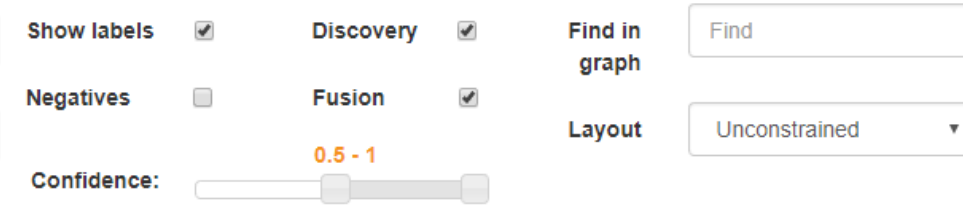
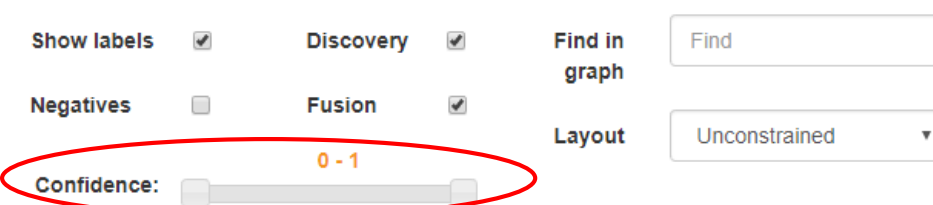
Sentences can be inspected further upon interaction

Network Viewer: **Discovery mode**

Extending the model with events found in the literature



Difficult to explore when too many candidate events are found



History of Medicine

- <http://nactem.ac.uk/hom>
- Archives
 - British Medical Journal articles (380,000)
 - London Medical Office of Health reports (5,000)

[Search](#) [My Documents](#) [Full Access](#) [?](#)

Search Query

You are currently viewing the entire set of documents. To find specific documents please refine your search.

[Q Start refining search](#)

Search Results [?]

Showing page 1 of 385409 results



Cardiomyopathy associated with Wegener's granulomatosis

Cardiomyopathy associated with Wegener's granulomatosis Andrew To Janak De Zoysa Jonathan P Christiansen Jonathan.Christiansen@WaitemataDHB.govt.nz KEYWORDS: A 35-year-old man with no history of cardiovascular disease presented with severe biventricular heart failure, after a 6-week history ...

bmj_3106061



Recurrent wheezing ... is it only asthma?

Recurrent wheezing ... is it only asthma? Luis Vaz Rodrigues Cristina Lopes a Castel-Branco 1 Centro Hospitalar de Coimbra, Pulmunology, Quinta dos Vales, S Martinho do Bispo, Coimbra 3041-801, Portugal 2 Hospital de São João, EPE, Immuno-allergology Division, Alameda Prof Hernâni Monteiro, Porto...

31

Search Query

Term

pulmonary consumption

New Search

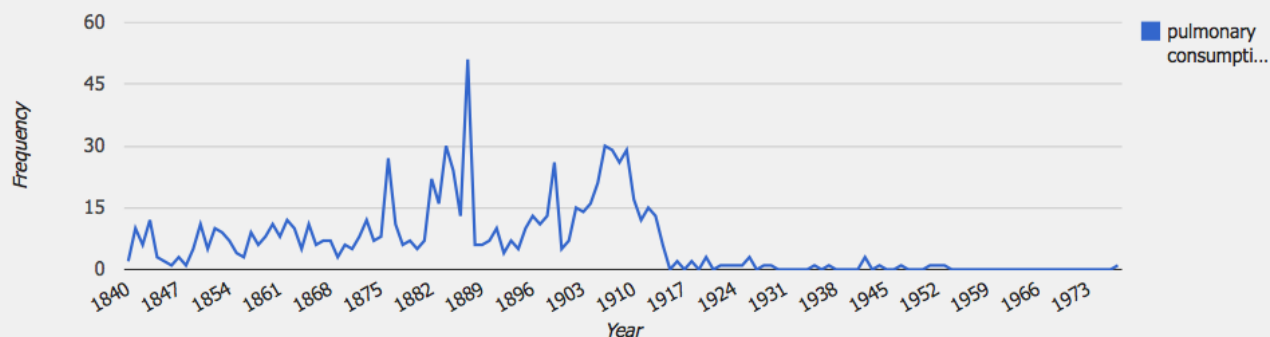
Refine Search

Current search criteria

Frequency of “pulmonary consumption” over time

Term Frequencies

Term frequency over time



Rest in Pulmonary Consumption

REST IN PULMONARY CONSUMPTION. SIR,-In a paragraph which appears in the BRITISH1 MEDICAL JOURNAL of Oct. 4th, it is mentioned that Dr. Berkart has instituted a novel plan of treating pulmonary consumption by the application of mechanical compression made in such a manner by strapping and...

bmj_2294575



GRADUATED LABOUR IN PULMONARY CONSUMPTION

GRADUATED LABOUR IN PULMONARY CONSUMPTION. Sir,-Dr. M. S. Paterson's paper on graduated labour In pulmonary consumption will be read with great interest by every one engaged In treating consumption. For the last two years, once a short visit to Sir A. E.,Wright's laboratory, endeavour ha...

bmj_2435881

pulmonary tubercular disease

pulmonary cedema

tubercular consumption consumption

chronic pulmonary tuberculosis pulmonary heart disease

tuberculous
consumption

tuberculous pulmonary disease

pulmonary pulmonary syphilis

infectious pulmonary tuberculosis

pulmonary tuberculosis

pulmonary
phthisis

related terms

Search Query

Term ×
pulmonary consumption

Term ×
pulmonary tuberculosis

New Search Refine Search

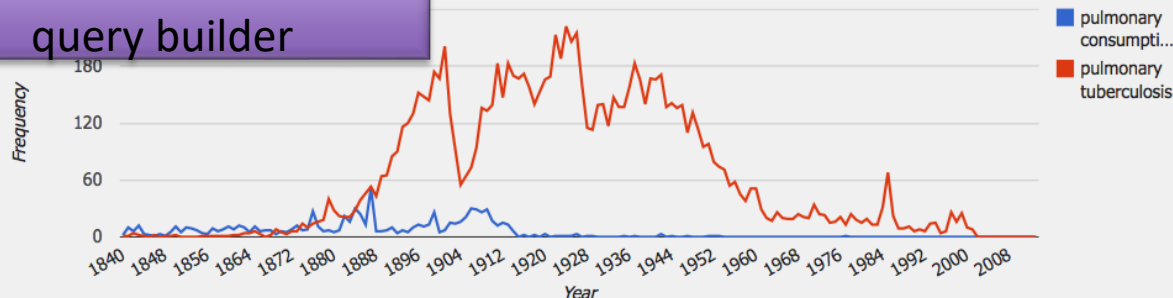
- Related Terms**
- tuberculous phthisis
- nonpulmonary tuberculosis
- pulmonary tuberculosis active
- pulmonary tubercular disease pulmonary cedema
- tuberculosis
- pulmonary
- pulmonary

Search Results

Showing page 1 of 11460 results

Term Frequencies

“pulmonary tuberculosis” is added to query builder



The Naval Manœuvres: Danger of Dissemination of Consumption

THE NAVAL MAN(ŒUVRES: DANGER OF DIS SEMINATION OF CONSUMPTION. Sir,-The time for mobilisation of the fleet for the naval manceuvres being at hand, it may not be amiss to draw attention to the necessity for careful examination of the men, with a view to prevent any with pulmonary tuberculosis be...

bmj_2403738



PREVENTION OF PULMONARY TUBERCULOSIS

PREVENTION OF PULMONARY TUBERCULOSIS. A CONFERENCE of representatives of twenty-eight out of thee twenty-nine city and metropolitan borough councils was held on June 6th at the Paddington Town Hall to consider the question of taking measures to limit the spread of pulmonary tuberculosis. The chai...

bmj_2357676

Terms related to “pulmonary consumption” and “pulmonary tuberculosis”

THE attention.

370 Medical JOURNAL I

INTERNATIONAL MEDICAL CONGRESS:

. * ~ ~ ~ .

[AUG. 16, 1913.]

THE NECESSITY FOR A MORE THOROUGH

CONTROL OF THE MILK SUPPLY IN COMBATING SURGICAL TUBERCULOSIS

IN C

By H

SUR

THE

we a

CHILDREN.

and others, Haye done valuable work in developing the methods by means of whilch

sis is of Halliman or bovine origin.

Professor Delepine has for several years carried out ii-antiport investigations in Manchester in Regar d to the **tuberculous milk** question, and lie has shown that mucll still remains to be done to diminish0 the amount of tuberculous **milk** whlich is supplied to our large cities.

The control of tile Edinburgh milk supply is very inadequate, and it is a remarkable fact that the.

Public Health Department has no power to enforce the laughter of tile cows with tub

from time to time in the city byres; the medical officer of health has merely power to

boundaries.

Fortunately comparatively large quantities of the bacilli are necessary to produce tu

even -more prevalent amongst children tilan it is.

Post-or0tem records in this country show tilat in about 25 per cent.

of the children possessing tuberculous lesions the infection has taken place through the alimentary tract.

As the result of my clinical experience in the Royal Edinburgh Hospital for Sick Children, I have for many years been convinced that Koch and his disciples committee a serious error in practically disregarding the **milk** as a source of tuberculous infection in children.

I could adduce many instances from my own personal observation where the etiological relations between the disease and the "**milk** history " of the

“Environmental” entities are highlighted

Number of “Environmental” entities in the document

“Environmental” entity instances in the document

Entities	
► Anatomical (37)	
▼ Biological (32)	
animal (1)	
bacilli (4)	
bacillus (7)	
bovine bacillus (2)	
cow (8)	
guinea-pig (2)	
human bacillus (4)	
organism (1)	
tubercle bacilli (3)	
► Condition (71)	
▼ Environmental (22)	
cow (1)	
dust (1)	
gold daledalin (1)	
infective material (1)	
milk (13)	
milk product (1)	
raw milk (1)	
rural district (2)	
tuberculous milk (1)	
► Sign or Symptom (8)	
▼ Subject (53)	
case (29)	
child (21)	
consumptive patient (1)	
given case (1)	
young child (1)	
► Therapeutic or Investigational (19)	

The earliest observation on the contagious nature of tuberculosis occurs in the Ordinances of Man in India, thirteenth centuries B.C.

In these, pulmonary consumption and swelling of the glands of the neck are declared to be unclean, incurable diseases.

Those who wanted to marry are cautioned not to select a spouse from a consumptive family even though the family had a good lineage and possessed great wealth.

These laws show a knowledge of tuberculosis, and as the disease was regarded as an impediment to marriage it seems likely that it was regarded as contagious.

In Europe the earliest reference to the contagious nature of tuberculosis was made about 390 B.C.

In this he states: "The majority of those who had nursed this disease [phthisis] had not generally subscribe to this view, preferring the idea of the tuberculous diathesis."

About one hundred years later Aristotle realized that consumption could be spread. Galen and Avicenna held similar views.

It is more than a tragedy that these early Greek observations were disregarded and forgotten in later centuries, for it was only towards the end of the seventeenth century that in Latin countries such as Spain and Italy the contagious nature of the disease was again being recognized.

In Britain, Edward Mainwaring was possibly the first to assert that tuberculosis was spread by contact, as in 1667 he wrote: "You must not frequently converse with a phthisical person whose unwholesome breath may infect the sound by drawing in putrid vapours which the other breathes forth, but above all a phthisical bedfellow is most dangerous to affect a sound person and chiefly to be avoided."

Later, in 1694, Richard Morton in his book Phthisis logia, which is an outstanding presentation of the symptomatology of tuberculosis, wrote: "

A contagious principle also propagates the disease, for, as I have found by experience, an affected person may poison a bedfellow by a kind of

infectious matter. In the nineteenth century, however, leaders of the profession like Bright and Addison (1839), also recognized the contagiousness of tuberculosis, and attached great importance to diathesis.

This view was so much dominated men's minds that little or no progress had been made for centuries

Laer

* A S

University of London on March 6, 1947.

concluded that the disease was tuberculosis, was of the opinion that at least in France tuberculosis was not usually contagious.

That tuberculosis could be produced in animals by inoculation with tuberculous material was shown in 1843 by Klenke, and in 1868 Villein finally proved experimentally that tuberculosis was an infectious disease.

It was Villein who first showed that tuberculous material from bovine sources was more virulent for rabbits than that from human.

In 1867 William Budd, of North Tawton, as a result of a study of the geographical distribution of consumption in past and present times,

concluded: "The tuberculous matter itself is (or includes) the specific matter of the disease and constitutes the material by which phthisis is

propagated from one person to another and disseminated throughout society." Even after the discovery of the tubercle bacillus by Koch in 1882 we

find from the Collective Investigation Record (British Medical Association, 1883) that many British physicians reported that they had never observed a

case of probable transmission of the disease from a case of phthisis.

Later, Theobald Smith (1896, 1898) reported the existence of "a distinctively human or sputum, and a bovine variety of tubercle bacillus."

Though Koch proved that the tubercle bacillus was the cause and stressed the importance of inhalation of infected sputum in the spread of the disease, it is strange how in 1901, while accepting that human and bovine types were different, he yet concluded that the latter was rarely pathogenic for man.

Koch (1882) had undoubtedly found the bovine bacillus in human disease, for he had obtained from a case of caseous pneumonia (No.

27) a culture of tubercle bacilli which after inoculation into the anterior chamber of the eye proved virulent for rabbits.

In 1911 the British Royal Commission proved conclusively that the bovine bacillus was a definite cause of tuberculosis in man.

It is not surprising that Koch went astray when we consider the relative rarity of primary abdominal tuberculosis in Germany as compared with this

Cases where specific causes of tuberculosis are mentioned in the document

▼ Causality (11)

- inoculation causes tuberculosis
- bovine bacillus causes tuberculosis
- inhalation causes respiratory tuberculosis
- Cause of lesion
- Cause of meningitis
- Caused by infection
- Caused by treatment
- Caused by infection
- Cause of respiratory tuberculosis
- Cause of infection
- Cause of tuberculosis

Phrases identifying Causality events are highlighted

Supporting hypothesis generation

Data driven methods complementing human hypothesis generation

Rapid mining of candidate hypotheses from text, validated against experimental data

- Migraine and magnesium deficiency
- Indomethacin and Alzheimer's disease
- Using thalidomide for treating a series of diseases such as acute pancreatitis and chronic hepatitis C

FACTA+

The screenshot shows the FACTA+ web application running in a Mozilla Firefox browser. The search query is 'caffeine', and 17,094 documents were found in 17,702,258 MEDLINE articles. The results are categorized into five groups: Human Gene/Protein, Disease, Symptom, Drug, and Compound. Each category contains a list of related terms with their respective counts and a small icon representing the concept type.

Human Gene/Protein	Disease	Symptom	Drug	Compound
ATP	malignant hyperthermia	headache	caffeine	caffeine
ryanodine receptor	depression	fatigue	Theophylline	calcium
AMP	cancer	pain	CTX	DNA
adenosine receptor	hypertension	seizures	CaCl ₂	sodium
CYP1A2	tumor	sleepiness	Norepinephrine	water
ATPase	migraine	anesthesia	CaCl ₂	ATP
phosphodiesterase	AT1	exhaustion	CaCl ₂	potassium
endoplasmic reticulum	diabetes	insomnia	Ethanol	glucose
insulin	obesity	nausea	Freeze	AMP
cytochrome P450	cold	analgesia	vitamin C	cAMP
cardiac muscle	stroke	vomiting	Forskolin	ethanol
RyR1	ischemia	tremor	lactose	Ryanodine
spermatozoa	Parkinson's disease	overweight	citric acid	noradrenaline
microsomal	osteoporosis	twitching	Histamine	Adenosine
p53	carcinogenesis	hypothermia	PCP	Mg ²⁺
voltage-gated	heart failure	bitter taste	vitamin E	oxygen

Discovering and visualizing indirect associations
between biomedical concepts

Bioinformatics

Yoshimasa Tsuruoka^{1,*}, Makoto Miwa^{2,3,4}, Kaisei Hamamoto³, Jun'ichi Tsuji^{3,4,5} and
Sophia Ananiadou^{3,4}

caffeine - FACTA Search - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://text0.mib.man.ac.uk/software/facta/a.cgi?query=caffeine|111111|0|0|132085|0|10&cat=

Most Visited Customize Links Free Hotmail Windows Marketplace Windows Media Windows Statistics for text0.mi... take' home page

Effects of oral administration of caffeine and D-ribose on mental fatigue.

OBJECTIVE: We examined the effects of administering two different candidate antifatigue substances, **caffeine** and D-ribose, on mental fatigue. METHODS: In a double-blinded, placebo-controlled, three-way crossover design, 17 healthy volunteers were randomized to oral **caffeine** (200 mg/d), D-ribose (2000 mg/d), or placebo for 8 d. As **fatigue**-inducing mental tasks, subjects performed a 30-min Uchida-Kraepelin psychodiagnostic test and a 30-min advanced trail-making test on four occasions. RESULTS: During the tasks, the task performance of the **caffeine** group was better than that of the placebo group. However, after the **fatigue**-inducing tasks, although subjective perception of **fatigue**, motivation, or sleepiness was not significantly different, plasma branched-chain amino acid levels in the **caffeine** group were lower than those of the placebo group. ... CONCLUSION: Because plasma branched-chain amino acid levels are decreased by mental fatigue, these results suggest that administration of **caffeine** improved task performance through the enhancement of central nervous system activity without increasing the sensation of **fatigue**. However, further decreases in branched-chain amino acid levels indicate that **caffeine** might promote deeper **fatigue** than placebo. ... PMID:18178380 Nutrition (Burbank, Los Angeles County) 2008 Mar

Efficacy of caffeine

... In this study, the marmoset monkey was assessed with a ... was not able to ... comparable effect ... CONCLUSION: ... psychomotor performance ... PMID:1805791

Enhanced mental performance

Caffeine produced ... restriction or **caffeine** ... subjective measures ... prolonged wakefulness ... more **tiredness** and mood disturbance at 3 a.m., and exhibited longer reaction times and more attentional lapses. Heavier **caffeine** consumers exhibited the greatest decreases in Profile of Mood States (POMS) Vigor. ... These effects did not vary with level of habitual **caffeine** consumption. These findings indicate that consumption of a **caffeine**-containing food supplement improves subjective state and cognitive performance in fatigued individuals that is likely a result of its **caffeine** content. PMID:18266548 Experimental and clinical psychopharmacology 2008 Feb

Done

... However, further decreases in branched-chain amino acid levels indicate that **caffeine** might promote deeper **fatigue** than placebo

FACTA+

FACTA+

E-cadherin

☒ Gene/Protein ☒ Disease ☒ Symptom ☒ Drug ☒ Enzyme ☒ Compound

Pivot Concepts: Gene/Protein Target Concepts: Disease

Query: **E cadherin**
 7,890 document(s) hit in 20,033,079 MEDLINE articles (5.23 seconds)

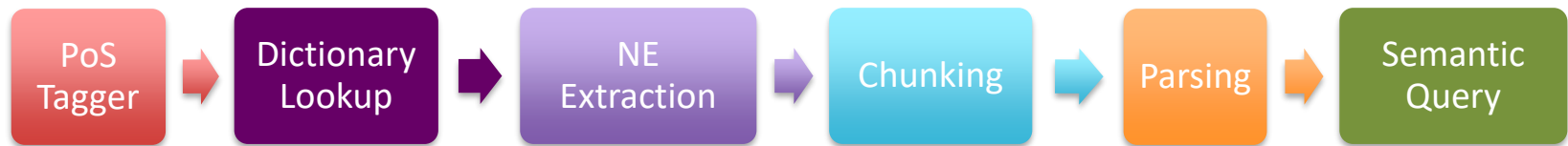
Diseases found indirectly associated with the query through Human Gene/Proteins.

Exp. Info.	Info.	Target Concepts	<—>	Pivot Concepts	<—>	Query Concept
8.8023	13.95	Parkinson's disease	0.500	CASS4	0.500	E cadherin
			0.333	SNAIL3	0.667	
			0.286	transcription factor EB	0.286	
8.1015	13.95	HJMD	0.750	P-cadherin	0.681	E cadherin
			0.750	CDHP	0.083	
			0.500	Polymerase	0.109	
7.9947	8.66	acute	0.667	E-cadherin (heart)	0.667	
7.9349	9.49	Synd				
7.5968	8.19	Testis	0.667	ZBTB7C	0.667	E cadherin
			0.222	cadherin-9	0.556	
			0.333	TRIM6	0.333	
7.5968	8.19	Testis	0.667	ZBTB7C	0.667	E cadherin
			0.222	cadherin-9	0.556	
			0.333	TRIM6	0.333	

E-cadherin is associated with **Parkinson's disease** via **CASS4, SNAIL3, transcription factor EB**, etc.

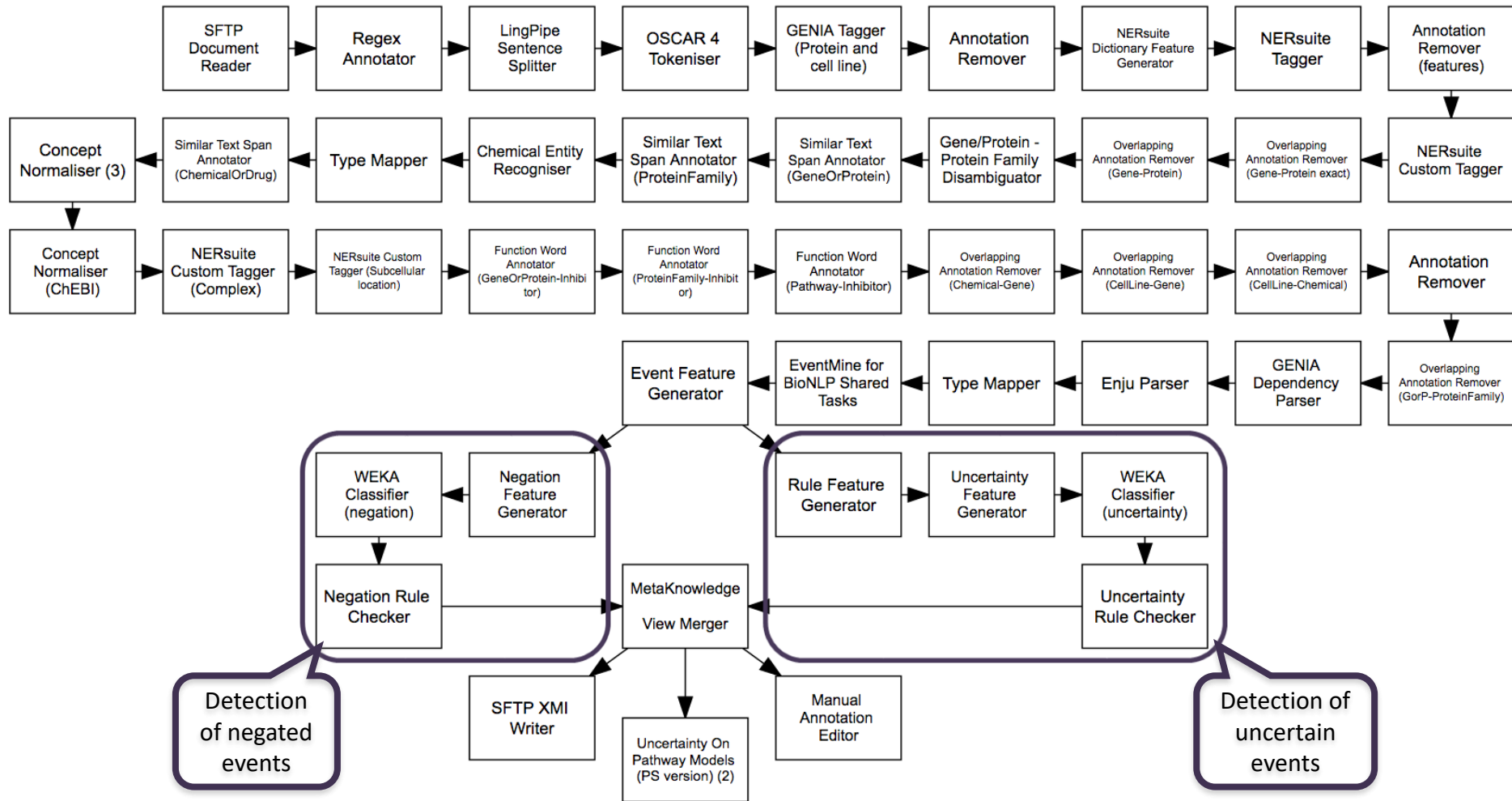
Text mining workflows

- A pipeline that executes particular tools and resources in order; text Mining is not monolithic
- **Semantic search**



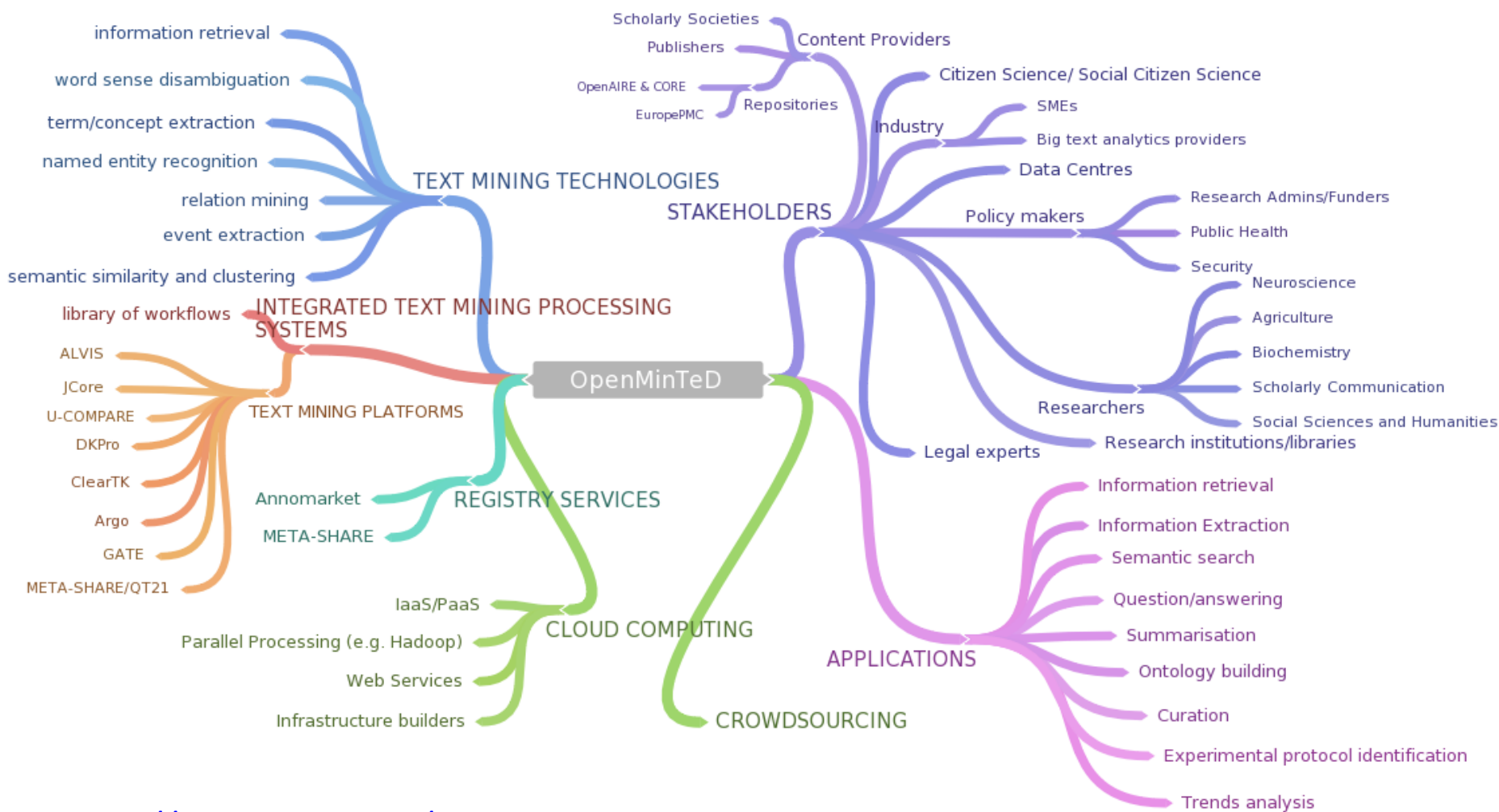
- Different workflows can be created, compared and evaluated by the ability to seamlessly “mix and match” various versions of components
- ***I know I can build the workflow from the components but which one is the preferred for my task?***

Text mining workflow for uncertainty



openMIN7ED

Open Mining Infrastructure for Text & Data



National Plan for Open Science

- What is the critical point in the plan?
 - Open data, open content
 - **Linking data with content**
 - **Reproducibility**
 - Research objects
 - Code, experiments, annotations, databases
 - Common Infrastructure for sharing and customisation
 - Standards FAIR

What action to prioritise?

- **Access to data and privacy protection**
 - difficulty gaining access to EHRs
 - cross-linked with other clinical, public health, biology data and the literature
 - better ways to anonymise data
 - TDM would contribute massively to personalised medicine
 - **Security**
- **Training. Lack of trained personnel in TDM**
- Lack of knowledge in existing tools and resources

Thank you. Merci.

Sophia Ananiadou

Sophia.Ananiadou@manchester.ac.uk

National Centre for Text Mining

www.nactem.ac.uk