Connecting Knowledge

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- The existing ecosystem
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Too much into much information

- information accessible today is constantly growing and appears fragmented and dispersed through a multitude of heterogeneous sources

- It is virtually impossible for an individual to access all the information components made available by various sources and process the content
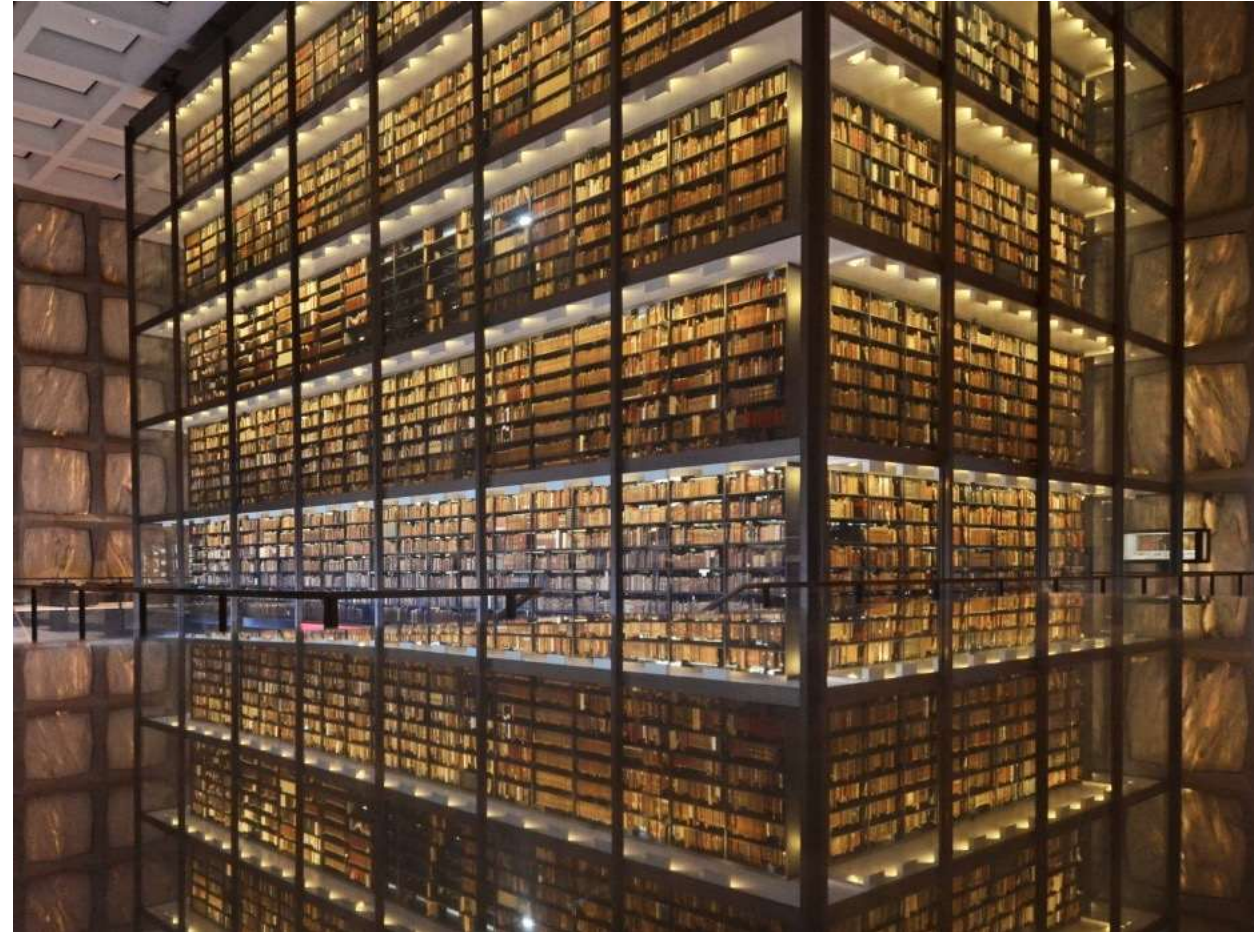
The problem to be solved …

Information is not the same as Knowledge

- Having access to information is **not** the same as *knowing*

- Every discipline or subject requires **information access and processing** so as to synthesize its contents and form ***Knowledge***

- But how can we access ALL the information spectrum available and derive knowledge of a topic?

" What distinguishes *Information* from *Knowledge* is the way that knowledge empowers the intellectual and physical capabilities of individuals

Knowledge is a matter of cognitive abilities that create an active ability to think and reflect.

In-situ information is instead a passive cognitive process and without any special utility for those who do not transform it into knowledge.

Finally, Knowledge provides the means by which information is interpreted and brought to life.

– The Work Foundation's Knowledge Economy Programme interim report (Brinkley 2008)

Yewno

What is Knowledge?

- It is to **understand** the information spectrum of a topic

- It is the condition at the outset of learning the truth of a fact through reasoning

Knowledge is the interpretation of the Information

How Knowledge is acquired

- Many of the human cognitive abilities are articulated from Knowledge Acquired in Unity, during our cognitive formation:

- How do we orient ourselves through the surrounding world?

- How do we solve problems from the simplest ones to the more complex ones?

- How do we understand the meaning, we make deductions and decisions?

Knowledge is formed in our mind

History of an Idea: Yewno

- Applied Mathematics in Complex Systems

- There is a structure for study and description of economic and financial cycles: Econophysics

- On the research line for emerging properties analysis of complex graphs, a new bio-medical research paradigm

- More than 23 million specialized scientific publications have processed and mapped tens of millions of biological reports: the application and Drug Repurposing

- Stanford University is interested in innovating this model.

- Part of a project for prototyping an inferential engine with the aim of providing a new tool for extracting knowledge by processing tens of millions of data sources across various disciplines

- Yewno, Inc., is a Silicon Valley based startup focused on information processing to create Knowledge and Advanced Analytics Applications

- The technology model is based on an innovative structure of algorithms based on Computational Linguistics, Neural Processes, and Deep Learning

| 2009 | 2010 ~ 2013 | 2014 | Today |

Why Yewno Discover?

WHEN YOU KNOW WHAT YOU'RE LOOKING FOR	WHEN YOU DON'T KNOW WHAT YOU'RE LOOKING FOR
Search	**Discover**

- Simple questions
- Straight answers

- Open-ended questions
- Complex answers
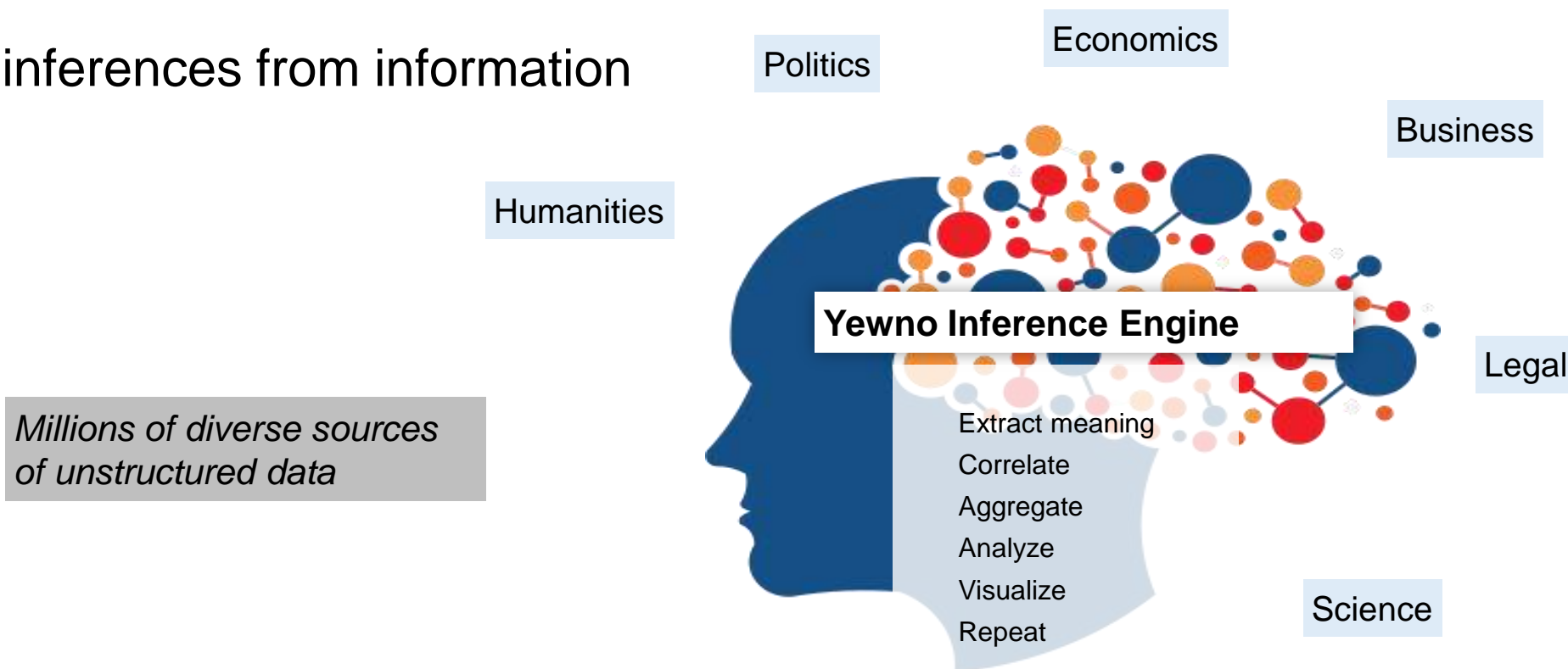
A different perspective on information
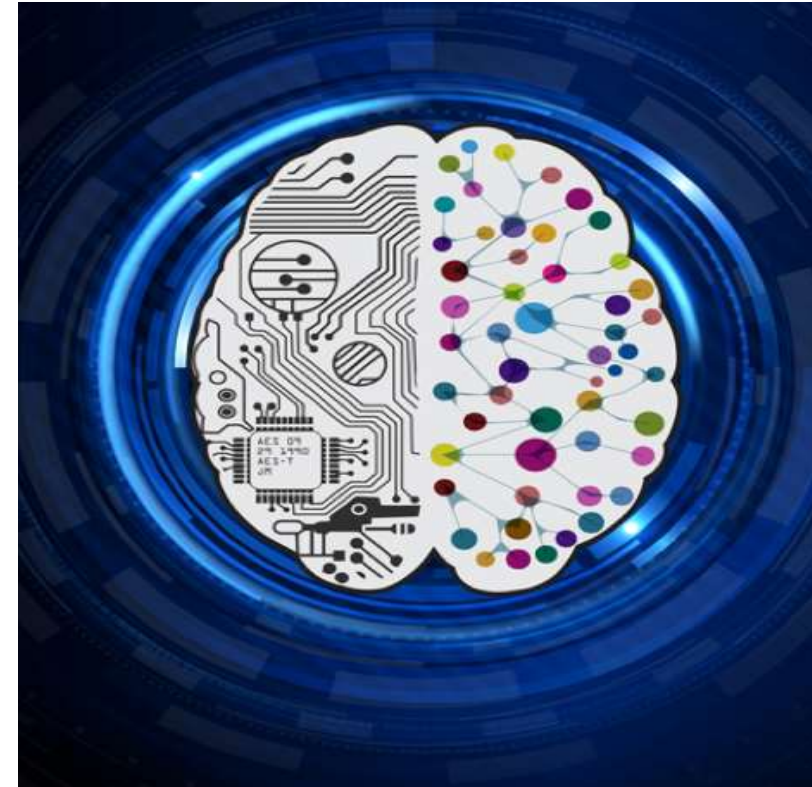
A blend of computational semantics, graph theory and machine learning

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Yewno understands context and meaning

Building inferences from information

Politics

Economics

Business

Humanities

Yewno Inference Engine

Legal

Millions of diverse sources of unstructured data

Extract meaning
Correlate
Aggregate
Analyze
Visualize
Repeat

Science

What is a concept?

- A **Concept** is an *abstraction of an idea*, *a thought, or an expression* portrayed in various forms

- We can "design" a **Concept** as an atomic information unit consisting of:

    - One or more definitions

    - Belonging to one or more categories

For example…:

Jaguar:

Jaguar is the luxury vehicle brand of Land Rover, a British multinational car manufacturer with its headquarters in Whitley, Coventry, England, owned by the Indian company Tata Motors since 2008

Democracy:

Democracy (from ancient Greek: δῆμος, démos, "people" and κράτος, krátos, "power") etymologically means "government of the people", a system of government in which sovereignty is exercised, directly or indirectly, by all Citizens who resort to a vote.

Quantitative Easing:

Quantitative Easing is a monetary policy tool, and it designates one of the ways in which a central bank creates coinage and its injection, with open market operations, in the financial and economic system.

A revolutionary framework

Yewno leverages Neural Network algorithms, Computational Linguistics and Graph Theory with a twofold goal:

- To identify and **to extract concepts** from both unstructured and structured data, and

- To uncover significant knowledge via an **inferential chain of connections across those concepts**

What is a *Concept*?

concept
noun | con·cept | \ˈkän-ˌsept\

Simple Definition of CONCEPT   Popularity: Top 10% of words

: an idea of what something is or how it works

Source: Merriam-Webster's Learner's Dictionary

significance
noun | sig·nif·i·cance | \sig-ˈni-fi-kən(t)s\

Simple Definition of SIGNIFICANCE   Popularity: Top 30% of words

: the quality of being important : the quality of having notable worth or influence

: the meaning of something

inference
noun | in·fer·ence | \ˈin-f(ə-)rən(t)s, -fərn(t)s\

Simple Definition of INFERENCE   Popularity: Top 1% of lookups

: the act or process of reaching a conclusion about something from known facts or evidence

: a conclusion or opinion that is formed because of known facts or evidence

Concepts as Atomic Units of Knowledge

- **In contrast to pure keyword-based NLP**, our approach to knowledge discovery is rooted into **computational linguistics and machine learning** (and a bit of NLP)

- It is based on the idea that **knowledge can be represented as a network of interconnected atomic units** of knowledge called *concepts*

- This is akin to the theory of "*conceptual spaces*" proposed by the cognitive scientist Peter Gärdenfors who introduced a geometrical approach to *meaning* and ultimately to *thinking*

Prototypical concepts

New concepts are continuously extracted from a hybrid-semantic corpus

- We generate candidate concepts via syntactical pattern matching and recognition of potential entities

- To be promoted to a first-class citizen, a candidate concept must be described and categorized

- Concepts are promoted when they can be coherently described in the text (e.g. looking for a minimum number of descriptions having the same semantical content)

Random document

Candidate concept

monetary_policy

Yewno syntagmatic Hub

Candidate concept extraction

Description(s) lookup

Description(s) extraction

Quantitative easing (QE) is a type of monetary policy used by central banks to stimulate the economy when standard monetary policy has become ineffective. Quantitative easing, and monetary policy in general, can only be carried out if the central bank controls the currency used in the country

Concept definition(s)

Monetary policy is the process by which the monetary authority of a country controls the supply of money, often targeting an inflation rate or interest rate to ensure price stability and general trust in the currency.

Extracting and projecting Concepts into an Inferential Semantic Space

Yewno is able to recognize a Concept amongst an enormous volume of unstructured data and to project its significance into an Inferential Semantic Space where this concept is correlated to others so as to create a mesh of potential inferences

This turnaround led to parent-company Ford, and Jaguar's then chairman Wolfgang Reitzle, to set ambitious sales targets in the belief that Jaguar could become a major luxury car manufacturer in the mould of Audi, BMW, and Mercedes-Benz.
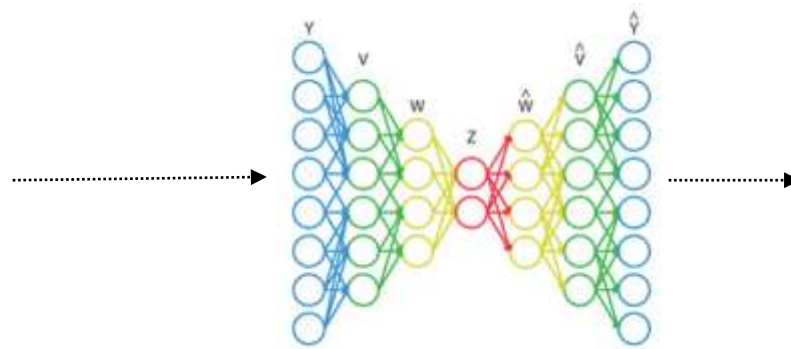
Auto-encoder
Deep Learning Network
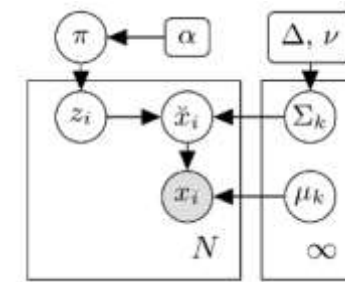
Dirichlet
Process
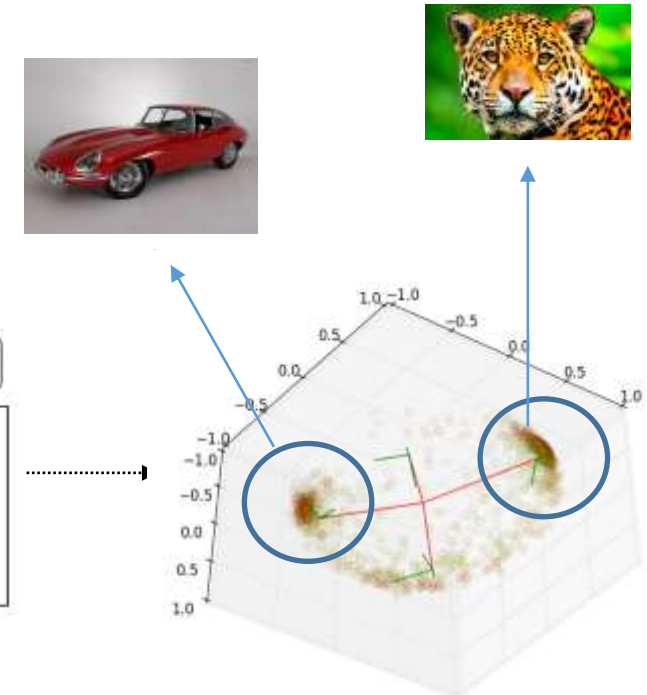
Projection of Knowledge space and elaboration of Inferences

Content discoverable

Demo

Appropriate uses

- **How would a user know which search engine would be best for them, full text search or Yewno graph?**

- As a complementary product we recommend offering users a range of options, the platform fits within all major search interfaces and homegrown solutions
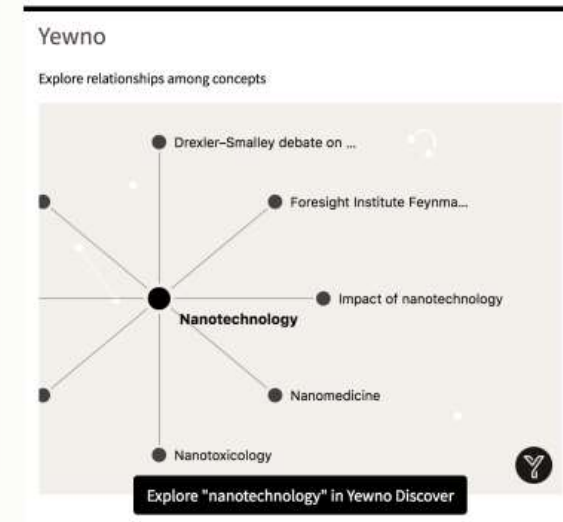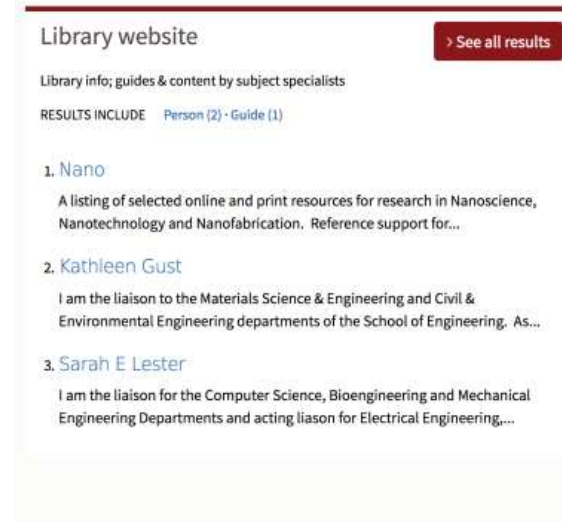
Use case 1: Developing research skills

UNDERGRADUATE STUDENTS

- Understand the big picture and how things connect together
- Drill down into individual areas of interest
- How to shape good research questions
- Introduction into more scholarly resources

Azucena, first year Undergraduate, Stanford
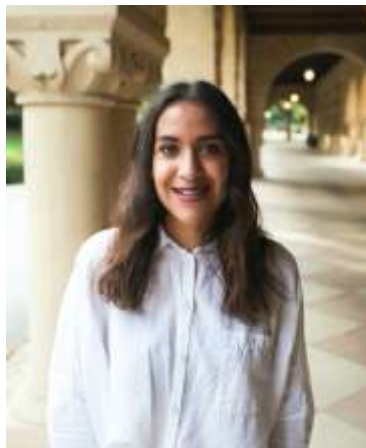
"Yewno gave me the tools to organize an effective argument. Simply put, Yewno gave me a place to start and push forward through each of my 3 final research papers".

Use case 2: Interdisciplinary research
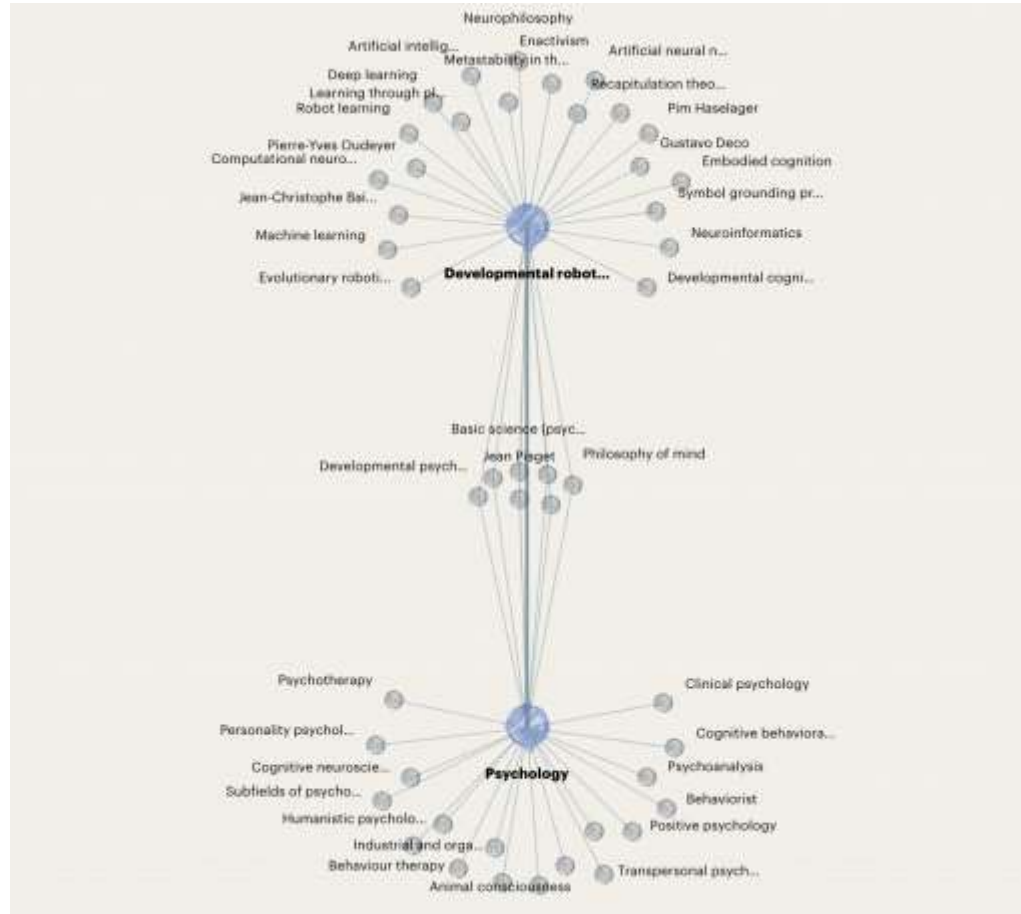
GRADUATE STUDENTS

FACULTY

RESEARCHERS

- Finding indirect and non-obvious relationships between concepts
- Helping identify concepts and connections where there is not yet an overload of scholarly publishing

Ryan, Stanford Master's Student

"Your tool helped immensely in visualizing the overlapping areas in relation to my research topics, helped me discover new vectors that I had not previously thought to search, and allowed me to discover new documents to form my argument".
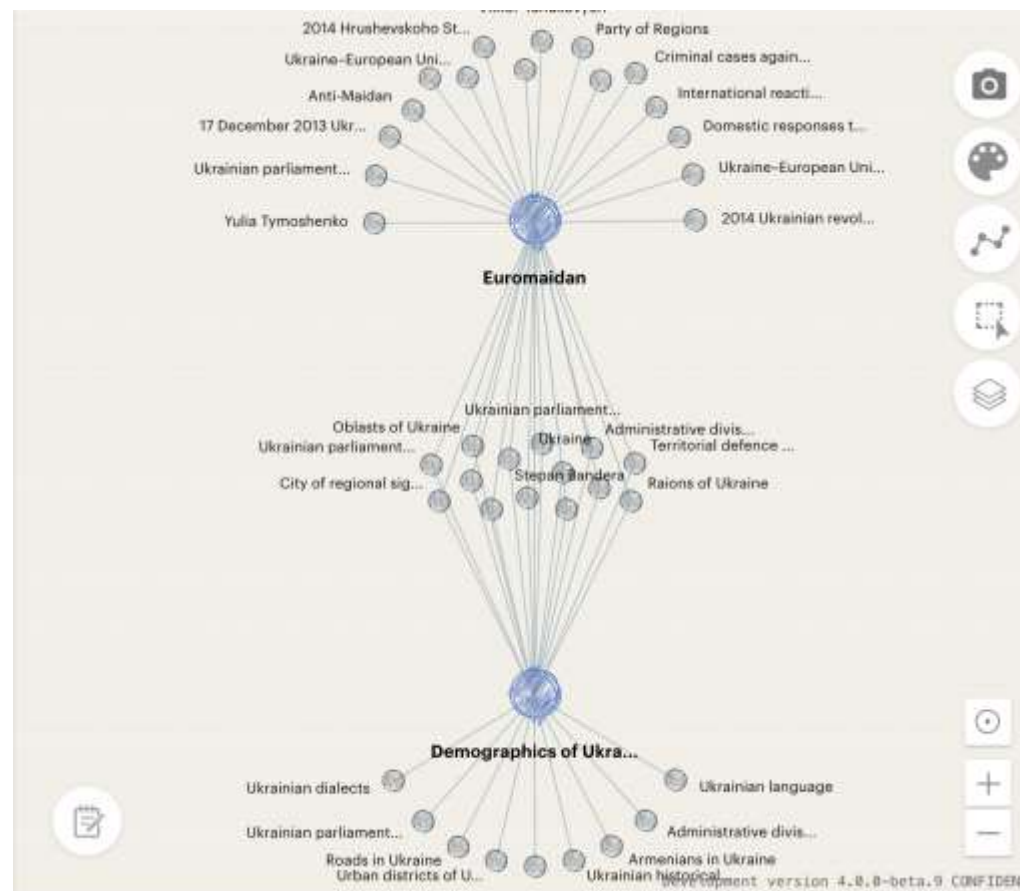
Use case 3: Serendipitous discovery
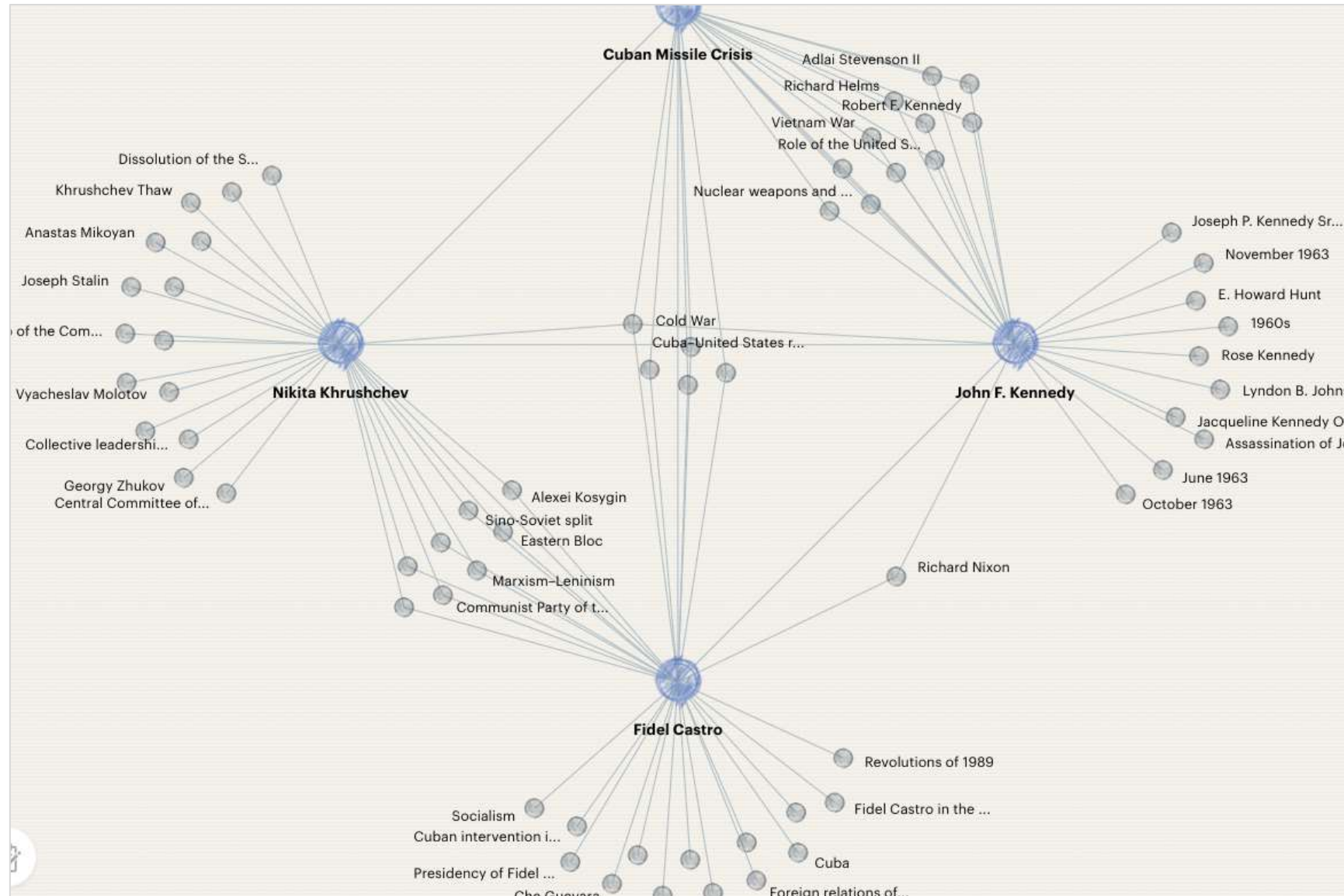
ANY LEARNER OR RESEARCHER

- Discovering relevant things you didn't know you didn't know

Interface Configuration option

- **Is the user interface for initiating a search or viewing results configurable? Is it easy to understand? Is it brandable?**

- Yes, in various places, see examples
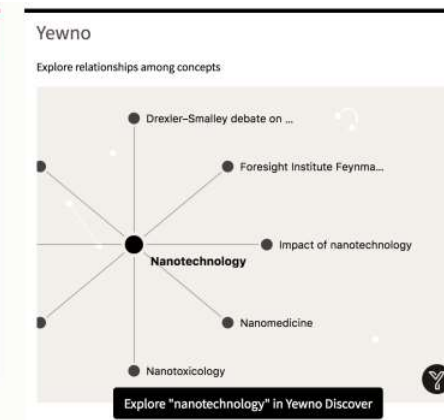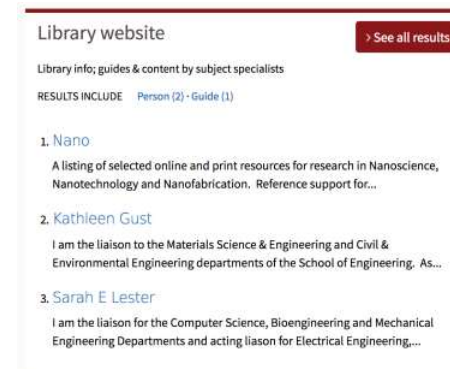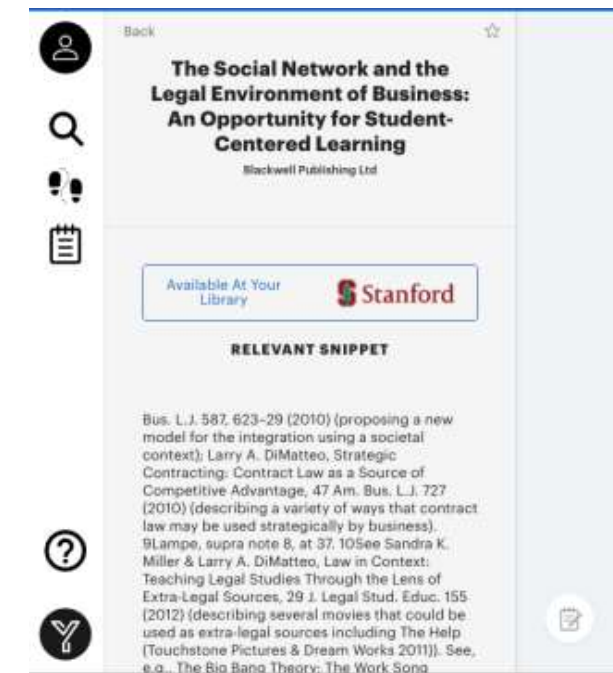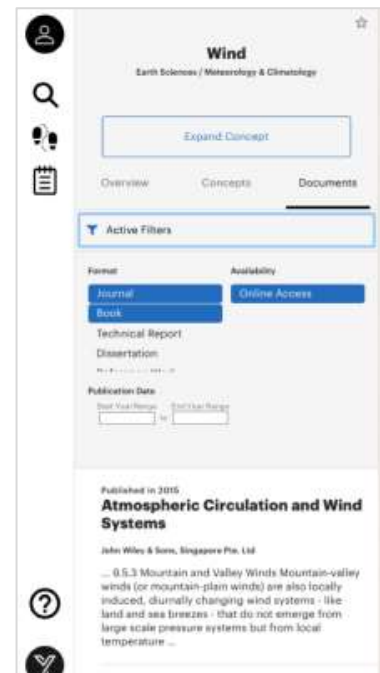
Key benefits for Researchers

- Intuitively explore a topic by navigating through correlated concepts

- Explore information across disciplines and link apparently uncorrelated topics

- Retrieve the information you find interesting quickly and link through to full text

- Find connections you didn't know existed, hunt for emergent knowledge

- Mimic lateral thinking

Key benefits for Universities

- Better exploration of collections – full text discovery

- Great teaching tool – topic exploration, brainstorming, critical thinking

- Provides a unique interdisciplinary environment

- Huge range of OA content available

- Easy integration with existing infrastructure

Additional benefits

- Increases visibility of more subscribed content and resources and links directly through your existing platforms

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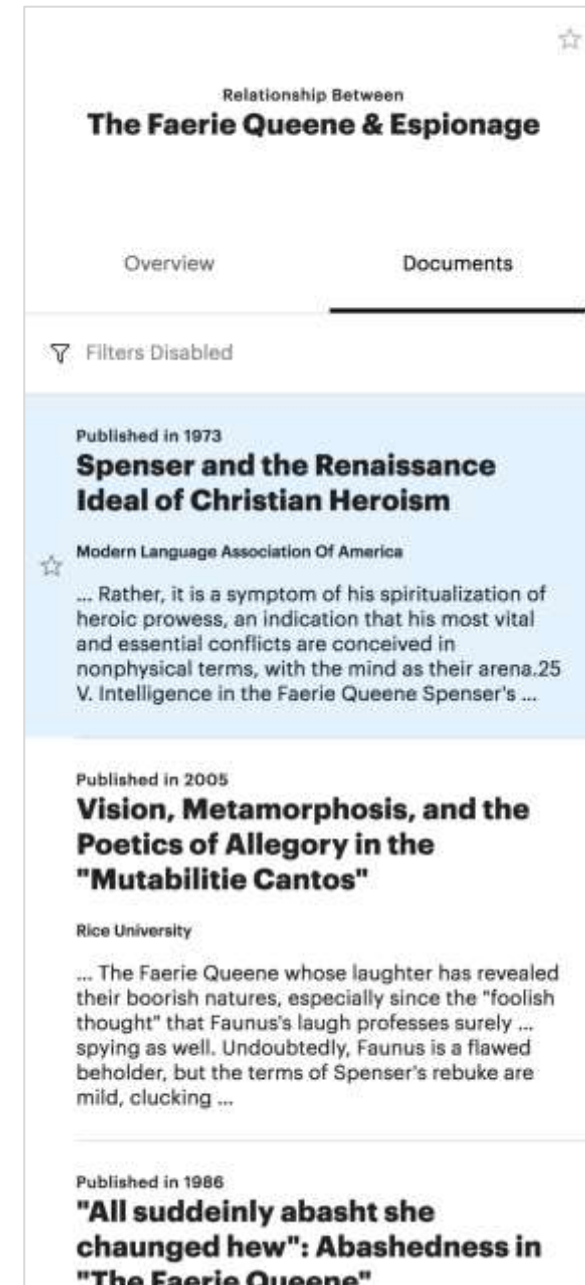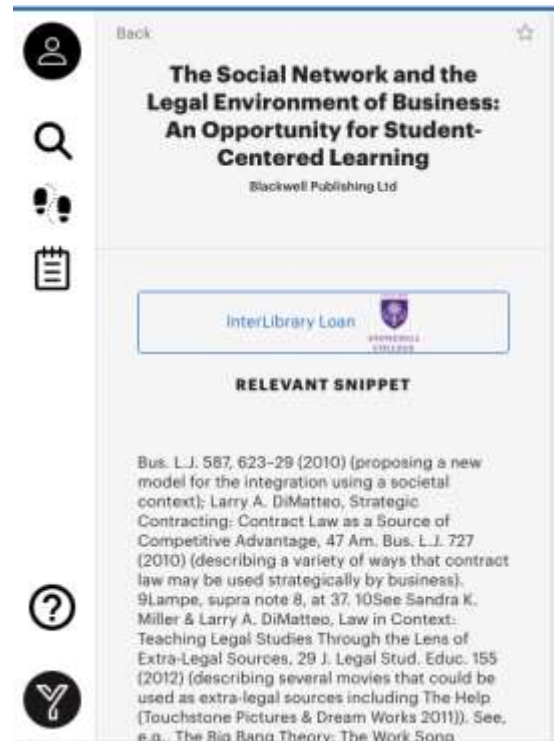
Additional benefits

- Additional features to streamline research and learning functions, from high-level research collaborations to first year student essay
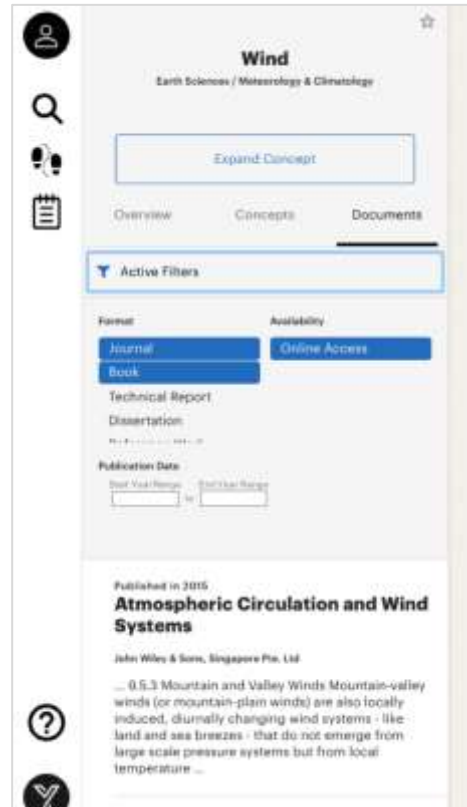
Customization with concept and document filters

Export and sharing features

Advanced Knowledge Map tools

Additional Benefits

- Connecting to your library's institutional holdings to show what is readily available to your students and patrons

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Easy set up and integration