IBM – IEEE
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Seminar and Round Table

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Seminar

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Agenda

- Enabling Cognitive Capablities: The Knowledge Graph
- IBM Cognitive Technologies at Work
- The Ecosystem: IBM Bluemix and Rest-API
- Use Case: IBM Cognitive Computing for Oncology Care Appropriateness

- **Enabling Cognitive Capablities: The Knowledge Graph**

Cognitive Computing

From Unstructured Data
to Cognitively Transparent
Knowledge Representation

From Unstructured Data to Cognitively Transparent Knowledge Representation

Gathering and transforming data into valuable and goal-oriented information is a crucial mission for both **human** and **artificial** decision makers (sensemaking / knowledge management).

In particular, **humans need cognitively transparent information** in order **to make informed decisions**.

In our applied research project we leverage on **IBM advanced content analytics technology** partnered with **knowledge-graph-based approach to enhance clinical knowledge sharing and medical decisions outcomes**.

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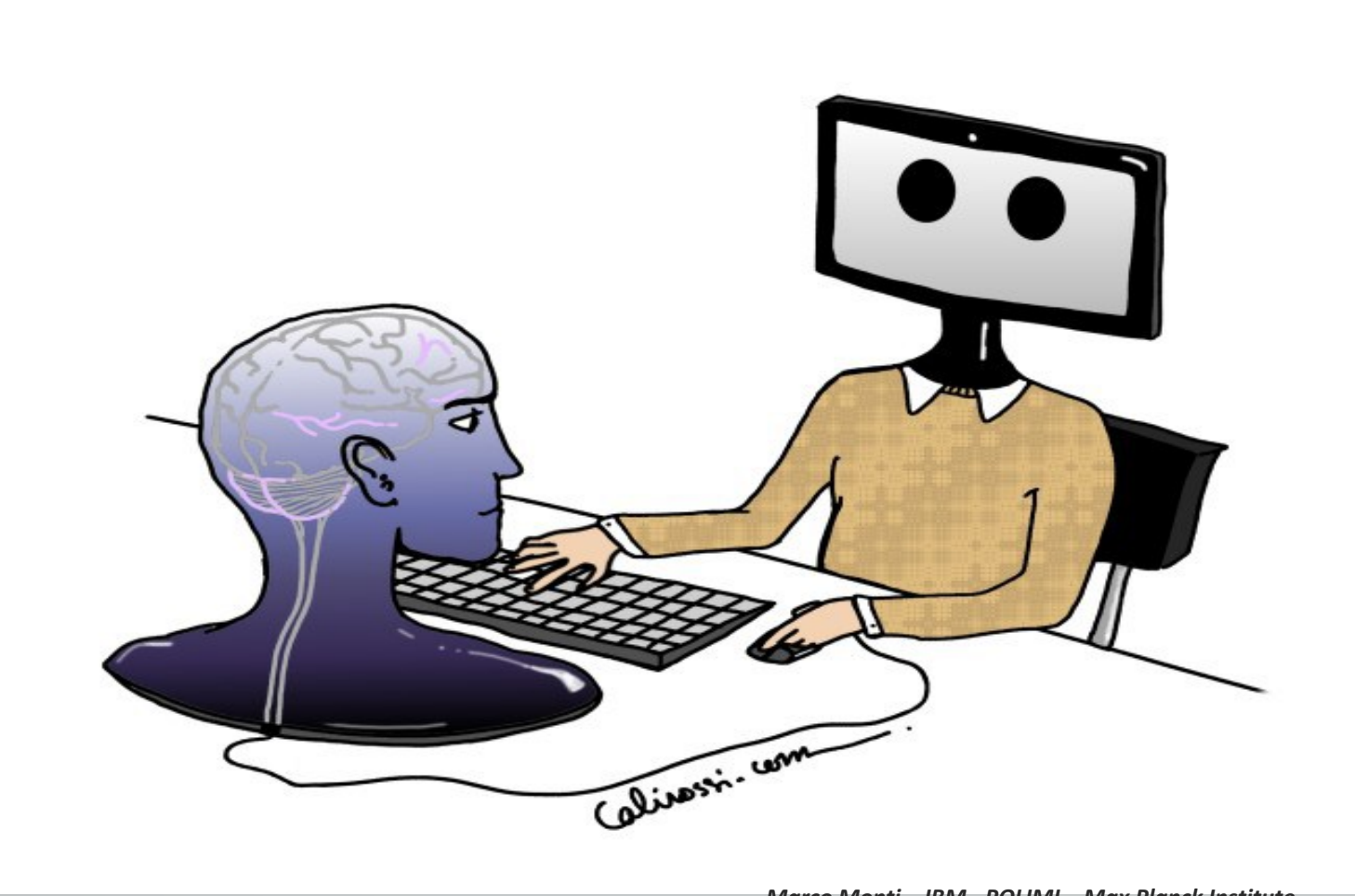
How Do Humans & Machine Make Sense of the World



Humans & Machines
SenseMaking & Situational Awareness

- **Sensemaking is an active two-way process of fitting data into a frame (mental framework/ data model) and fitting a frame / ontology around the data.**
- **Neither data nor frame comes first; data evoke frames and frames select and connect data** (**Knowlege Graphs**). When there is no adequate fit, the data may be reconsidered or an existing frame may be revised.

Human SenseMaking Features

- People **extract cues / attributes** **from the context to help them decide on what information is relevant and what explanations are acceptable** (Salancick & Pfeffer, 1978; Brown, Stacey, & Nandhakumar, 2007) **Extracted cues provide points of reference for linking ideas to broader networks of meaning** and are 'simple, familiar structures that are seeds from which people develop a larger sense of what may be occurring." (Weick 1995: 50).

The Creation of New Knowldedge

The interaction between Tacit Knowledge & Explicit Knowledge

two modes of knowing vital for the creation of new knowledge.

The Role of Knowledge Graphs in Cognitive Computing

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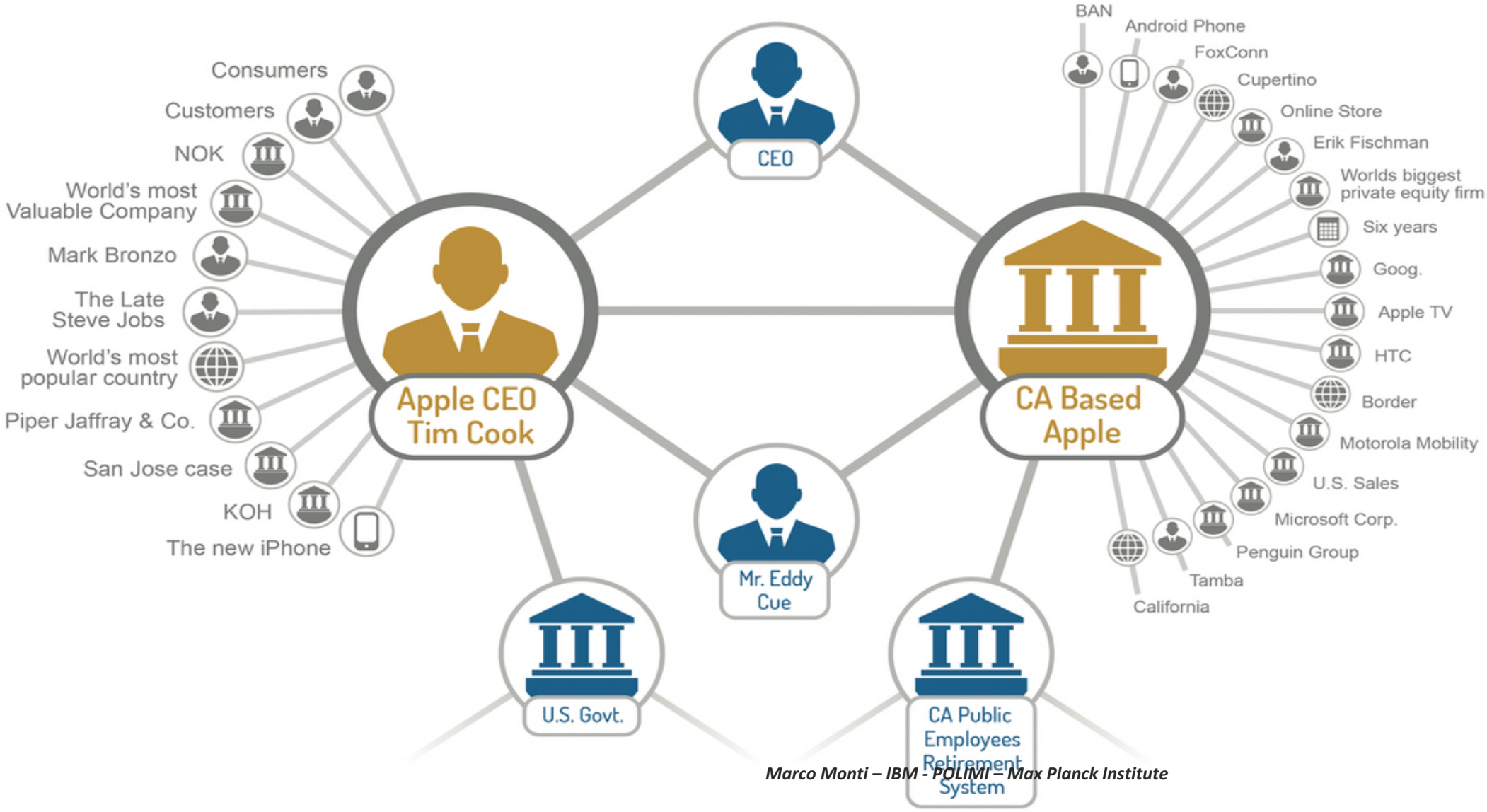
THE KNOWLEDGE GRAPH

LINKS TOGETHER BILLIONS OF ENTITIES, FACTS AND RELATIONSHIPS



What are Knowledge Graphs

- A knowledge graph is composed by a set of **interconnected typed** **entities and their attributes**. It also contains a simple **ontology**, and represents high quality knowledge, and **provides efficient and effective knowledge service**
- the **distinguished features** of Knowledge Graphs consists in their special **combination of knowledge representation structures, information management processes, and search algorithms**.
- In a knowledge graph, **the basic unit is** (the representation of) **a singular entity**, anything you would like to describe.
- Each entity **might have various attributes**.
- Furthermore, **entities are connected to each other**; This is the so-called interlinking in knowledge graphs (i.e.to bridge separate knowledge graphs).
- Not surprisingly, **each entity needs an identification to distinguish each other**; the entity IDs need to be **globally unique**.

Knowlege Graphs **Features**

- Knowledge graphs inherit from classic Artificial Intelligence formalisms such as semantic networks and Description Logics.
- **KG** should be regarded to **as high-quality, knowledge intensive information systems**. Firstly, the knowledge they convey should be **consistent**.
- Besides consistency, "high quality knowledge" should also feature a certain degree of **completeness**, **accuracy**, and **timeliness**.
- To help achieving such quality standards, Knowledge Graphs are typically **implemented in a centralized way**.
- **KG** should be able to **provide a set of knowledge services**, which should be adequate enough for implementing tasks or **achieving goals**. This involves features like high **reliability** (e.g., fast response time, and high fault tolerance) and high **usability** (e.g., good learnability, and the ease of use).

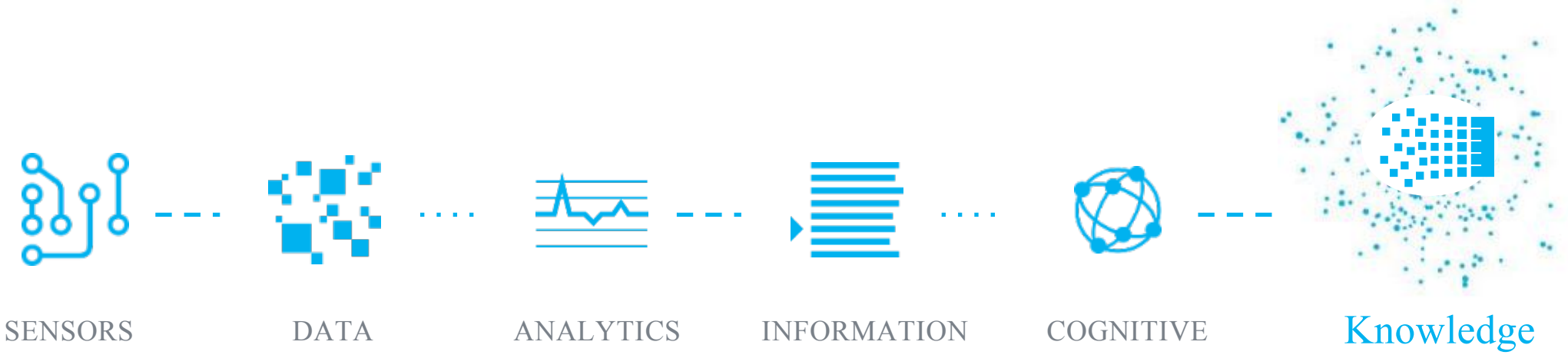
What is Watson Explorer?

IBM Watson Explorer combines search and content analytics with unique **cognitive computing** capabilities to help users find and understand the contextual information they need to work more efficiently and make better, confident decisions at the point of impact.

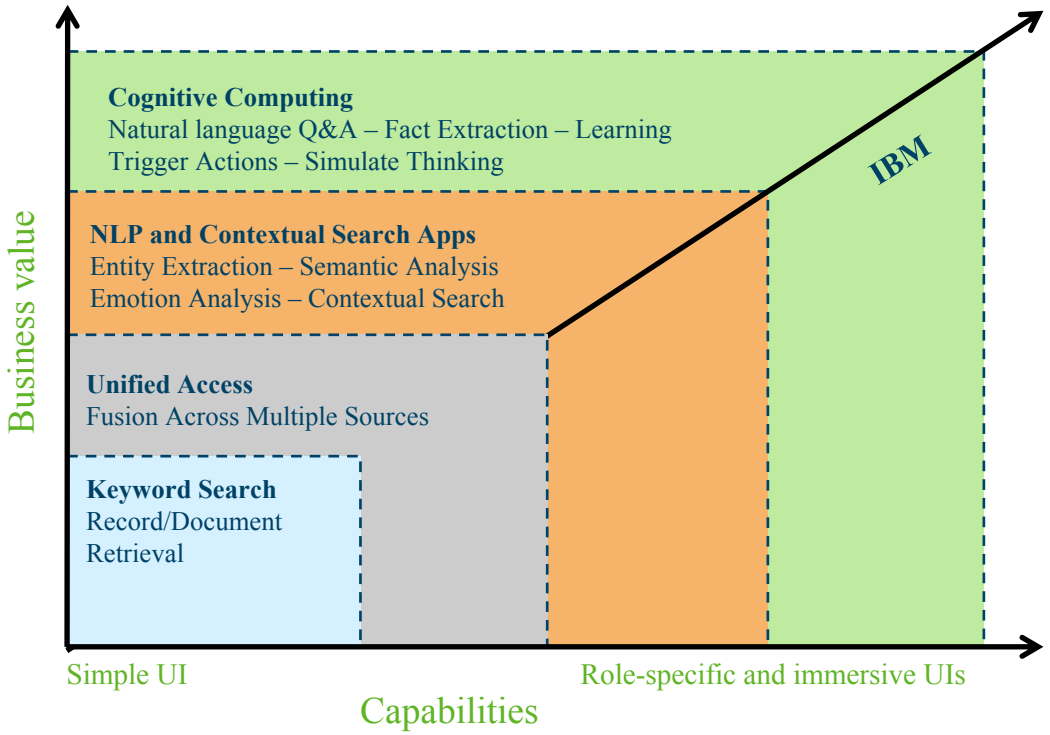
Watson Explorer enables organizations to

- **Explore:** Securely connect to, search and explore all of your organization's data, regardless of format or where it is stored or managed
- **Analyze:** Gain insights from unstructured dark data with advanced content analytics using hypothesis-free discovery
- **Interpret:** Scale expertise with leading-edge cognitive services from Watson Developer Cloud

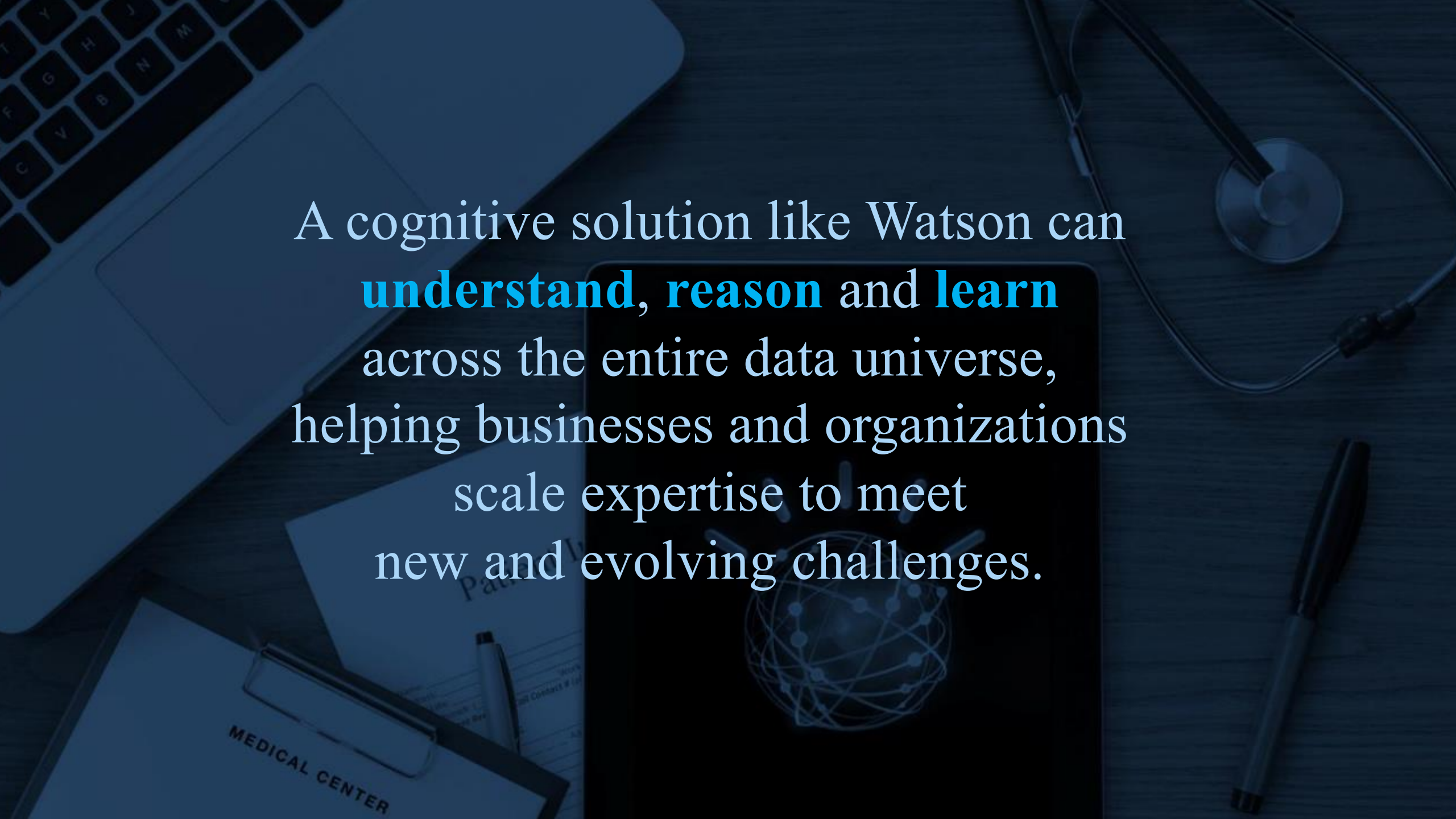
Cognitive systems democratize innovation by scaling knowledge



Evolution from search through cognitive computing



There is a natural and cumulative evolution from basic search, through advanced NLP, to cognitive computing … all with the goal of delivering information and scaling expertise.



A cognitive solution like Watson can
understand, **reason** and **learn**
across the entire data universe,
helping businesses and organizations
scale expertise to meet
new and evolving challenges.

Bring Watson's APIs cognitive technology to Watson Explorer

Watson's APIs are cognitive building blocks that can harness data in Watson Explorer

Message Resonance
Concept Expansion
Face Detection
Natural Language Classifier
Speech to Text
Text to Speech
Language Translation
Language Detection
Sentiment Analysis
Dialog
Retrieve and Rank
Image Link Extraction
Tradeoff Analytics
Entity Extraction
Tone Analyzer
Personality Insights
Taxonomy
Author Extraction
Concept Tagging
Concept Insights
Relationship Extraction
Question & Answer
Feed Detection
Keyword Extraction
Visual Recognition
Image Tagging
Text Extraction

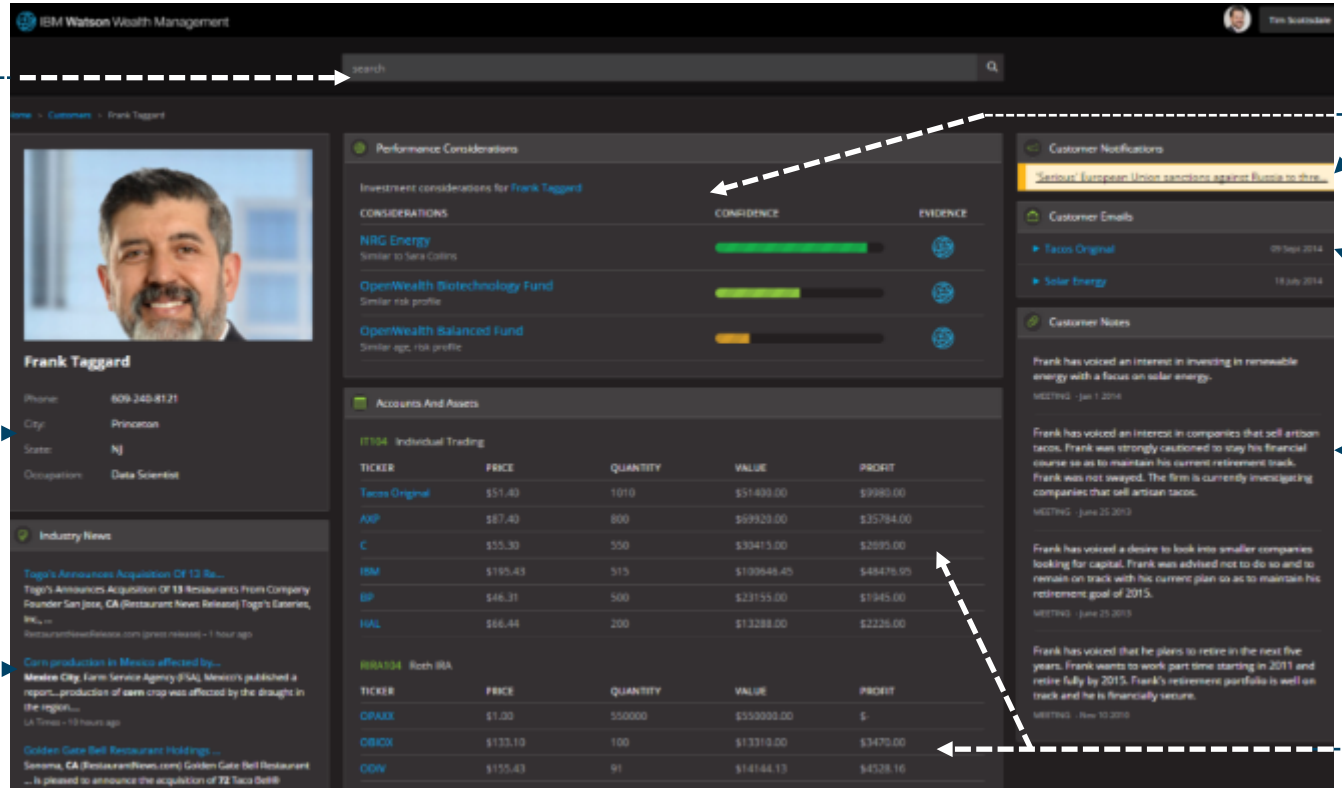
Services are licensed separately. Some services may be in beta.

Unified information application using Watson Developer Cloud services

User's search can be submitted to Watson Developer Cloud services simultaneously

Client data from cloud and enterprise systems

News highlighted with Watson Relationship Extraction service



Recommendations and alerts based on structured and unstructured content

Customer e-mails from corporate email system

Client notes from CRM

Account holdings from systems of record

Watson Explorer raises the bar with cognitive exploration

Explore

Watson Explorer

Search, visualize, and explore information across enterprise applications through **360° views of any topic**

+

Analyze

Content Analytics

Analyze, visualize, and discover insight in structured and unstructured data through **NLP and content mininig**

+

Engage

- Question Answer
- Relationship Extraction
- Concept Expansion
- User Modeling
- Language Identification
- Machine Translation
- Message Resonance

... more ...

Watson Developer Cloud

Enhance, scale, and accelerate human expertise through **user modeling, relationship extraction, and more**

New packaging with same functionality
Healthcare Annotators – deliver value out of the box

Problems
- Result of a series of interim annotations that identify diseases, symptoms, and disorders
- Normalize to standard terms and standard coding systems including SNOMED CT, ICD-9, HCC, CCS
- Capture timeframes of the problem
  - determine if past or current problem
- Determine confidence (Positive, Negative, Rule Out)

Procedures
- Identify compound procedures
- Normalize to standard terms and standard coding systems including SNOMED CT, CCS, CPT
- Capture timeframes of the procedure

Medications
- Series of interim annotations that identify drugs, administrations, measurements
- Normalize to standard terms RxNorm

Cancer Diagnosis
- Attributes: Name, Date, Modality, Grade (Scale, Value), Behavior, Site, Measurement

Allergies
- Drug allergies, generic allergies e.g. food

Export Adapter
- Configure annotation output destination
- Default configuration is IBM Healthcare Provider Data Model staging tables

Demographic and Social
- Patient Age
- Living Arrangement
- Employment status
- Smoking status
- Alcohol use

Compliance & Noncompliance
- Patient's history of medication compliance with directions such as "take all doses, even if you feel better earlier"
- Noncompliance - Patient's history of medication noncompliance with directions.

Labs results

Type of lab test performed, unit of measure, result value

Ejection Fraction – in support of CHF use cases

Coding Systems – can identify these codes
- CPT
- CCS
- HCC
- NDC (National Drug Codes)

100+ dictionaries, 800+ parsing rules

IBM Cognitive Services

Watson Developer Cloud

&

IBM Bluemix

The Evolution

Watson Developer Cloud

Bluemix

Service introduction and Demo

AlchemyLanguage
- Entity Extraction
- Sentiment Analysis
- Emotion Analysis

(Beta)
- Keyword Extraction
- Concept Tagging
- Relation Extraction
- Taxonomy

Classification
- Author Extraction
- Language Detection
- Text Extraction
- Microformats Parsing
- Feed Detection
- Linked Data Support

Concept Expansion
Concept Insights
Dialog
Document Conversion
Language Translation
Natural Language Classifier
Personality Insights
Relationship Extraction
Retrieve and Rank
Tone Analyzer
Speech to Text
Text to Speech
AlchemyVision
Visual Insights
Visual Recognition
AlchemyData News
Tradeoff Analytics

IBM Cognitive Computing for Oncology Care Appropriateness

Marco Manca – IBM - PCUMI – Max Planck Institute

Who's who

Founded in 1925, the **Fondazione IRCCS Istituto Nazionale dei Tumori (INT)** is a top-tier Scientific Research and Treatment Institution which has achieved renowned excellence in the field of **pre-clinical and clinical oncology research and care**.

In 2011 the Istituto performed:

- **13,630 in-patient** admissions (**415 beds**)
- 8,464 one-day-hospitalization admissions (67 beds)
- **1.1 milion out-patient treatments**
- 11,500 surgical operations

The **IBM Research Lab in Haifa (HRL)** has conducted decades of research that have been vital to IBM's success. R&D projects are being executed today in areas such as **healthcare and life sciences**, discovery, verification technologies, multimedia, active management, information retrieval, programming environments, business transformation, and optimization technologies. The Lab houses IBM's biggest research center outside the US, and employs over 500 people.

The research project

Business needs:

- Huge amount of clinical data reported in **free-text** annotations to leverage on;
- Clinical Decision-Making based on real **evidence (clinical trials);**
- Strong need for **automatic tools** to monitor clinical appropriateness.

The project aims to to provide **clinical doctors and healthcare managers** with a comprehensive **view of the care delivery processes** and their **appropriateness**, highlighting their clinical **outcome** and their overall **cost** for the organization.

Unit engaged in INT:

- Oncologia Medica Tumori Mesenchimali dell'Adulto, dott. Paolo Casali
- Oncologia Medica dei Tumori della Testa e del Collo, dott.ssa Lisa Licitra

Medical Treatment Programs:

- **Recommended**
- **Performed**

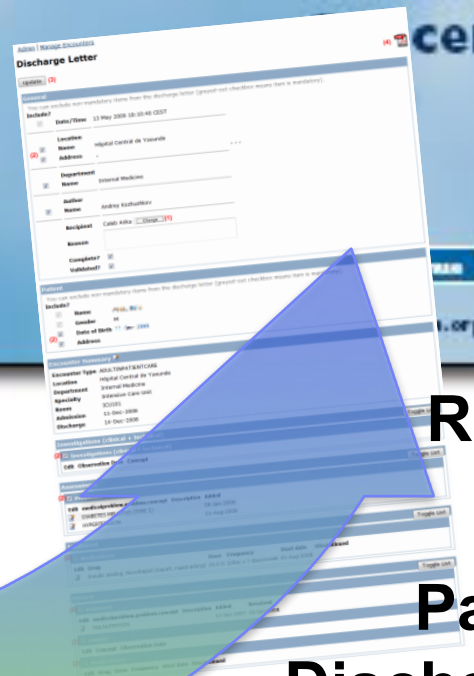
What is the «Treatment Program Deviation Analysis»?

Treatment Programs (TP) Deviation Analysis

Identifies differences between **recommended** and **performed** treatments as documented in the clinical data by care givers.

Documented **T**reatment **P**rograms that have been analyzed can:

1. **adhere** to one of the recommended TPs (guidelines)
2. **do not adhere** to any recommended TPs (guidelines)



Clinical Tests

Clinical Best Practices based on Literature Review and Medical Consultations

ROL Guidelines

Patients' Discharge Letters

ROL clinical documents

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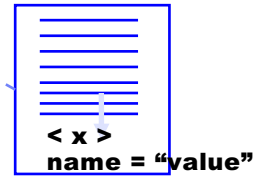
- In-patient discharge letter
- Out-patient observation report

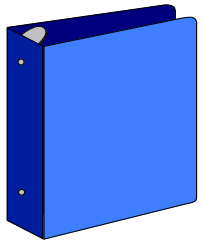
PDF
(digital signature)



XML-CDA2

INT
Clinical
Repository

Fascicolo
Sanitario
Elettronico
(EHR)



ROL clinical guidelines

Sharing classifications and semantics

- **Clinical Presentations**
- Oncological clinical history
- Extra-oncological clinical history
- **Reccommended Treatment Programs**
- Performed Treatments
- Patient’s clinical status

Integrating Knowledge and Data for Decision Support

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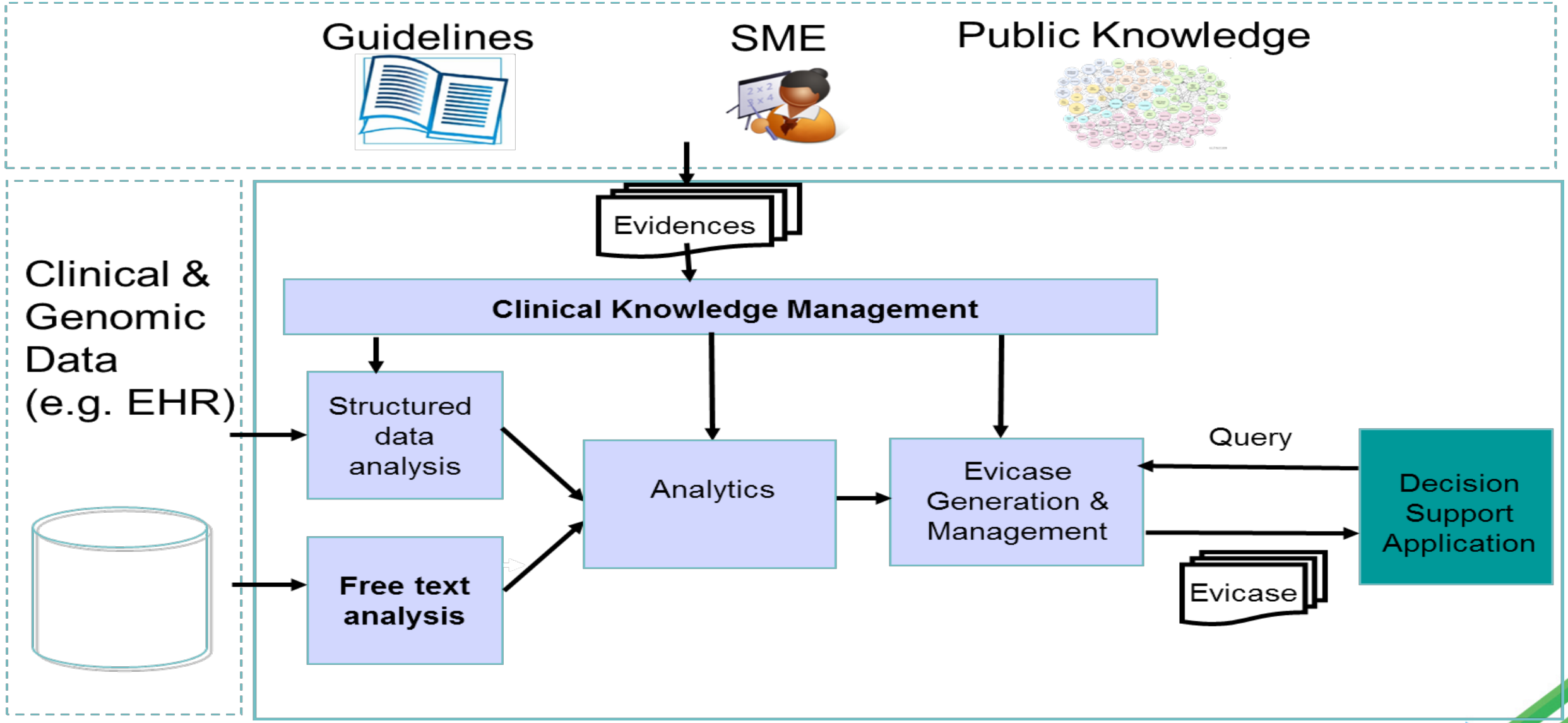

Content Analytics Applied to Report on AVE8062 Use

Il paziente è stato ricoverato per valutazione di malattia e programmazione terapeutica. E stata dunque effettuata una TC del torace e dell addome, con riscontro di incremento dimensionale del noto espanso nel contesto del muscolo gluteo sinistro (attualmente di circa 8 cm verso i precedenti 5,5 cm); appare invece immodificata la localizzazione ipodensa in regione lombare nel contesto del tessuto sottocutaneo di circa 30 mm. Il distretto toracico appare tuttora libero da malattia. In considerazione dell istotipo, dell estensione metastatica di malattia e dei pregressi trattamenti effettuati, è stata proposta al paziente la partecipazione ad uno studio clinico randomizzato in doppio cieco, che prevede l mpiego di Cisplatino in associazione a placebo verso AVE8062, farmaco dotato di attività antivascolare. Il paziente ha accettato il programma proposto e firmato il relativo consenso informato. Si è somministrato pertanto il primo ciclo chemioterapico con Cisplatino ed AVE/placebo, soggettivamente ben tollerato. Nel corso del ricovero sono stati eseguiti inoltre prelievi seriati di farmacogenomica e farmacocinetica. Si dimette pertanto il paziente, in buone condizioni generali, con indicazione a proseguire il trattamento in regime ambulatoriale.</paragraph>

Measurements | Body Parts | Treatment Reasons

Conjunctions | Chemo Drugs | Chemo Cycles | Clinical Studies

CareView – Decisions Review

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IBM Oncology Care View — User Name

Filters — Clean

- By clinical parameters
- By demographic parameters
- By encounter parameters

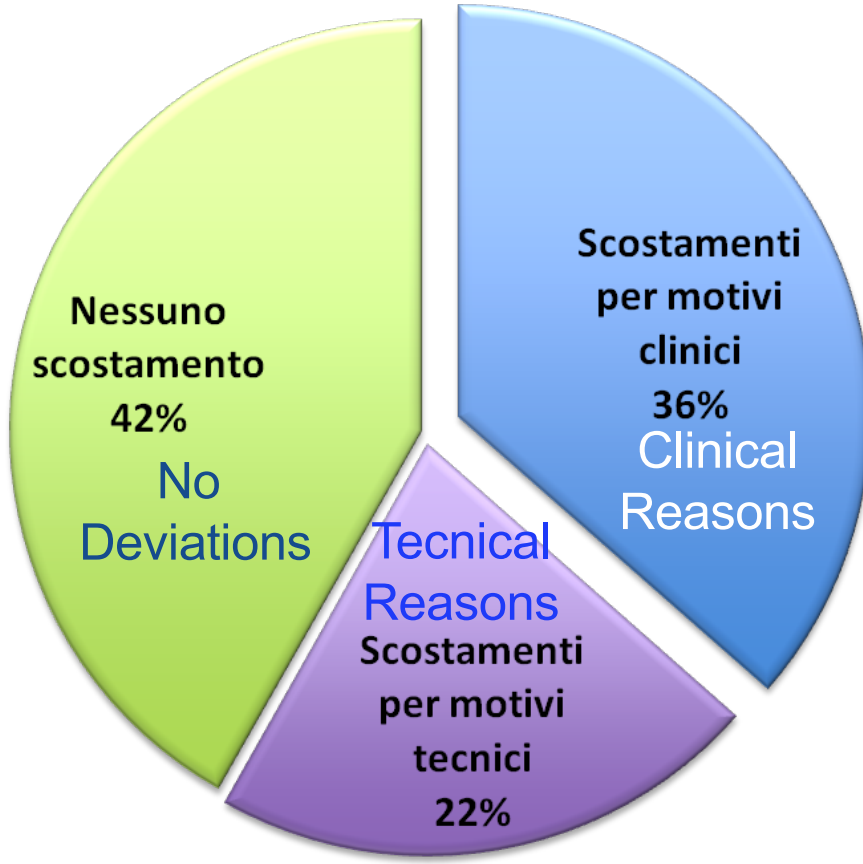
Treatment Decisions | Treatment Outcome | **Decision Analysis**

Rationale for treatment selection

Id	Reason Name	#
0	Patient Related	2421
1	Clinical history	215
2	Previous treatments	212
29	Family clinical history	3
7	Clinical status	2174
8	Overall clinical condition	208
9	Acute symptoms	396
10	Age	56
11	Comorbidities	27
12	Disease relapse	324
13	Disease progression	348
14	No disease progression	606
15	Stage of disease	7
16	Tumor parameters	202
25	Other	0
26	Patient preferences	32
40	Environmental constraints	13
41	Lack of non-human resources	0
42	Lack of personnel	13
30	Physician practice style	116
31	Anticipated efficacy	8

Clinical status (i.e. Comorbidities, disease status)

Patient preferences



Time Frame: 2006-2012
1.786 patients
2.295 treatment programs
4.388 ROL-Documents

The IBM Onco Care Trio

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IBM Oncology Care Edit

use to edit
oncology care guidelines

IBM Oncology Care Guide

use to guide
care decisions

IBM Oncology Care View

use to view
past care decisions

- Leverages the **IBM Advanced Content Analytics** (ICA) to perform free text analytics on patient's data
- Utilizes similar natural language processing (NLP) methods used in **IBM Watson**
- Has built-in **medical terminology** support (taxonomies / ontologies)
- By exploting ICA text analytic capabilities, we succeeded in processing **free-text** information **together** with **structured data**

Achievements:

- Collaboration among clinical and technical project people
- **Sharing a common semantic platform and domain view**
- Tools and insights for improvements: techincal refinements and training to clinicians

Future perspectives:

- Extension to other oncology care organization and other pathologies (i.e. Rete Oncologica Lombarda, Rete Nazionale Tumori Rari)
- Extension to include biomolecular data
- Cost evaluation linked to performed treatments
- Comparison among oncology care organizations (outcome, case-mix, costs)

IBM Vision on Personalized Medicine

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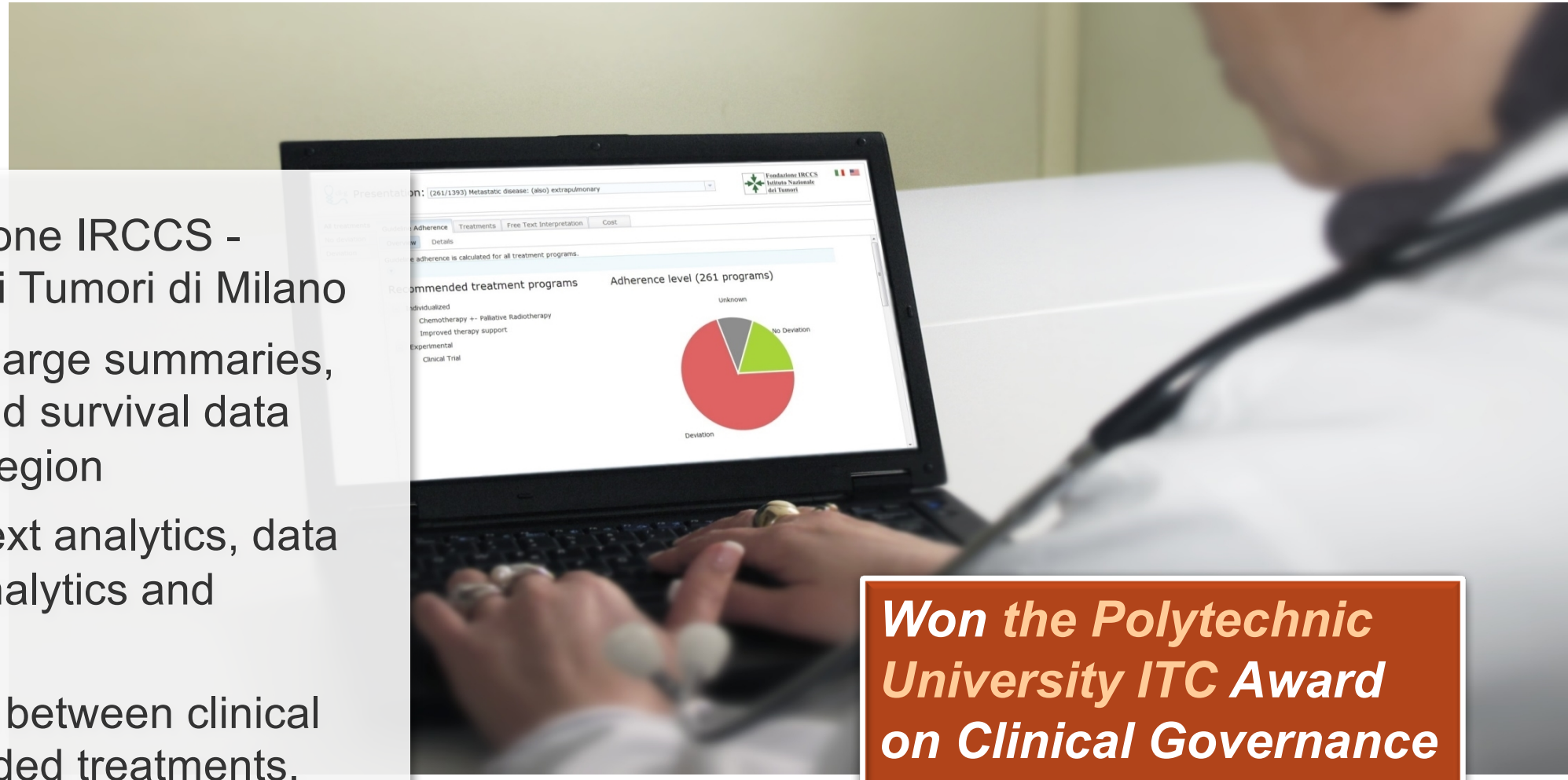
Customer: Fondazione IRCCS - Istituto Nazionale dei Tumori di Milano

Data: Patient's discharge summaries, clinical guidelines and survival data from the Lombardy region

Technology: Free text analytics, data mining, advanced analytics and visualization

Value: Gap analysis between clinical guidelines and provided treatments, decision support, care management, cost efficiency



Won the Polytechnic University ITC Award on Clinical Governance and Decision Support

•AlchemyLanguage

AlchemyLanguage is a collection of APIs that offer text analysis through natural language processing. The AlchemyLanguage APIs can analyze text and help you to understand its sentiment, keywords, entities, high-level concepts and more.

- AlchemyLanguage offers several API functions as part of its text analysis service, each of which uses **sophisticated natural language processing techniques to analyze your content.**

•AlchemyLanguage:Intended Use

- Entity Extraction
- Sentiment Analysis
- Emotion Analysis (Beta)
- Keyword Extraction
- Concept Tagging
- Relation Extraction
- Taxonomy Classification
- Author Extraction
- Language Detection
- Text Extraction
- Microformats Parsing
- Feed Detection
- Linked Data Support

•AlchemyLanguage:Demo

Demo Website

IBM Watson now powers a **Hilton hotel robot concierge**

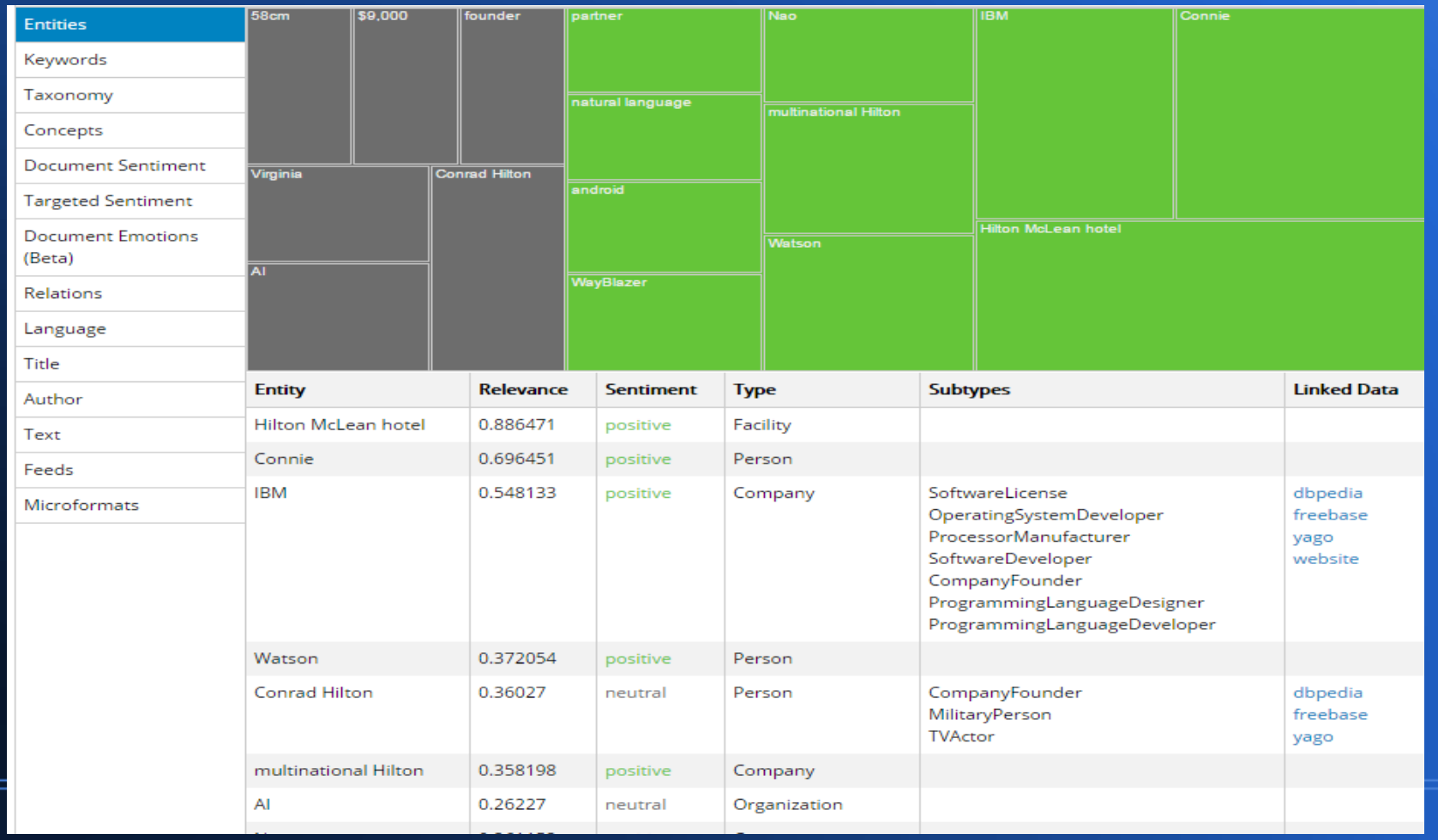
IBM/Hilton
Just arrived to your hotel, desperate for some munch at a decent restaurant nearby, and not really into speaking with human beings? Connie the robo-concierge is here to help. American hotel multinational Hilton has teamed up with tech giant IBM to trial a robotic concierge powered by IBM's AI software Watson.

The bot has been christened "Connie" after the chain's founder, Conrad Hilton, and it is currently assisting residents at Hilton McLean hotel, in Virginia. From its station next to the reception desks, Connie helps guests navigate around the hotel and find restaurants or tourist attractions in the area—but it is not able to check them in just yet.

Connie's physical support is Nao, a French-made 58cm-tall android that has become the go-to platform for educational and customer care tasks, thanks to its relative affordability (about £6,000 or $9,000). But the concierge's brain is based on IBM's flagship AI program Watson—the Jeopardy!-winning system engineered to understand people's questions and answer them in the best way possible.

In this case, Watson's main role is natural language processing, which enables the bot to welcome guests, grasp their spoken queries, and answer accordingly. The information on local attractions and interesting sites is actually channelled from the database of travel platform WayBlazer, also an IBM's partner. Connie is also designed to improve itself through interactions with human customers, learning from frequent queries how to fine-tune its recommendations.

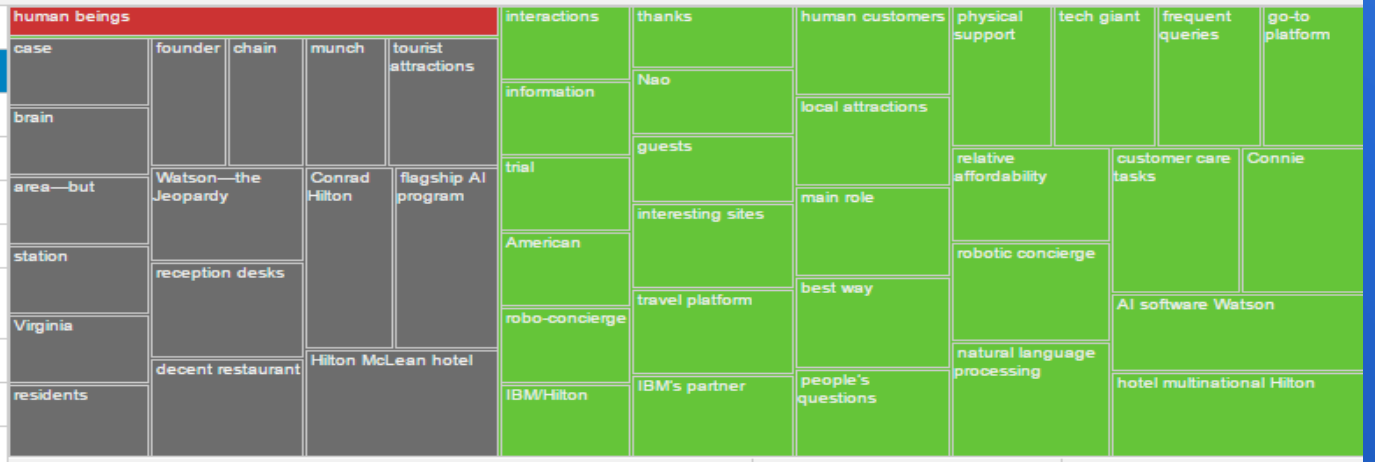
•AlchemyLanguage:Demo



Entity	Relevance	Sentiment	Type	Subtypes	Linked Data
Hilton McLean hotel	0.886471	positive	Facility		
Connie	0.696451	positive	Person		
IBM	0.548133	positive	Company	SoftwareLicense OperatingSystemDeveloper ProcessorManufacturer SoftwareDeveloper CompanyFounder ProgrammingLanguageDesigner ProgrammingLanguageDeveloper	dbpedia freebase yago website
Watson	0.372054	positive	Person		
Conrad Hilton	0.36027	neutral	Person	CompanyFounder MilitaryPerson TVActor	dbpedia freebase yago
multinational Hilton	0.358198	positive	Company		
AI	0.26227	neutral	Organization		

•AlchemyLanguage:Demo

- Entities
- Keywords
- Taxonomy
- Concepts
- Document Sentiment
- Targeted Sentiment
- Document Emotions (Beta)
- Relations
- Language
- Title
- Author
- Text
- Feeds
- Microformats

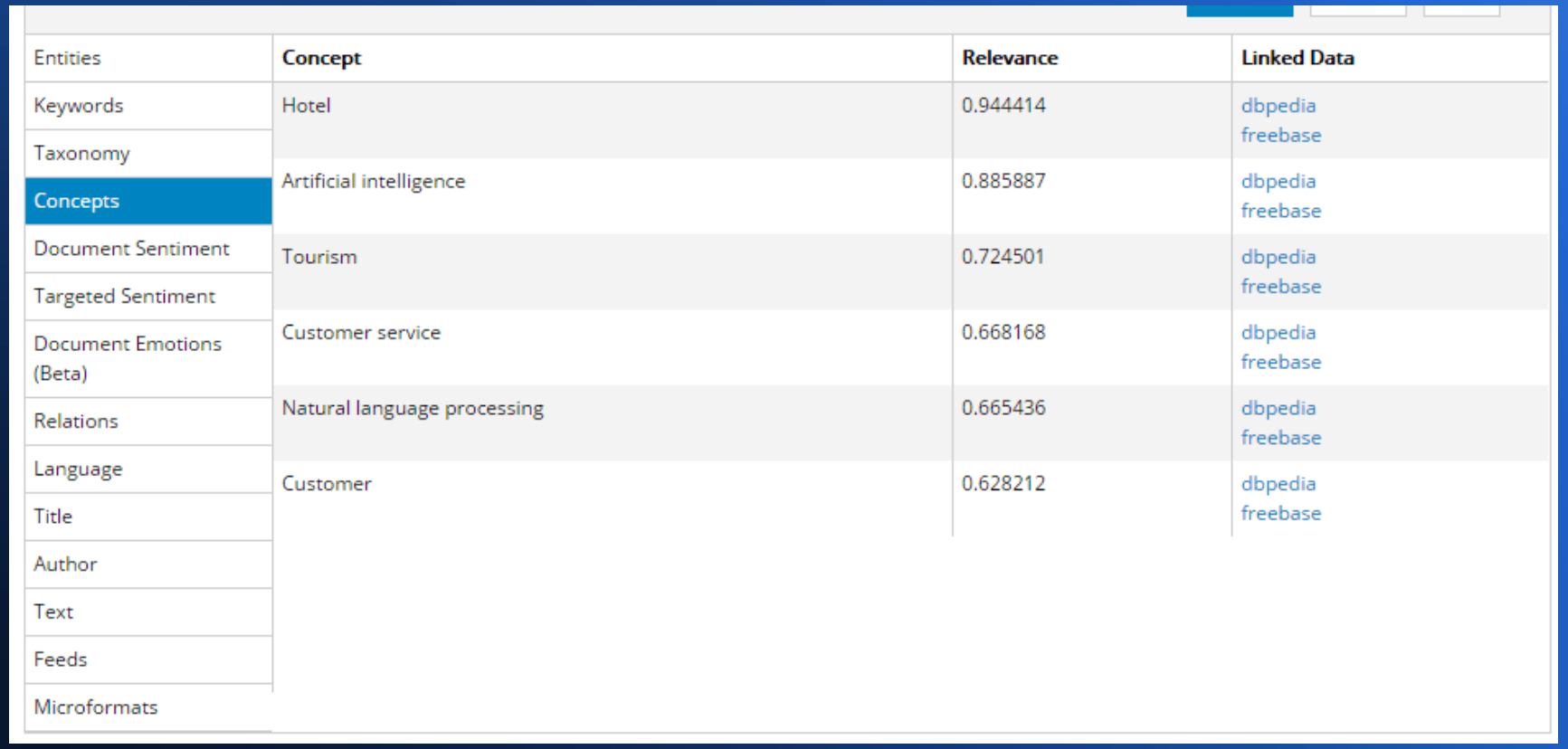


Keyword	Relevance	Sentiment
hotel multinational Hilton	0.953338	positive
Hilton McLean hotel	0.934587	neutral
AI software Watson	0.908814	positive
flagship AI program	0.854386	neutral
Connie	0.839705	positive
customer care tasks	0.836688	positive
natural language processing	0.816597	positive
Conrad Hilton	0.723756	neutral
robotic concierge	0.697727	positive
decent restaurant	0.69372	neutral
human beings	0.682162	negative
relative affordability	0.671437	positive
go-to platform	0.670605	positive

•AlchemyLanguage:Demo

Entities	Label	Score	Confident?
Keywords	/travel/tourist facilities/hotel	0.441453	
Taxonomy	/art and entertainment/music/singing	0.331408	no
Concepts	/technology and computing/software/databases	0.271525	no
Document Sentiment			
Targeted Sentiment			
Document Emotions (Beta)			
Relations			
Language			
Title			
Author			
Text			
Feeds			
Microformats			

•AlchemyLanguage:Demo



•AlchemyLanguage:Demo

Entities	Sentiment	Score
Keywords	positive	0.756197
Taxonomy		
Concepts		
Document Sentiment		

•AlchemyLanguage:Demo

Click here to learn more about **targeted sentiment**.

Visual | JSON | API

- Entities
- Keywords
- Taxonomy
- Concepts
- Document Sentiment
- **Targeted Sentiment**
- Document Emotions (Beta)
- Relations
- Language
- Title
- Author
- Text
- Feeds
- Microformats

Target	Type	Sentiment
Hilton McLean hotel	Entity	positive
Connie	Entity	positive
IBM	Entity	positive
Watson	Entity	positive
Conrad Hilton	Entity	neutral
multinational Hilton	Entity	positive
AI	Entity	neutral
Nao	Entity	positive
WayBlazer	Entity	positive
android	Entity	positive
Virginia	Entity	neutral
natural language	Entity	positive
partner	Entity	positive
founder	Entity	neutral
$9,000	Entity	neutral
58cm	Entity	neutral
hotel multinational Hilton	Keyword	positive
Hilton McLean hotel	Keyword	neutral
AI software Watson	Keyword	positive
flagship AI program	Keyword	neutral
Connie	Keyword	positive
customer care tasks	Keyword	positive
natural language processing	Keyword	positive

•AlchemyLanguage:Demo

Concept Expansion

Link euphemisms or colloquial terms to more commonly understood phrases.

Concept Expansion is a Watson service that analyzes large amounts of text to create a dictionary of contextually related words.
Concept Expansion's pattern recognition technology **helps users identify contextually similar terms and phrases**, create dictionaries, and find or organize text based on those dictionaries. It knows that '**The Big Apple**' refers to **New York City** and that '**getting in touch**' **means communicating by email, letter, or phone.**

Concept Expansion:Demo

This demo uses unstructured content extracted from thousands of random websites. Providing some starting seed terms will return new concepts or words, ranked in order of contextual similarity to your input.

Initial Seeds

Give the service a starting point. One concept per line. Each concept can have up to 3 words each.

Try: Slang | Movies | Cities

Apple
banana
peach

Analyze

Output

Add the best results to your seeds. Then, run the demo again and watch your dictionary get bigger and better.

Results | JSON

- raspberry
- blueberry
- melon
- mango
- strawberry
- apricot
- pineapple
- guava
- passion fruit
- tart apple

← Add All Concepts

Concept Expansion:Demo

This demo uses unstructured content extracted from thousands of random websites. Providing some starting seed terms will return new concepts or words, ranked in order of contextual similarity to your input.

Initial Seeds

Give the service a starting point. One concept per line. Each concept can have up to 3 words each.

Try: Slang | Movies | Cities

Apple
IBM

Analyze

Output

Add the best results to your seeds. Then, run the demo again and watch your dictionary get bigger and better.

Results | JSON

- hewlett-packard ⊕
- ibm (nyse ⊕
- ibm's ⊕
- sun microsystems ⊕
- hewlett-packard's ⊕
- system z9 ⊕
- enterprise-focused ⊕
- apple's ⊕
- ibm's ⊕
- dell ⊕

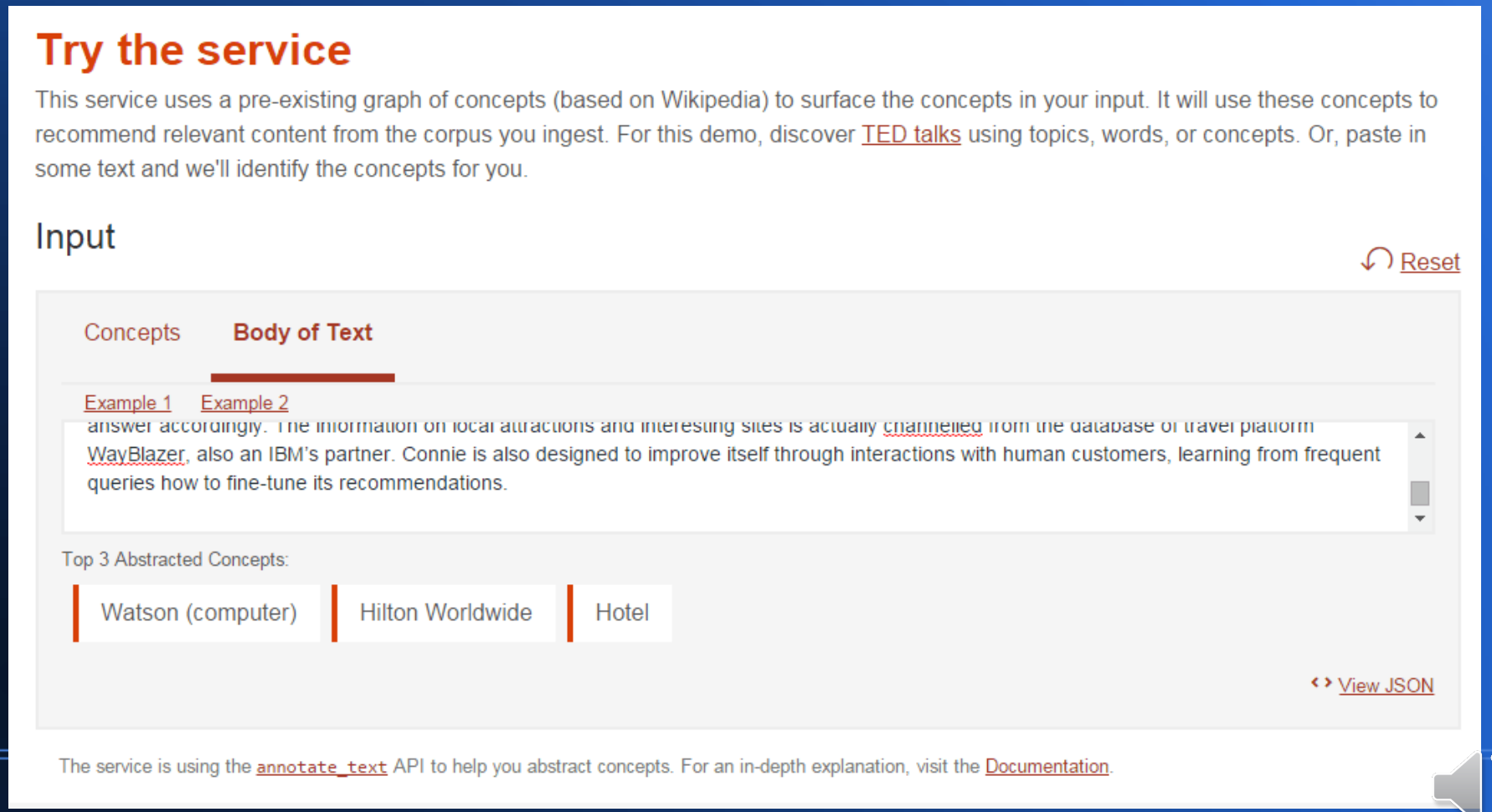
← Add All Concepts

Concept Insights

Rather than limiting findings to traditional text matching**, Concept Insights explores information based on the concepts behind your input.**

Concept Insights **maps input text to a concept graph that is based on the English language Wikipedia**. The service not only identifies explicit links when a concept is directly mentioned, but it **also provides implicit links to concepts that are not directly mentioned.**

Concept Insights:Demo



Concept Insights:Demo

Output

TED talks may have explicit concept matches from your input. However, they also have implicit matches, with a single related concept or a collection of concepts. You may be surprised at what you would miss using a traditional keyword search.

Your concepts | TED talk concepts

Retrofitting suburbia

Ellen Dunham-Jones

Confidence Score:98%

- Watson (computer)
- Hilton Worldwide
- Hotel
  - Hotel
  - Office
  - Restaurant

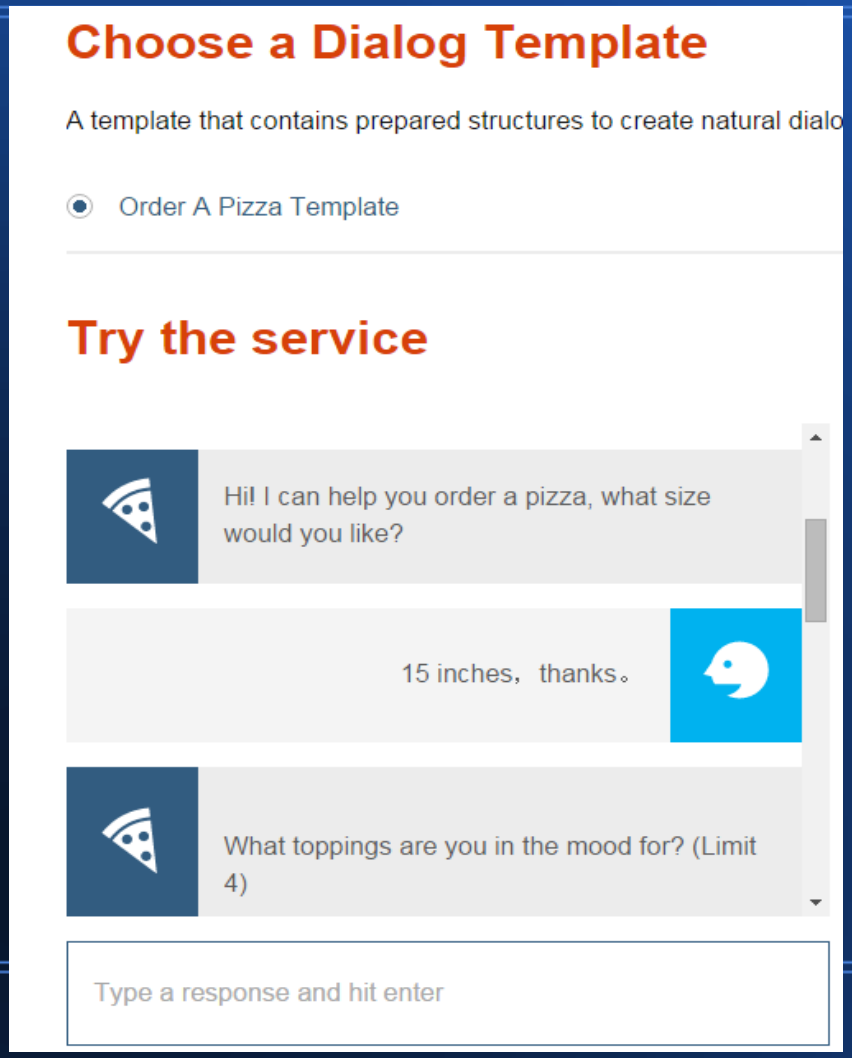
*"...I mean now we're hoping we start to see it; they've already built City Hall, attracted two **hotels**. I could imagine beautiful housing going up along there without tearing down another tree. So..."*

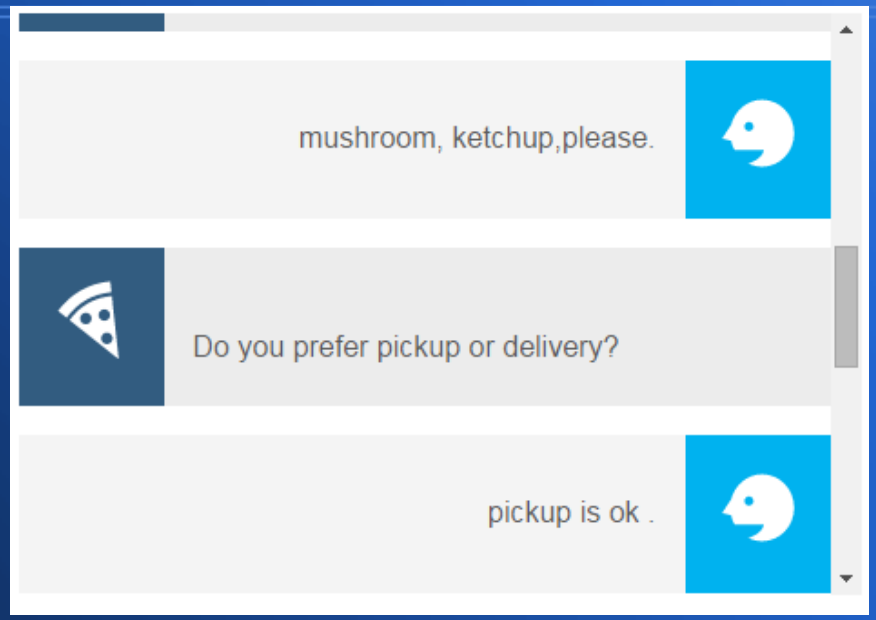
Dialog

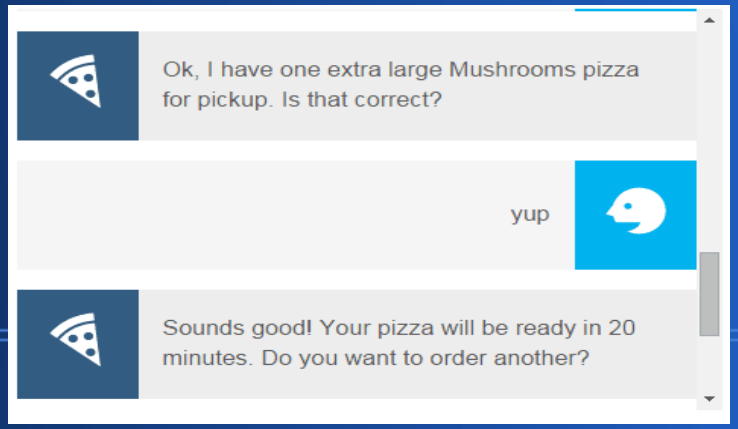
Script conversations any way you like to answer questions, walk through processes, or just to chat!

The IBM Watson Dialog service enables a developer to automate branching conversations between a user and your application. The Dialog service enables your applications **to use natural language to automatically respond to user questions**, cross-sell and up-sell, walk users through processes or applications, or even hand-hold users through difficult tasks. The Dialog service **can track and store user profile information to learn more about end users**, guide them through processes based on their unique situation, or pass their information to a back-end system to help them take action and get the help they need.

Dialog:Demo


Choose a Dialog Template
A template that contains prepared structures to create natural dialo
Order A Pizza Template
Try the service
Hi! I can help you order a pizza, what size would you like?
15 inches，thanks。
What toppings are you in the mood for? (Limit 4)
Type a response and hit enter


mushroom, ketchup,please.
Do you prefer pickup or delivery?
pickup is ok .


Ok, I have one extra large Mushrooms pizza for pickup. Is that correct?
yup
Sounds good! Your pizza will be ready in 20 minutes. Do you want to order another?

Document Conversion

Converts PDF, Word, or HTML documents into HTML, Plain Text, or JSON Answer Units needed by other Watson services

Service provides an Application Programming Interface (API) that enables developers **to transform a document into a new form**at. The input is a single PDF, Word, or HTML document and the output is an HTML document, a Text document, or Answer units that can be used with other Watson services.

Language Translation

Translate and publish content in multiple languages.

The Watson Language Translation service provides domain-specific translation utilizing Statistical Machine Translation techniques that have been perfected in our research labs over the past few decades. Currently, three domains are available that provide translation among a total of seven languages. For best results, a domain that matches the content to be translated should be chosen.

Language Translation:Demo

Translate Text

Input

Enter or paste text from a passage.

English

Text | Rest API

system engineered to understand people's questions and answer them in the best way possible.

In this case, Watson's main role is natural language processing, which enables the bot to welcome guests, grasp their spoken queries, and answer accordingly. The information on local attractions and interesting sites is actually channelled from the database of travel platform WayBlazer, also an IBM's partner. Connie is also designed to improve itself through interactions with human customers, learning from frequent queries how to fine-tune its recommendations.

Output

Copy output from this field to clipboard.

French

Text | JSON

Je suis arrivé à votre hôtel, désespérée pour certains accros à un restaurant décent à proximité, et pas vraiment en parlant avec les êtres humains? Connie le concierge de robots-est là pour aider. L'hôtel Hilton multinationales a fait équipe avec le géant de la technologie IBM pour l'essai d'un concierge robotique alimentés par des logiciels IBM AI Watson.

Le hyperbot a été baptisé "Connie" après le fondateur de chaîne, Conrad Hilton, et il est actuellement d'aider les résidents à l'hôtel Hilton de McLean, en Virginie. Dans sa station en regard des

Language Translation:Demo

Translate Text

Input

Enter or paste text from a passage.

Chinese

Text | Rest API

Abstract

本发明提供一种用于提示电子文档内容变更的方法、系统以及一种建立用于建立所述关系信息变更历史数据库的方法和系统。其中所述方法包括：响应于客户端浏览电子文档的请求，分析所述请求以获得相关信息；基于所述相关信息，确定所述电子文档的至少部分命名实体之间的关系信息是否存在变更；以及如果所述关系信息存在变更，向客户端发送至少部分所述关系信息的变更。通过本发明用户可以了解有关电子文档的相关更改，从而可以高效地获得有关信息。

Output

Copy output from this field to clipboard.

English

Text | JSON

Abstract

The invention claims a method and system for changing the content of the electronic document and a method for establishing the relation information changing history database method and system. Wherein the method comprises the following steps: browsing the electronic document in response to a client request, analyzing the request to obtain related information based on the related information, it is determined that the electronic document between at least parts of the named entity relationship information exists is changed, and if the

Natural Language Classifier

Interpret and classify natural language with confidence.

The service enables developers **without a background in machine learning** or statistical algorithms to create natural language interfaces for their applications. **The service interprets the intent behind text and returns a corresponding classification with associated confidence levels.** The return value can then be used to trigger a corresponding action, such as redirecting the request or answering a question.

Natural Language Classifier:Demo

Ask a question about the weather

Watch the Natural Language Classifier categorize your weather-related question. In this demo, the classifier is trained to determine whether the question is related to *temperature* or *weather* conditions. The output includes the top classification and a confidence score.

will it is snow tomorrow ?

Ask

Sample questions

Is it hot outside?
What is the expected high for today?
Will it be foggy tomorrow morning?
Should I prepare for sleet?
Will there be a storm today?

The classifier often scores well with terms that it hasn't been trained on. In the sample questions, the words "sleet," "foggy," and "typhoon" are not part of the training data, yet the classifier correctly handles questions about them.

Output

Natural Language Classifier is 99% confident that the question submitted is talking about 'conditions'.

Classification: conditions

Confidence: 99%

Personality Insights

Uncover a deeper understanding of people's personality characteristics, needs, and values to drive personalization.

Personality Insights extracts and analyzes a spectrum of personality attributes to help discover actionable insights about people and entities, and in turn guides end users to highly personalized interactions. The service outputs personality characteristics that are divided into three dimensions: the Big 5, Values, and Needs. While some services are contextually specific depending on the domain model and content, Personality Insights only requires a minimum of 3500+ words of any text.

Personality Insights:Demo

Personality Portrait

4011 words analyzed: Strong Analysis

Summary

You are inner-directed, skeptical and strict.

You are adventurous: you are eager to experience new things. You are imaginative: you have a wild imagination. And you are solemn: you are generally serious and do not joke much.

You are motivated to seek out experiences that provide a strong feeling of sophistication.

You consider achieving success to guide a large part of what you do: you seek out opportunities to improve yourself and demonstrate that you are a capable person. You are relatively unconcerned with helping others: you think people can handle their own business without interference.

How did we get this?

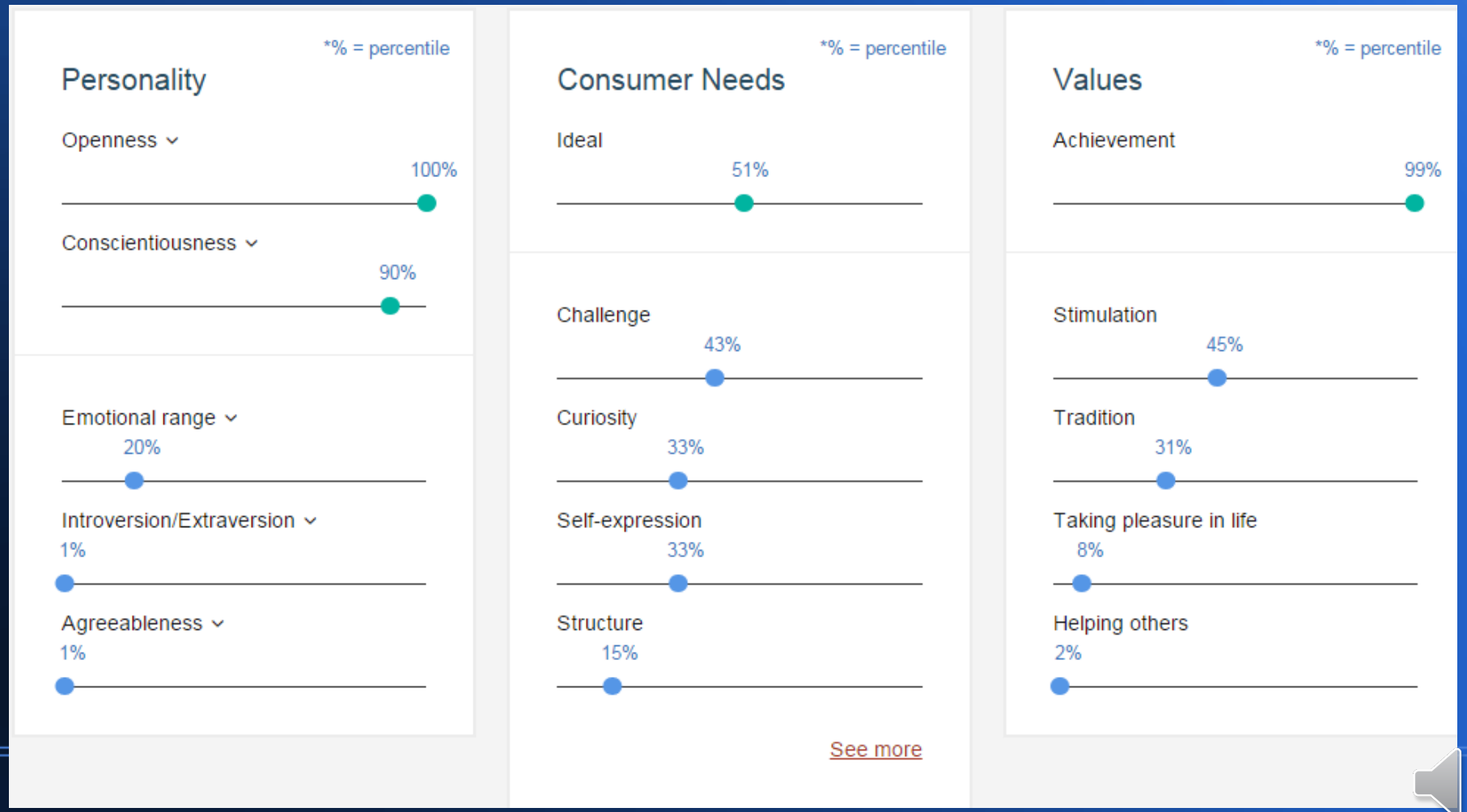
You are likely to_____

- Click on an ad
- Follow on social media
- Buy healthy foods

You are unlikely to_____

- Reply on social media
- Buy eco-friendly
- Put health at risk

Personality Insights:Demo



Relationship Extraction

Extracts relationships between different text entities.

Unlike general-purpose text analytics tools, **Relationship Extraction leverages Watson machine learning technologies. The API can analyze news articles and use statistical modeling to perform linguistic analysis of the input text**. It then finds spans of text and clusters them together to form entities, before finally extracting the relationships between them.

Relationship Extraction:Demo

Try the service

For example, if you are a news agent researching a person, you can input his or her blogs, emails, tweets, etc into the text window below and see all the places and events that he or she talked about (a location is represented by the label GPE, which stands for Geo Political Entities)

restaurants or tourist attractions in the area—but it is not able to check them in just yet.

Connie's physical support is Nao, a French-made 58cm-tall android that has become the go-to platform for educational and customer care tasks, thanks to its relative affordability (about £6,000 or $9,000). But the concierge's brain is based on IBM's flagship AI program Watson—the Jeopardy!-winning system engineered to understand people's questions and answer them in the best way possible.

In this case, Watson's main role is natural language processing, which enables the bot to welcome guests, grasp their spoken

Clear Input | Submit

Output

Select the type of entity you want to see in the output (after clicking submit):

ALL

Hilton	*GPE*
IBM	*ORGANIZATION*
American	*GPE*
residents	*PEOPLE*
station	*ORGANIZATION*
guests	*PEOPLE*
hotel	*ORGANIZATION*
restaurants	*ORGANIZATION*
area	*LOCATION*
brain	*ORGAN*
people	*PEOPLE*
questions	*EVENT_COMMUNICATION*
Connie	*TITLEWORK*
attractions	*ORGANIZATION*
partner	*PERSON*
customers	*PEOPLE*
some	*CARDINAL*
speaking	*EVENT_COMMUNICATION*
£6,000	*CARDINAL*
$9,000	*MONEY*
answer	*EVENT_COMMUNICATION*
spoken	*EVENT_COMMUNICATION*
your	*PERSON*
Conrad Hilton	*PERSON*
its	*ORGANIZATION*
58cm	*MEASURE*
Virginia	*GPE*
Connie	*PERSON*
Watson	*PERSON*

Retrieve and Rank

Enhance information retrieval with machine learning.

helps users **find the most relevant information for their query by using a combination of search and machine learning algorithms to detect “signals” in the data**. Built on top of Apache Solr, developers load their data into the service, train a machine learning model based on known relevant results, then leverage this model to provide improved results to their end users based on their question or query.

Tone Analyzer

Discover, understand, and revise the language tones in text.

Tone Analyzer might be able to help. The service uses linguistic analysis to **detect and interpret emotional, social, and writing cues found in text.**

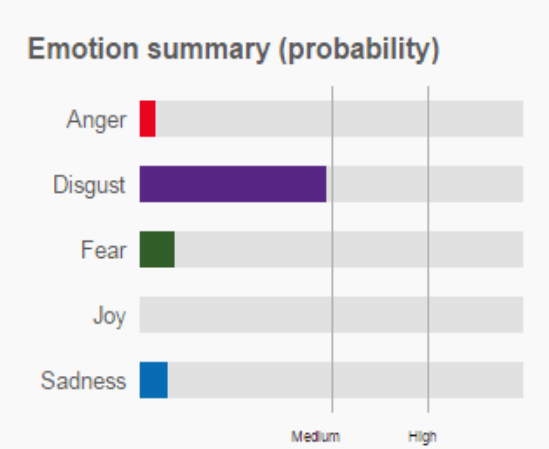
Tone Analyzer:Demo

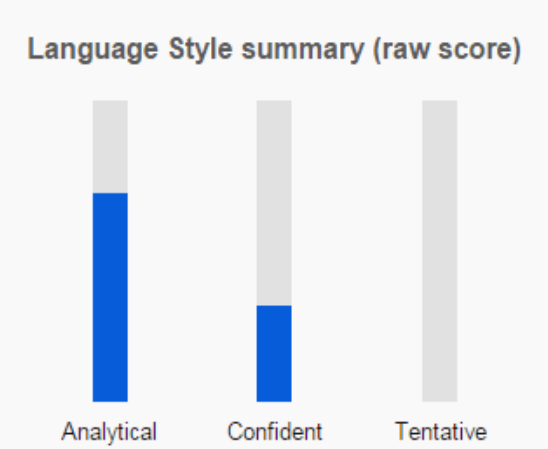
Output

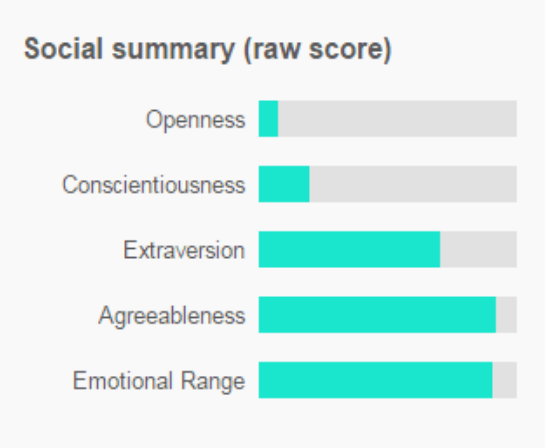
The tone API analyzes text at the document level and the sentence level for 3 categories of tones: Emotion, Language, and Social. It produces 2 levels of scores, at the document-level, and the sentence-level.

Document-level

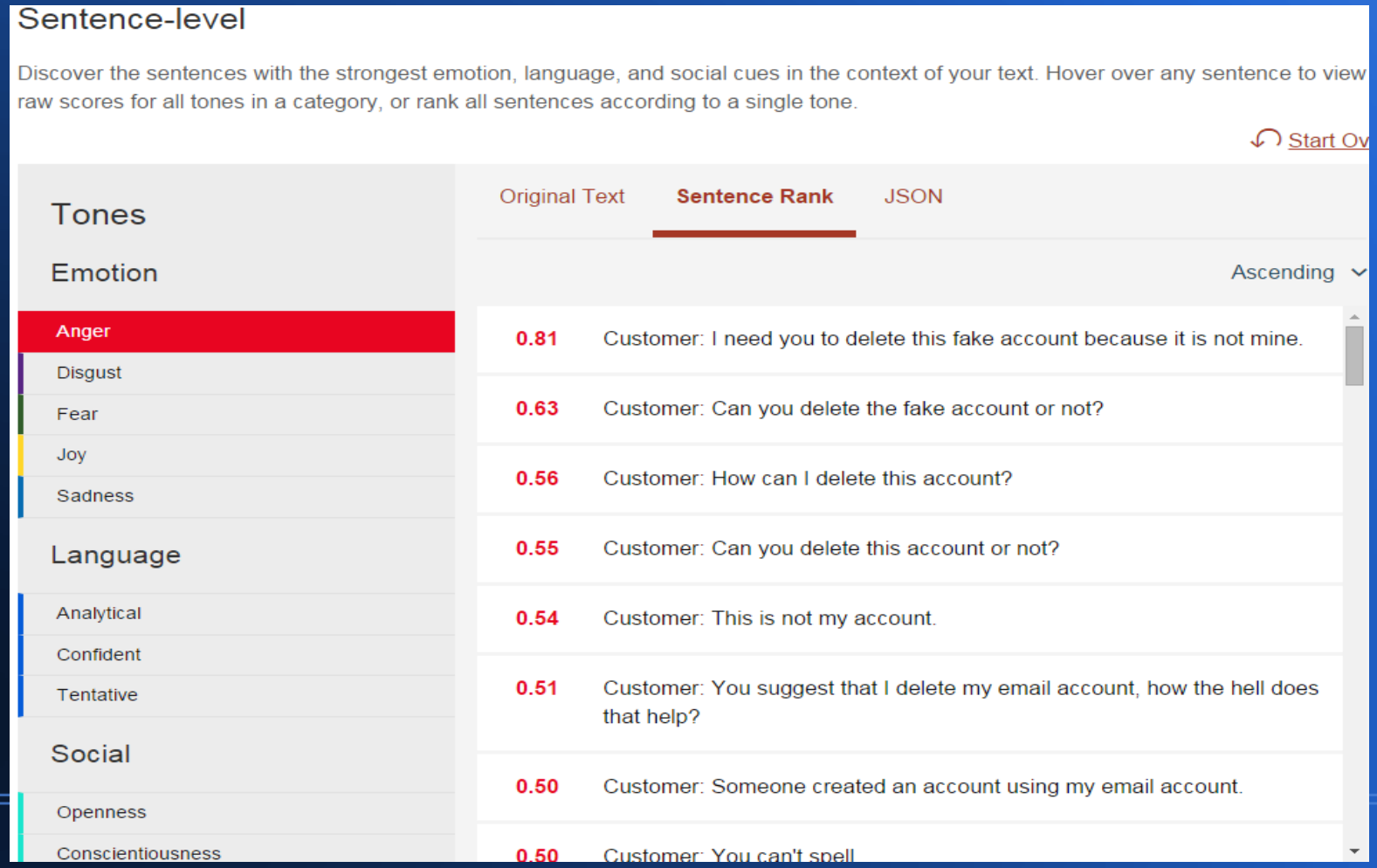
Quickly assess the ways your text is or is not making the right impression. Learn how to interpret these graphs for your use case in the Documentation.







Tone Analyzer:Demo



Speech to Text

- **The Speech to Text service converts the human voice into the written word.**

- Watson Speech to Text can be used anywhere there is a need to bridge the gap between the spoken word and its written form. This easy-to-use service uses machine intelligence to combine information about grammar and language structure with knowledge of the composition of an audio signal to generate an accurate transcription. It uses IBM's speech recognition capabilities to convert speech in multiple languages into text. The transcription of incoming audio is continuously sent back to the client with minimal delay, and it is corrected as more speech is heard. Additionally, the service now includes the ability to detect one or more keywords in the audio stream. The service is accessed via a WebSocket connection or REST API.

Speech to Text:Demo

Transcribe Audio

You may choose to spot your keywords by entering them (separated by commas) in the text box. Use your microphone (compatible only with Google Chrome and Mozilla Firefox). Upload pre-recorded audio (WAV for uncompressed audio, FLAC or OPUS) file formats. Drag and drop recorded audio onto the page, or use the audio samples provided. The returned result includes the recognized text, word alternatives (aka confusion networks), and spotted keywords.

Would you like to help make this service better?

- (•) Allow Watson to learn from this session
- ( ) Opt out

US English broadband model (16KHz)

changing the world,round,sense of pride,technology,unwanted emo

Record Audio | Select Audio File | Play Sample 1 | Play Sample 2

Text | JSON

Keywords Spotted

Text to Speech

- Designed for streaming low-latency synthesis of audio from written text. **The service synthesizes natural-sounding speech from input text in a variety of languages and voices that speak with appropriate cadence and intonation.**

- Watson Text to Speech provides a REST API to synthesize speech audio from an input of plain text. Multiple voices, both male and female, are available across Brazilian Portuguese, English, French, German, Italian, Japanese, and Spanish. Once synthesized in real-time, the audio is streamed back to the client with minimal delay. The Text to Speech service now enables developers to control the pronunciation of specific words.

Text to Speech:Demo

Input Text

The text language must match the selected voice language: Mixing language (English text with a Spanish male voice) does not produce valid results. The synthesized audio is streamed to the client as it is being produced, using the HTTP chunked encoding. The audio is returned in the Ogg Opus format which can be played using VLC and Audacity players.

Would you like to help make this service better?

- (•) Allow Watson to learn from this session
- ( ) Opt out

American English (en-US): Allison (female, expressive)

Text | Expressive SSML

I have been assigned to handle your order status request. I am sorry to inform you that the items you requested are back-ordered. We apologize for the inconvenience. We don't know when those items will become available. Maybe next week but we are not sure at this time. Because we want you to be a happy customer, management has decided to give you a 50% discount!

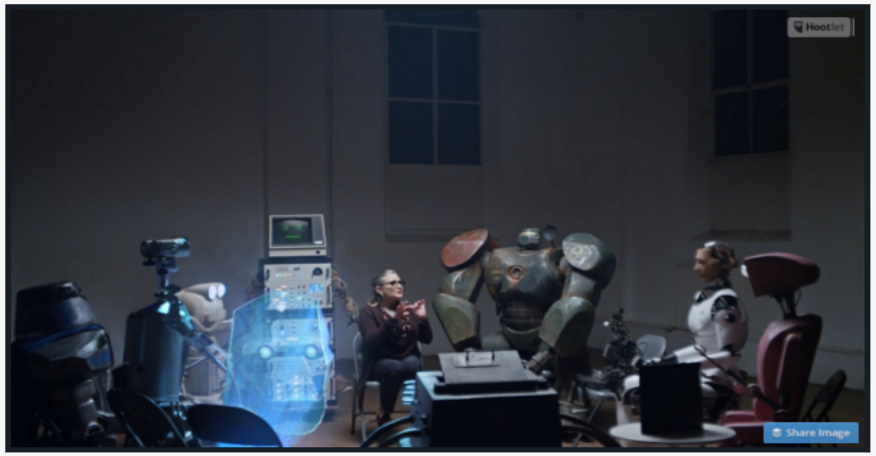
Download | Speak (Only in Chrome & Firefox)

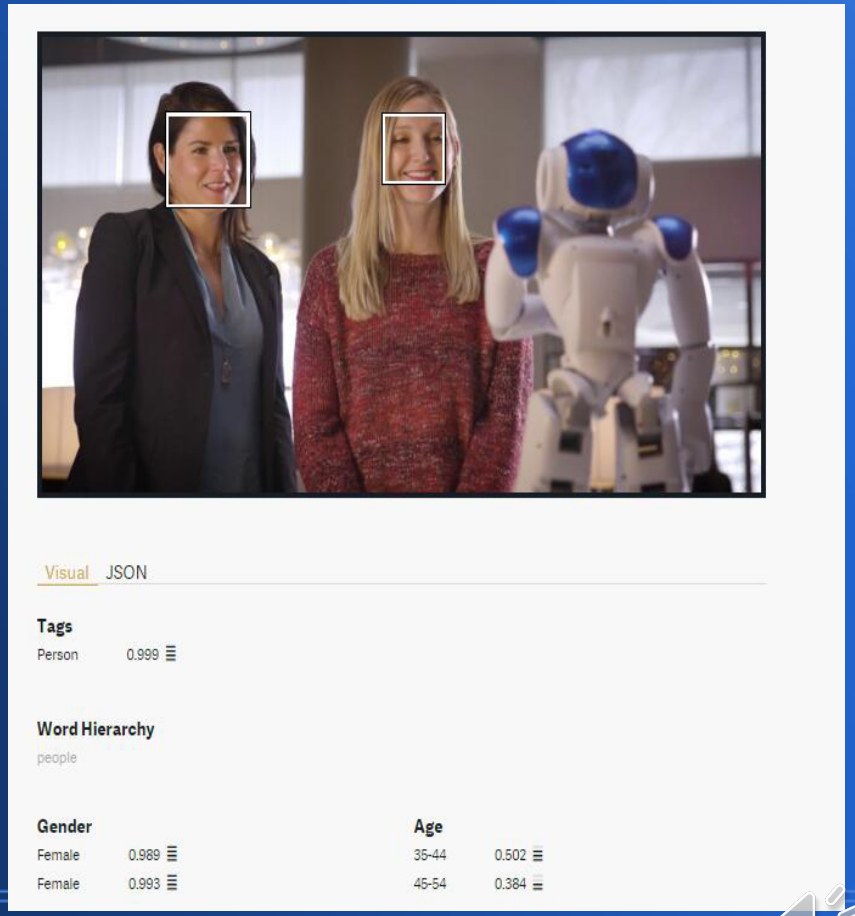
AlchemyVision

- **AlchemyVision is an API that can analyze an image and return the objects, people, and text found within the image**. AlchemyVision can enhance the way businesses make decisions by integrating image cognition.
- AlchemyVision employs our deep learning innovations to understand a picture's content and context.

AlchemyVision:Demo

https://youtu.be/f8T8eWBmls0

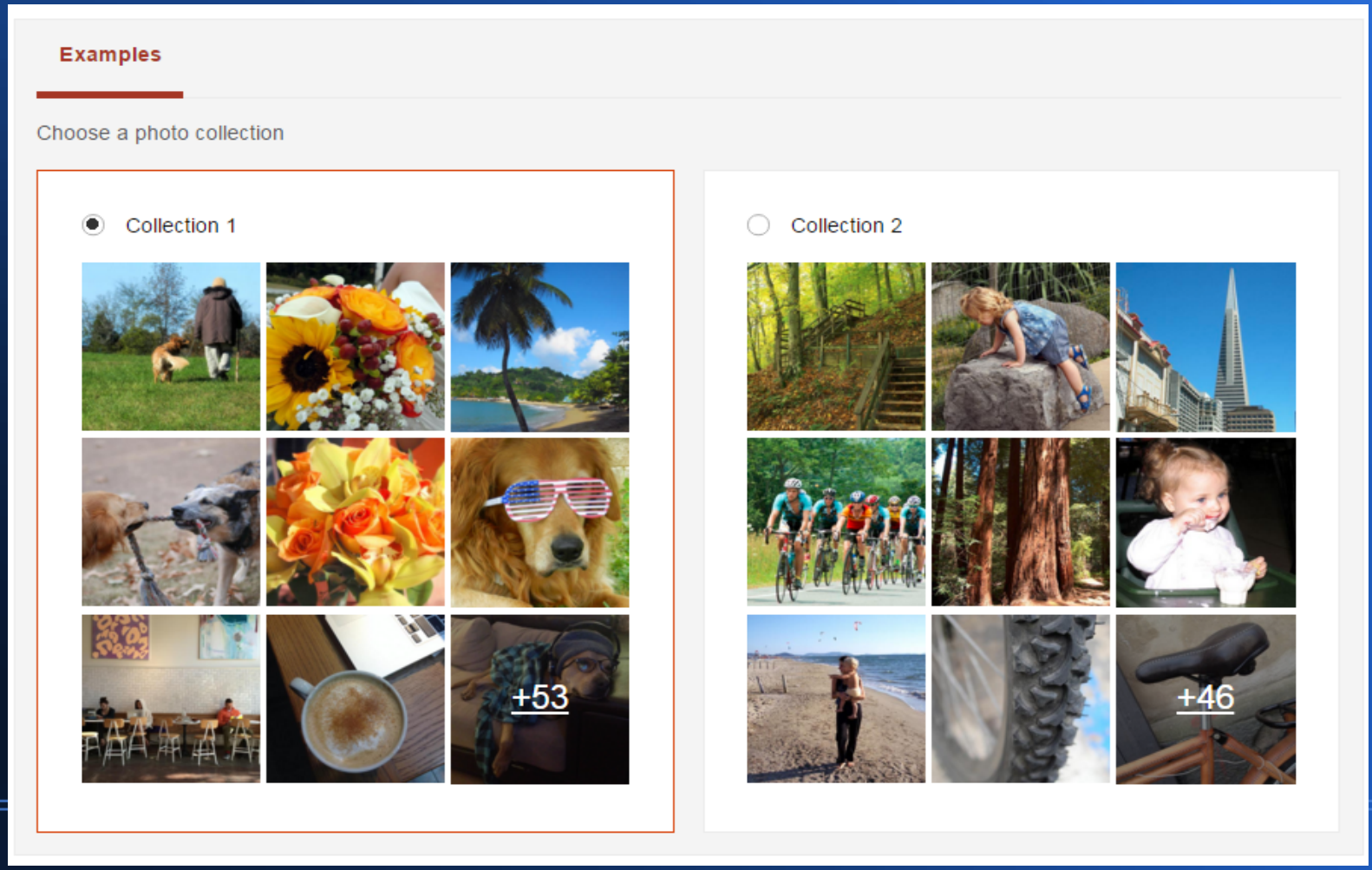




Visual Insights

- **Visual Insights enhances the customer view** by analyzing online photos and video to extract consumer insights related to interests, activities, hobbies, life events, and products
- With so many social media channels used by a brand it's important to know not only your customers, but also your competitors to ensure alignment across channels. Visual Insights works to give users **tools to ensure consistency across those social media channels**, segment customers to an individual level, create targeted campaigns, and align their social media output to followers' preferences by running comparative analysis with competitors' feeds.

Visual Insights:Demo



Visual Insights:Demo

Output

This service delivers a tagging profile that tells you how common each tag is in the photo collection. Each tag's score is a combination of confidence and prevalence, ranging from low (zero) to high (one).

Tagging Profile

Activities		Interests		Non-Photo		People		Places	
Fishing	16.54	Animal	37.26	Chart	8.88	Baby	15.84	Outdoors	33.72
Dancing	13.23	Fashion	31.63			Crowd	14.03	Nature Scene	30.48
Demonstration	13.33	Dog	30.35			Face	14.73	Indoors	28.30
Show All		Show All				Show All		Show All	

Visual Recognition

- **Understand the contents of images. Trainable for custom content**.
- Visual Recognition allows users to understand the contents of an image or video frame, answering the question: “What is in this image?” **Submit an image, and the service returns scores for relevant classifiers representing things such as objects, events and settings**. What types of images are relevant to your business? How could you benefit from understanding and organizing those images based on their contents? With Visual Recognition, users can automatically identify subjects and objects contained within the image and organize and classify these images into logical categories. Need to train Visual Recognition on specific or custom content? Easily train a new classifier by sending examples and voila! Custom image recognition!

Visual Recognition:Demo

https://i.ytimg.com/vi/jC0I08qt5VU/maxresdefault.jpg

Results

Classifier	Confidence Score
Indoors	66%
Graduation	66%
Clothing_Store	65%
Scene	63%
Beverage	63%

You can use your own images to create a custom classifier that is tailored to your needs.

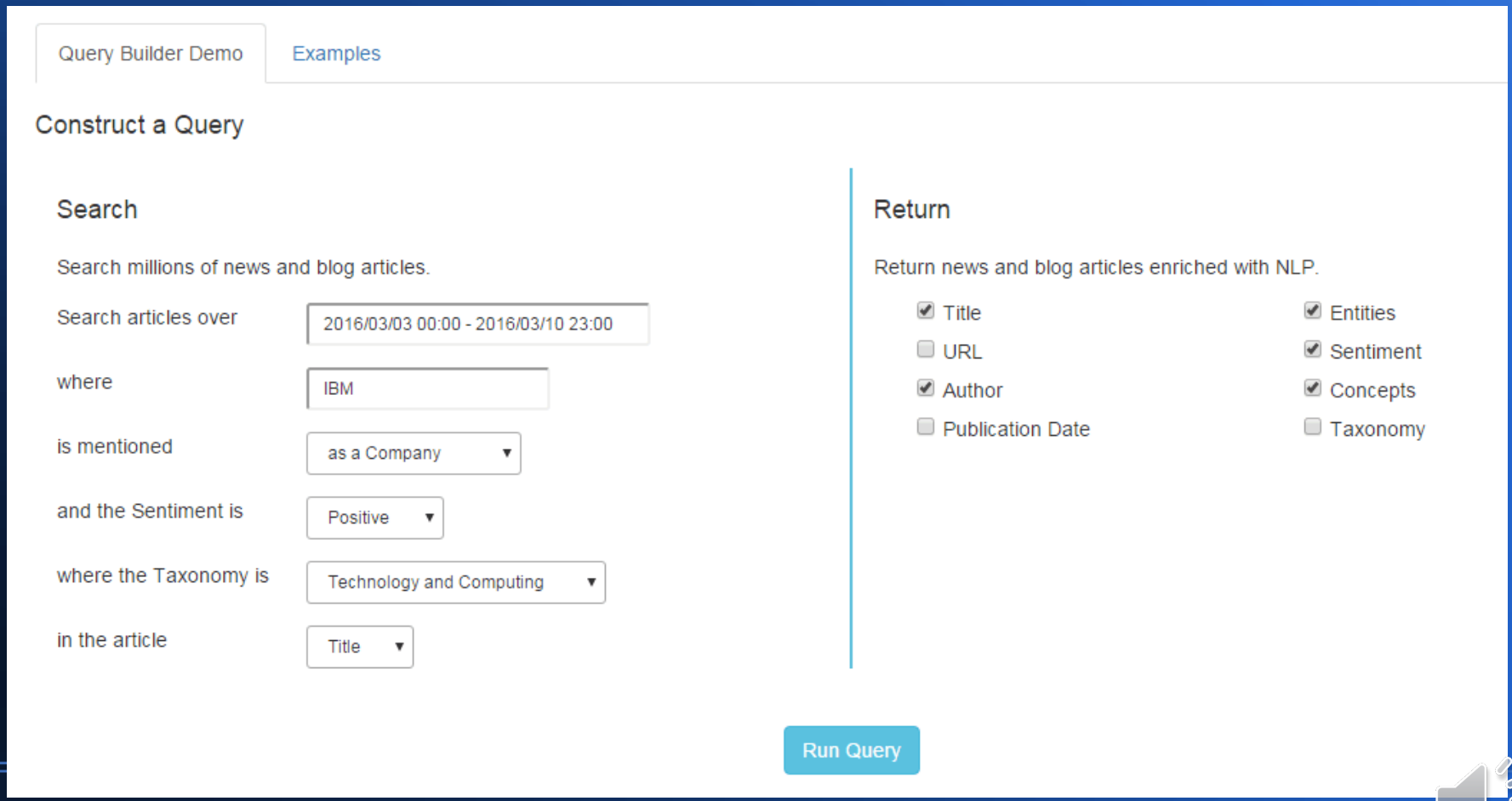
Create a custom classifier

AlchemyData News

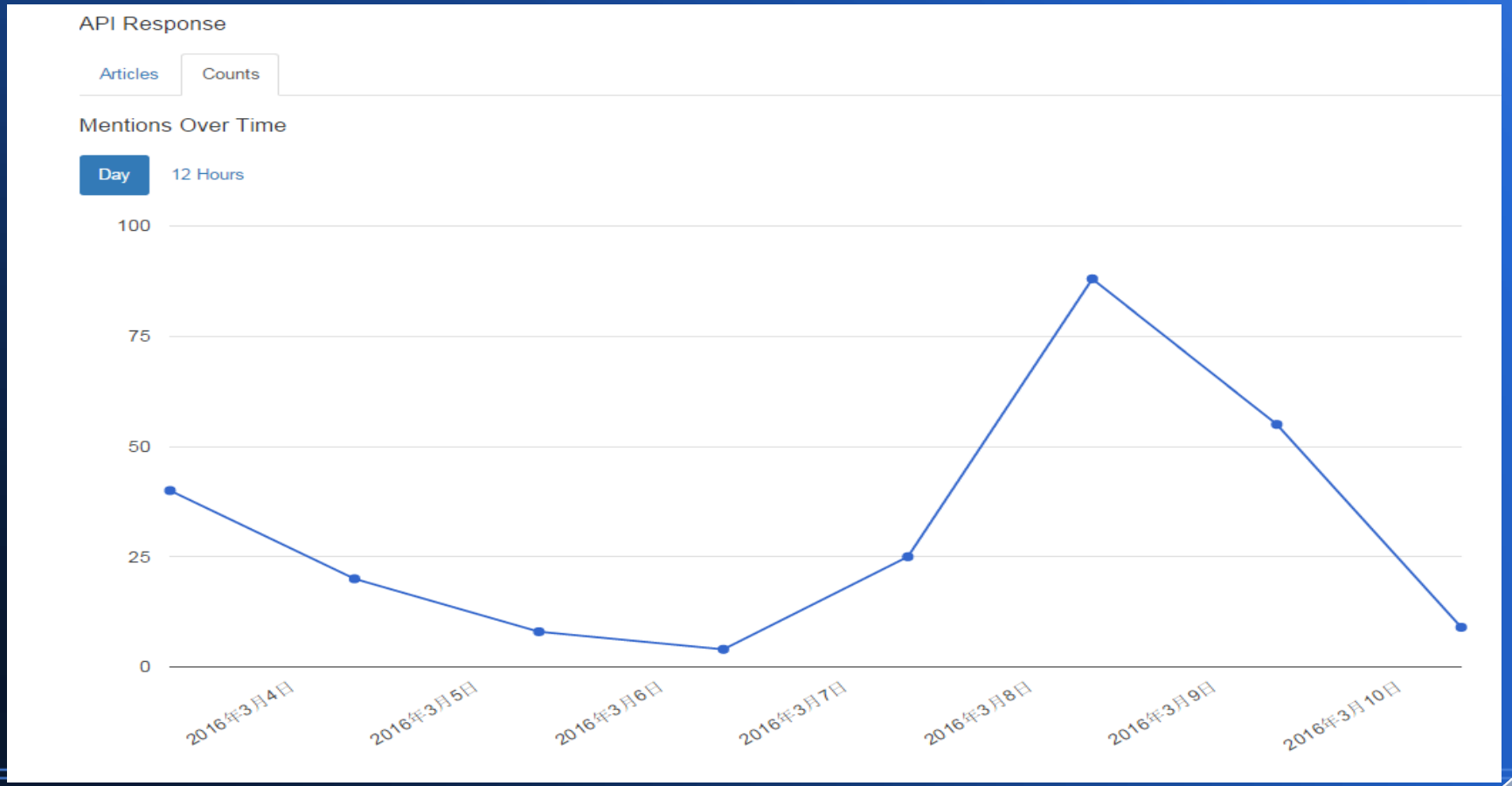
- AlchemyData provides news and blog content enriched with natural language processing to allow for highly targeted search and trend analysis. Now you can query the world's news sources and blogs like a database.

- AlchemyData News indexes 250k to 300k English language news and blog articles every day with historical search available for the past 60 days. You can query the News API directly with no need to acquire, enrich and store the data themselves – enabling you to go beyond simple keyword-based searches.

AlchemyData News:Demo



AlchemyData News:Demo



AlchemyData News:Demo

API Response

Articles | Counts

Query

```
https://access.alchemyapi.com/calls/data/GetNews?apikey=YOUR_API_KEY_HERE&return=enriched.url.title,enriched.url.author&start=1456963200&end=1457650800&q.enriched.url.enrichedTitle.entities.entity=|text=IBM,type=company|&q.enriched.url.enrichedTitle.docSentiment.type=positive&q.enriched.url.enrichedTitle.taxonomy.taxonomy_.label=technology%20and%20computing&count=25&outputMode=json
```

JSON


```
{
    "status": "OK",
    "usage": "By accessing AlchemyAPI or using information generated by AlchemyAPI, you are agreeing to be bound by the AlchemyAPI Terms of Use: http://www.alchemyapi.com/company/terms.html",
    "totalTransactions": "814",
    "result": {
        "docs": [
            {
                "id": "MTE3OTY4MzY3MTR8MTQ1NzU5MTU1Mg",
                "source": {
                    "enriched": {
                        "url": {
                            "author": "Zacks Equity Research 6 hours ago",
                            "title": "IBM Unveils First Cloud Data Center in South Africa"
                        }
                    }
                },
                "timestamp": 1457591552
            },
```

Tradeoff Analytics

- **Helps users make better choices to best meet multiple conflicting goals.**

- **Tradeoff Analytics is a Watson service that helps people make decisions when balancing multiple objectives**. The service uses a mathematical filtering technique called “Pareto Optimization,” that enables users to explore tradeoffs when considering multiple criteria for a single decision. When your company makes decisions, how many factors need to be considered? What’s the process like? How do you know when you’ve found the best option? With Tradeoff Analytics, users can avoid lists of endless options and identify the right option by considering multiple objectives.

Tradeoff Analytics:Demo

Try the service

Select a scenario to find the best options in the scenario:

Phones

Bring your own data (CSV format)

Analyze Sample Data

Advanced

The list of options to analyze:

Id	Name	Price	Brand	RAM (MB)	Screen (inch)	Camera	Memory	Battery (mAh)	Weight	Release Date
1	Samsung Galaxy S4 White	239	Samsung	2048	5	13	16	2600	130	2013-04-29T00:00:00Z
2	Samsung Galaxy S4 Black	239	Samsung	2048	5	13	16	2600	130	2013-04-29T00:00:00Z
3	Samsung Galaxy S3 White	79	Samsung	2048	4.8	8	16	2100	133	2012-05-29T00:00:00Z
4	Samsung Galaxy S3 Blue	79	Samsung	2048	4.8	8	16	2100	133	2012-05-29T00:00:00Z
5	Samsung Galaxy S3 mini White	299	Samsung	1024	4	5	8	1000	111	2012-10-01T00:00:00Z
6	Apple iPhone 5 White	449	Apple	1024	4	8	32	1440	112	2012-09-21T00:00:00Z
7	Apple iPhone 5 Black	449	Apple	1024	4	8	32	1440	112	2012-09-21T00:00:00Z
9	HTC One	189	HTC	2048	4.7	4	32	2300	143	2013-03-01T00:00:00Z
10	LG Optimus G	189	LG	1024	4.7	13	32	2100	145	2012-09-19T00:00:00Z
11	Nokia Lumia 520	199	Nokia	512	4	5	8	1430	124	2013-02-25T00:00:00Z
12	Samsung Galaxy Ace 2	220	Samsung	768	3.8	5	4	1000	122	2012-02-

Watson-developer-cloud SDK and App

- SDK: Github
  - python-sdk
  - ios-sdk
  - node-sdk
  - speech-javascript-sdk
  - speech-android-sdk
  - java-sdk
  - unity-sdk
  - speech-ios-sdk

Watson-developer-cloud SDK and App

App Gallery :Gallery :

- IBM Watson Trend,
- Sentiment and Emotion,
- Election Insights,
- Investment Advisor,
- Speech to Speech,
- Questions on the Natural Language Classifier,
- What's In Theaters,
- News Explorer,
- Watson Rover,
- Cognitive Head Hunter,
- Designer Match,
- NYC School Finder,
- Nests,
- SF Life,
- Your Celebrity Match,
- People in the News.