

IBM **Watson**

# Watson Developer Cloud - A Platform for Cognitive Solutions

**David Nahamoo**

IBM Fellow



Visit [IBM.com/WatsonDeveloperCloud](https://www.ibm.com/WatsonDeveloperCloud)



## Competitors will continue to accelerate disruption and blur the lines among categories

**54%**  
of CxOs

expect more competitors from **outside their industry**, while only 29 percent expect more competition from within their industry.

“The biggest threat is new competitors that aren’t yet classified as competitors.”

—Piotr Ruszowski, chief marketing officer,  
Mondial Assistance, Poland

## CxOs sense the opportunity, but are limited by lack of visibility

Three- to five-year strategies  
for CxOs:

They'll be hampered by  
limited insights when **only**:

**80 percent** are set on being the first  
to market with innovation

**66 percent** plan to focus more  
on customers as individuals

**81 percent** expect to shift to more  
digital, virtual client engagement models

**51 percent** draw on customer  
feedback

**39 percent** draw from adjacent  
industries

**29 percent** draw from blogs and  
social media sites

## Digital intelligence provides enterprises competitive advantage

### Enterprise Data

Customer records  
Transactional systems  
Predictive models  
Institutional expertise  
Operational systems



### Data outside the firewall

News  
Events  
Geospatial  
Weather  
Social media



### Data that's coming

Internet of Things  
Sensory data  
Images  
Video  
Speech

Structured and active

Unstructured and dark

# Cognitive APIs add completely new abilities for business technology



AlchemyLanguage



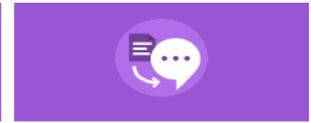
Concept Expansion



Concept Insights



Speech to Text



Text to Speech



Dialog



Document Conversion



Language Translation



AlchemyData News



Tradeoff Analytics



Natural Language Classifier



Personality Insights



Relationship Extraction



AlchemyVision



Visual Insights



Retrieve and Rank



Tone Analyzer



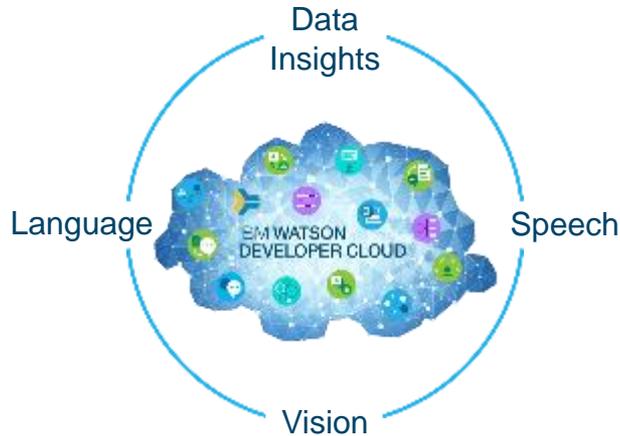
Visual Recognition

## The Watson Cognitive Computing Evolution

Based on more than 40 years of innovations at IBM Research in statistical data driven approaches in speech and language

- **2011:** Jeopardy ... introduced a Factoid Pipeline for use with general domain knowledge
- **2012:**
  - Watson Discovery Advisor ... leverages the Factoid Pipeline around specific domains to ‘help find the questions you’ re not thinking to ask ‘
  - Healthcare ... Utilization Management, Oncology Treatment Advisor, Clinical Trial Manager
- **2013:** Watson Engagement Advisor ... Introduced a Passage and then FAQ pipeline
- **2014:**
  - Expanded Watson Discover Advisor ... added knowledge extraction and graph visualization
  - Introduced Watson Explorer ... combined with Watson Content Analytics
  - Watson Ecosystem ... made the (WEA) Passage and FAQ pipeline available as a service
- **2015:** Watson Developer Cloud ... dramatically expanded the range of services designed to interpret the human condition, and made them available on Bluemix
- **2016:** Enhancing Human Engagement ... focusing on emotion detection and expression, Robotics

# Watson is available as a set of services delivered as APIs in the Cloud



Can be combined with the 100s of other available services on Bluemix

## Language

- AlchemyLanguage
- Personality Insights
- Dialog
- Natural Language Classifier
- Retrieve and Rank
- Language Translation
- Concept Expansion
- Concept Insights
- Tone Analyzer
- Relationship Extraction
- Document Conversion

## Data Insights

- AlchemyData News
- Tradeoff Analytics

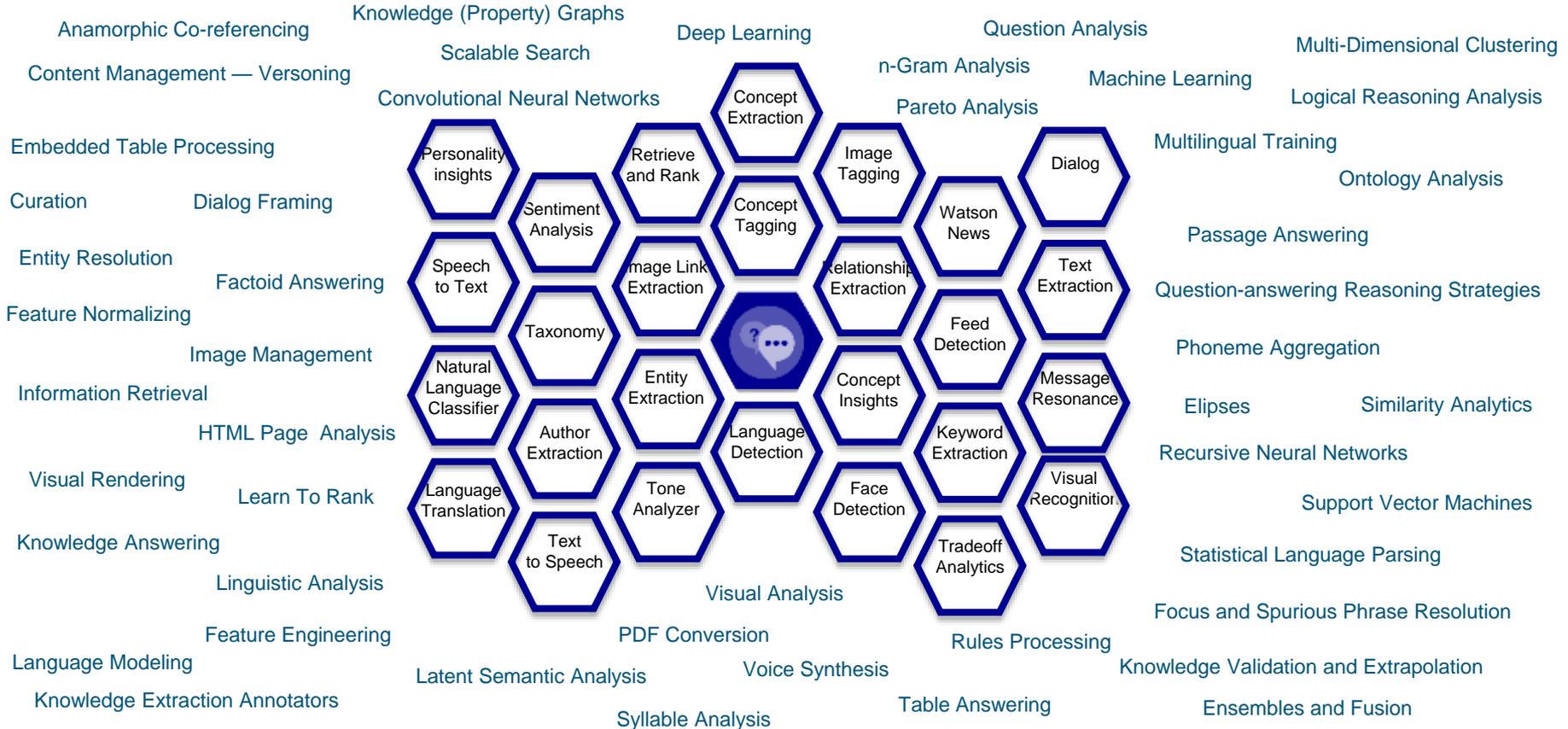
## Speech

- Speech to Text
- Telephony Speech to Text
- Text to Speech
- Keyword Spotting

## Vision

- AlchemyVision
- Visual Insights
- Visual Recognition

# These are a sample of the 50+ technologies that make up Watson

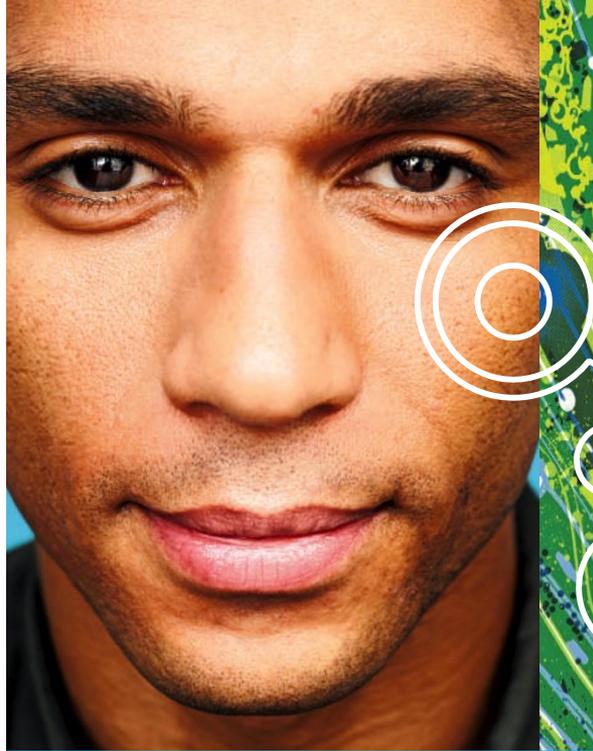


IBM **Watson**

**Shift**  
technology's role  
from enabler  
to advisor



Visit [IBM.com/WatsonDeveloperCloud](https://www.ibm.com/WatsonDeveloperCloud)



**Cognitive business**  
The next evolution of human  
and systems capabilities,  
where technology enhances, scales and  
accelerates human expertise

Today's industry leaders recognize the gap in their organizations' abilities

Retail

**60%**

believe they can't  
deliver on consumer  
expectations

---

**94%**

plan to invest in cognitive

---

Healthcare

**50%**

say available data limits  
confidence in strategic  
decisions

---

**95%**

plan to invest in cognitive

---

Insurance

**30%**

say the quality of data  
is insufficient for  
business model  
innovation

---

**98%**

plan to invest in cognitive

---

# Cognitive Business Opportunities Today

Become indispensable to users and customers

Deepen relationships through interactive, **personal engagement**

Develop applications, **products and services** that read, see, talk, hear and learn

Amplify knowledge, reimagine workflows

Accelerate learning and scale **expertise**

Institute **processes and operations** with learning built in

Transform the enterprise

**Discover and explore** intelligently to unlock new business models and accelerate evolution

Cognitive Business

# Enterprises Applying Cognitive Capabilities

## Become indispensable to users and customers

- Elemental Path: Toys that generally interact with children
- IBM Watson Trend – Gift Guide for Holiday Heroes
- The Hunt – Visually mine and find items based on their pictures
- Newsly - Deliver highly targeted news to subscribers based on social media data
- Connectidy - Revolutionizing relationship science by providing deeper emotional intelligence
- Spiderbook - Companies can better identify ideal prospects

## Amplify knowledge and reimagine workflows

- Ross Intelligence - Reduced research time from hours to seconds
- A Retailer - Creating a cognitive supply chain
- MP Maritime - better track, assess, and manage the location of ships
- IBM Technical Support Services - Delivering accurate answers instantly

## Transform the enterprise

- Baylor College of Medicine - Accelerate disease treatment research

# Elemental Path

Toys that generally interact with children

Become  
indispensable  
to users and  
customers

## The vision

We can change the way that children learn by changing the way they play.

## The disruption

Elemental Path built the first WiFi-enabled toy that holds conversations with kids—responding to questions with developmentally appropriate content.

Educational content  
framework

+

IBM Watson™  
APIs

+

IBM Watson  
Developer Cloud

**The result:** CogniToys can evolve over time to take on a unique personality based on a child's interactions, helping her develop language and mathematics skills.

# Ross Intelligence

Power through legal research

Amplify  
knowledge,  
reimagine  
workflows

## The vision

Enable lawyers to perform comprehensive legal research more quickly and effectively than ever before

## The disruption

Draw from legislation, case law and secondary sources, answering natural-language queries with citations and recommended reading, monitoring law developments 24x7 and alerting researchers to relevant changes

Entire body  
of law

+

IBM Watson  
APIs

+

IBM Watson  
Developer Cloud

**The result:** Reduced research time from hours to seconds, allowing teams to service more clients, with clients seeing lower legal fees



# Baylor College of Medicine

Accelerate disease treatment research

Transform  
the enterprise

### The vision

We can identify a new path for generating scientific questions to accelerate the development of new, effective treatments for disease.

### The disruption

Watson technology assisted researchers by reading 70,000 scientific articles to find new proteins that could be helpful in the fight against cancer.

Baylor Knowledge  
Integration Toolkit

+

Medical  
journals

+

IBM Watson  
Discovery Advisor™

**The result:** Seven new proteins were identified in less time than it historically took to discover one.



# The four E' s of Cognitive Systems

Cognitive systems are able to learn their behavior through *education*

Support forms of *expression* that are more natural for human interaction

Their primary value is their *expertise*

Continue to *evolve* as they experience new information, new scenarios, new responses

# Learning how to extract knowledge

Watson Knowledge Studio provides a set of tooling that manages the full development lifecycle of text annotation

The screenshot displays the IBM Watson Knowledge Studio interface. The main window shows a document titled "Technology - technewsworld.com" with several paragraphs of text. A diagram above the text illustrates the extracted knowledge graph, showing nodes for "PERSONNEL", "PERSON", and "ORG.", with a "founderOf" relationship between "PERSON" and "ORG.". The text includes phrases like "Both Steve Jobs and Apple (Nasdaq: AAPL) are unique - well, almost - in the technology market." and "Most companies spend their money on lots of product choices and hope to hit a sweet spot for a customer; Apple spends its money on marketing and design and drives customers to the sweet spot it creates." The interface also features a sidebar with navigation options (Models, Relations, Conf, Comments) and a right-hand panel titled "All Relations" with a table of relation types and counts.

Relation	Count
b: affiliatedWith	0
m: descendantOf	0
t: educatedAt	0
u: employedBy	0
w: foundersOf	1
o: managerOf	0
1: memberOf	0
4: ownerOf	0
F: shareholdersOf	0
H: spokespersonFor	0

# AlchemyLanguage

Twelve APIs around text analysis service functions, each of which uses sophisticated natural language processing techniques to analyze your content and add high-level semantic information

- **Entity Extraction:** what are the entities (people, places, organizations, etc.) in text
- **Sentiment Analysis:** how are people talking about the entities (positive, negative)
- **Keyword Extraction:** identify important topics in content
- **Concept Tagging:** high-level concepts in text (e.g. article is about monetary policy)
- **Relation Extraction:** subject / action relations between entities
- **Taxonomy Classifier:** hierarchical categorization (finance/personal finance/credit card)
- **Author Extraction:** who wrote the article
- **Language Detection:** what language is this written in
- **Text Extraction:** extract the important parts of text within an article
- **Microformat Parsing:** enhances webpage categorization and indexing and to perform content discovery tasks
- **Feed Detection:** discover new content, including blog posts, news articles and comment streams.
- **Linked Data Support:** bring any content into the semantic web

# Tone Analyzer understands and helps fine tune your message

Uses psycholinguistics, emotion and language analysis to assess Tone

## Online Dating Profile

I'm a hard working adventurous, very talented man who's been caring and helpful throughout my life, I like to travel, play my guitar, dance, and cook, I love the beach, sailing my boat, and the outdoors.

I raised two great kids and now I'm starting a new chapter in my life.

Thanks.

What I'm doing with my life  
Working toward a new goal, keeping fit, helping others, and traveling whenever i get a chance.

I'm really good at Listening, enjoying the moment, and many other things.

The six things I could never do without

Family, the ocean, intimacy, friends, adventure, music, love.

On a typical Friday night I am

Meeting with friends, listening to a band or playing my guitar, dancing or just staying home with someone special and enjoying each other.

You should message me if

You're looking for a relationship with someone that likes to sail his boat, ride bicycles, travel, swim, go to the beach, listen to music and enjoy everyday pleasures together.

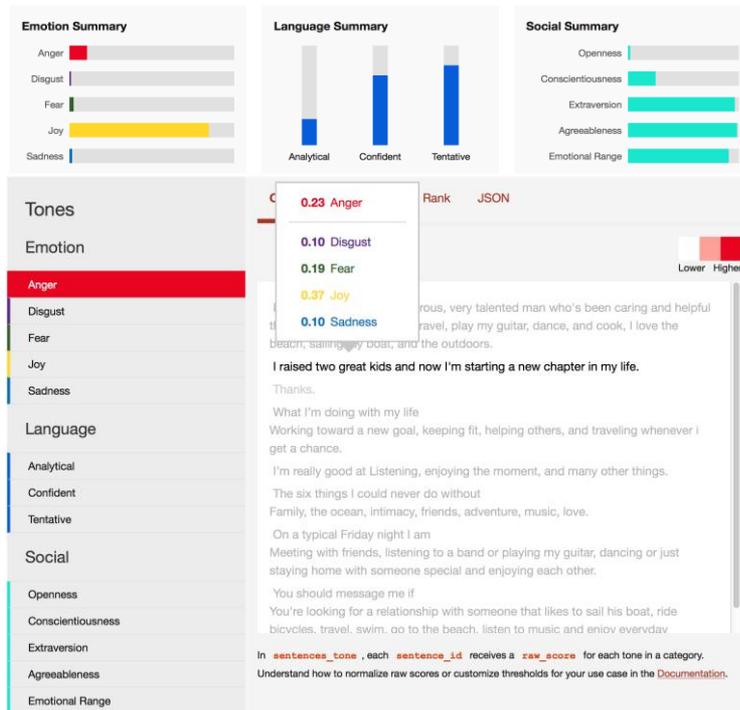


## Output

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](#).



# Use your voice

## Speech to Text

The IBM Watson Speech to Text service uses speech recognition capabilities to convert Arabic, English, British English, Spanish, Brazilian Portuguese, Japanese, and Mandarin speech into text.

### You input:

- Streamed audio with Intelligible Speech
- Recorded audio (telephony) with Intelligible Speech
- Keyword Spotting

### Service output:

- Text transcriptions of the audio with recognized words

## Text to Speech

The Text to Speech service understands text and natural language to generate synthesized audio output complete with appropriate cadence and intonation. It is available in 12 voices across 7 languages.

### You input:

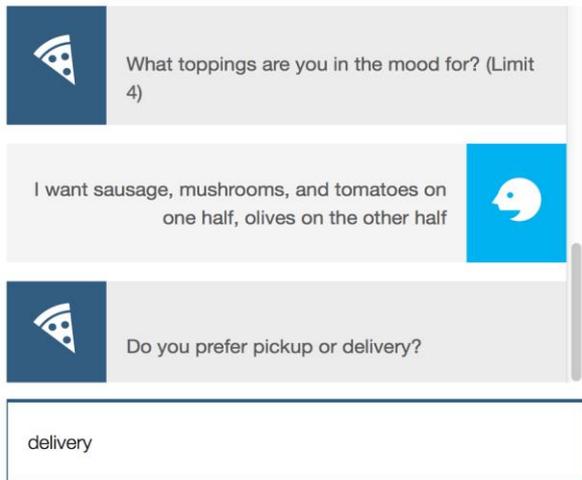
- Text that you want spoken
- Supports [W3C Speech Synthesis Markup Language \(SSML\) Version 1.1](#).

### Service output

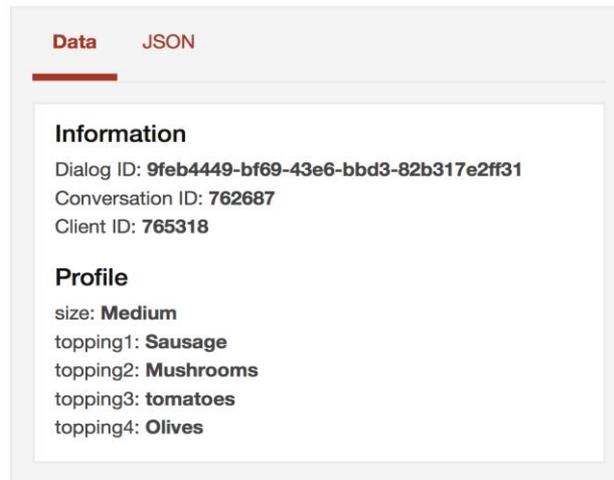
- .ogg, .wav or .flac file containing your spoken expression

# Why should Watson carry on a Conversation?

- Not everything is just a question
- Engage in personalized, context-aware interactions
- Provide product suggestions and decision support
- Perform tasks and make transactions
- Drive a user through a step-by-step process
- Connect with external systems
- Show personality and have humanized interaction
- Navigate users through websites and provide links
- Provide interactive problem resolution
- Disambiguate inquiries



The screenshot shows a chat interface with a dark blue header containing a pizza slice icon. The first message from the user asks, "What toppings are you in the mood for? (Limit 4)". The assistant's response is, "I want sausage, mushrooms, and tomatoes on one half, olives on the other half". The second message from the user asks, "Do you prefer pickup or delivery?". The assistant's response is, "delivery".



The screenshot shows a JSON data view with a red header containing the words "Data" and "JSON". The data is organized into two sections: "Information" and "Profile".

**Information**

- Dialog ID: **9feb4449-bf69-43e6-bbd3-82b317e2ff31**
- Conversation ID: **762687**
- Client ID: **765318**

**Profile**

- size: **Medium**
- topping1: **Sausage**
- topping2: **Mushrooms**
- topping3: **tomatoes**
- topping4: **Olives**

# Retrieve and Rank

- The purpose of the Retrieve and Rank service is to help you find documents that are more relevant than those that you might get with standard information retrieval techniques.

## Using the Retrieve and Rank Service

### Collect and load content



- Collect content
- Modify and upload Solr configuration files
- Upload content

### Train the machine learning rank model



- Collect queries and relevant answers to leverage as training data
- Create and upload training data

### Query service and evaluate results



- Send runtime queries to trained model
- Evaluate results and improve model

The core users of the Retrieve and Rank service are customer-facing professionals that must find relevant results quickly from large numbers of documents:

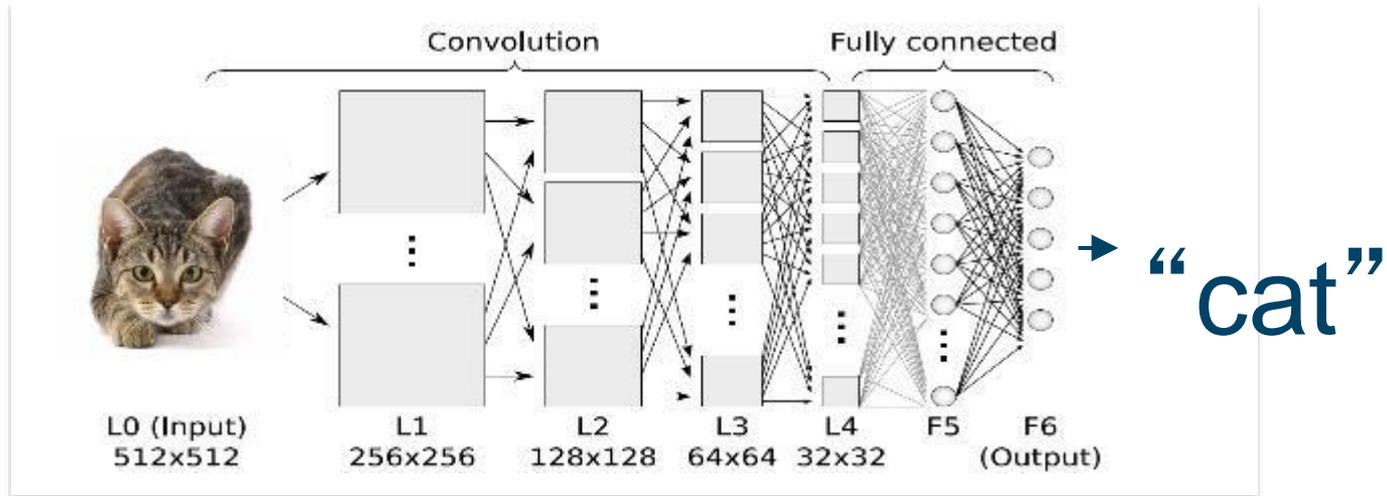
**Customer support:** Find quick answers for customers from your growing set of answer documents

**Field technicians:** Resolve technical issues onsite

**Professional services:** Find the right people with the right skills for key engagements

# Evolving Machine Learning Techniques with Deep Learning

- Learning representations of data by modeling high-level abstractions
- Uses model architectures with multiple layers of non-linear transforms
- Overcomes challenges of designing hand-crafted features for tasks



# So you don't speak English

Language Translation enables you to dynamically translate news, patents, or conversational documents between a variety of languages

## News Domain

- English to/from Brazilian Portuguese, French, Modern Standard Arabic, or Spanish

## Conversational Domain

- English to/from Brazilian Portuguese, French, Modern Standard Arabic, or Spanish

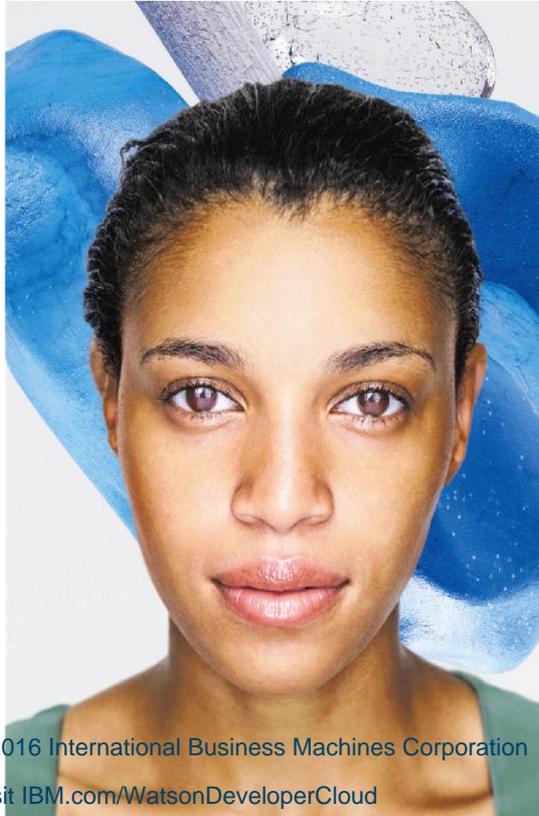
## Patent Domain (ADVANCED)

- Brazilian Portuguese, Chinese, Korean, or Spanish to English

## Language Identification

- Identify plain text as having been written in one of the following languages:
  - Afrikaans, Albanian, Arabic, Azerbaijani, Bashkir, Belarusian, Bulgarian, Bengali, Bosnian, Chinese, Traditional Chinese, Czech, Chuvash, Danish, Dutch, German, Greek, English, Esperanto, Spanish, Estonian, Basque, Farsi/Persian, Finnish, French, Gujarati, Hebrew, Hindi, Haitian, Hungarian, Armenian, Indonesian, Icelandic, Italian, Japanese, Georgian, Kazakh, Central Khmer, Korean, Kurdish, Kirghiz, Lithuanian, Latvian, Malayalam, Mongolian, Norwegian Bokmal, Norwegian Nynorsk, Panjabi, Polish, Pushto, Portuguese, Romanian, Russian, Slovakian, Somali, Swedish, Tamil, Telugu, Turkish, Ukrainian, Urdu, Vietnamese

# Watson Developer Cloud does these at enormous scale



- [Meet Watson](#)  
The platform for Cognitive Business
- [Explore the Watson Developer Cloud](#)  
Gaining insights from text to analyzing images and video, you can tap into the power of Watson APIs to build cognitive apps
- [Build Cognitive Apps with Bluemix](#)  
Get started with a free 30 day trial of Bluemix, a platform as a service that enables developers to build and run apps in the cloud
- [Your Cognitive Future Part I](#)  
The Evolution of Cognitive Computing
- [Your Cognitive Future Part II](#)  
Kick Starting Your Cognitive Journey