Enhancing applications with Cognitive APIs
After you complete this section, you should understand:

- The Watson Developer Cloud offerings and APIs
- The benefits of commonly used Cognitive services
Watson Developer Cloud

- Watson Developer Cloud is a cognitive platform that provides developers easy access to expertise using a collection of REST APIs & SDKs
- Watson SDKs for Node, Java, Python, Swift, and Unity are available for application development
- The Watson Developer Cloud Services are categorized into:
  - Language
  - Speech
  - Vision
  - Data Insights
Watson Developer Cloud APIs

**Language**
- Conversation
- Document Conversion
- Language Translator
- Natural Language Classifier
- Natural Language Understanding
- Personality Insights
- Retrieve and Rank
- Tone Analyzer

**Speech**
- Speech to text
- Text to speech

**Data Insights**
- Discovery

**Vision**
- Visual Recognition

https://www.ibm.com/watson/developercloud
Natural Language Classifier

• Machine learning algorithms return the top matching predefined classes for short text inputs.

• Helps an application understand the meaning and elements of input text and make predictions about how to respond. A classifier learns from example data and then can return information for new text input.

The Natural Language Classifier service supports English, Arabic, Brazilian Portuguese, French, German, Japanese, Italian, and Spanish.
The IBM Watson Conversation service helps developers create an application that understands natural-language input and uses machine learning to respond to customers in a way that simulates a conversation between humans.

The application sends the user input to the Conversation service.
- The application connects to a *workspace*, which is a container for your dialog flow and training data.
- The service interprets the user input, directs the flow of the conversation, and gathers information that it needs.
- Additional Watson services can analyze user input, such as Tone Analyzer or Speech to Text.

The application can interact with your back-end systems based on the user's intent and additional information.
Using the Conversation service

A middleware plugin for Botkit enables developers to easily integrate a Watson Conversation workspace with multiple social channels, including Slack, Facebook, and Twilio.
Speech to Text

• The IBM Watson Speech to Text provides an Application Programming Interface (API) that lets users add speech transcription capabilities to their applications.

• To transcribe the human voice accurately, the service leverages machine intelligence to combine information about grammar and language structure with knowledge of the composition of the audio signal.

• The service continuously returns and retroactively updates the transcript as more speech is heard.

• The service can be used in any application where speech or audio files are used as input and in which text is the desired output format.
Document Conversion

- Converts a single HTML, PDF, or Microsoft Word™ document. The input document is transformed into normalized HTML, plain text, or a set of JSON-formatted Answer units.

- Output works with other Watson services, like the Watson Retrieve and Rank Service.

Supports content in English, French, German, Japanese, Italian, Brazilian Portuguese, and Spanish.
The IBM Watson Retrieve and Rank service helps users find documents that are more relevant than those that users might get with standard information-retrieval techniques.

**Retrieve**: Based on Apache Solr, it supports nearly all of the default Solr APIs and improves error handling and resiliency. The user can start the solution by first using only the Retrieve features, and then add the ranking component.

**Rank**: The rank component (ranker) creates a machine-learning model trained on the user’s data. The user calls the ranker in the runtime queries to use this model to boost the relevancy of the results with queries that the model has not previously seen.

The service combines several proprietary machine-learning techniques, which are known as learning-to-rank algorithms. During its training, the ranker chooses the best combination of algorithms from the user’s training data.
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 are customer-facing professionals, such as support staff, contact center agents, field technicians, and other professionals.
Natural Language Understanding

• Developers can analyze semantic features of text input, including categories, concepts, emotion, entities, keywords, metadata, relations, semantic roles, and sentiment.

• Send API requests to the Analyze endpoint using text, HTML, or a public URL, and specify one or more of the following features of the content to be analyzed:
  – Categories: Pre-defined categories, like art and entertainment, science, technology, business, finance, sports, and more.
  – Concepts: Ideas not directly referenced in the text.
  – Emotion: Emotion conveyed by specific target phrases or as a document as a whole.
  – Entities: Find people, places, events, and other types of entities mentioned in your content.
Natural Language Understanding

• Analyze endpoint features continued:
  – Keywords: Search your content for relevant keywords.
  – Metadata: For HTML and URL input, get the author of the webpage, the page title, and the publication date.
  – Relations: Recognize when two entities are related, and identify the type of relation.
  – Semantic Rules: Parse sentences into subject-action-object form, and identify entities and keywords that are subjects or objects of an action.
  – Sentiment: Analyze the sentiment toward specific target phrases and the sentiment of the document as a whole.
Personality Insights

• The IBM Watson Personality Insights service provides an Application Programming Interface (API) that enables applications to derive insights from social media, enterprise data, or other digital communications.

• The service uses linguistic analytics to infer individuals' intrinsic personality characteristics from digital communications, such as email, text messages, tweets, and forum posts.

• The service can automatically infer, from potentially noisy social media, portraits of individuals that reflect their personality characteristics. It can also determine individuals' consumption preferences, which indicate their likelihood to prefer various products, services, and activities.

• Businesses can use these insights to improve client acquisition, retention, and engagement, and to guide highly personalized engagements and interactions to better tailor their products, services, campaigns, and communications for individual clients.
The IBM Watson Tone Analyzer service uses linguistic analysis to detect emotional, social, and language tones in written text.

- Emotional tone: The different emotions and feelings that people express, like joy, fear, sadness, disgust, anger.
- Social tone: The social tendencies in people, like openness, conscientiousness, extraversion, agreeableness, emotional range, or neuroticism.
- Language tone: The perceived writing style, like analytical, confidence, tentative.

The user can submit JSON or plain text that contains the written content to the service. The service returns JSON results that report the tone of the input. The user can use these results to improve the perception and effectiveness of their communications.
Using the Tone Analyzer service

- Input your content as plain text, or JSON
- Analyze your content
- View a JSON analysis of your content
- Use the analysis to adjust the tone of your content if needed

The Tone Analyzer service can be used with additional IBM Watson services, such as IBM Watson Conversation or IBM Watson Speech to Text, to analyze user input.
Language Translator

• With the IBM Watson Language Translator service, the user can create an application that identifies the language of input text and uses a domain-specific linguistic model to translate the text into another language.

• To translate industry-specific jargon or other types of specialized terminology, the user can customize the linguistic model to optimize it for their needs.

• The linguistic models that are provided with the service can perform translations between the following languages:
  – News: Targeted at news articles and transcripts. Translate English to and from Arabic, Brazilian Portuguese, French, German, Italian, and Spanish. You can also translate Spanish to and from French.
  – Conversational: Targeted at conversational colloquialisms. Translate English to and from Arabic, Brazilian Portuguese, French, Italian, and Spanish.
  – Patents: Targeted at technical and legal terminology. Translate Brazilian Portuguese, Chinese, and Spanish to English.
Text to Speech

• The IBM Watson Text to Speech service provides an Application Programming Interface (API) that uses IBM speech-synthesis capabilities to convert written text to natural-sounding speech.

• The service streams the results back to the client with minimal delay.

• The Text to Speech service can be used in voice-driven and screenless interfaces, as well as in interfaces for the disabled.

• It can be used in situations where audio is the preferred method of output, including home automation solutions, assistance tools for the vision-impaired, reading text and email messages aloud to drivers, video script narration and voice over, and reading-based educational tools.
Visual Recognition

• The IBM Watson Visual Recognition service uses deep learning algorithms to analyze images for scenes, objects, faces, and other content.

• The response includes keywords that provide information about the content.

• A set of built-in classes provides highly accurate results without training. The user can train custom classifiers to create specialized classes.

• The user can also create custom collections of their own images, and then upload an image to search the collection for similar images.
Discovery

• The IBM Watson Discovery service makes it possible to rapidly build cognitive, cloud-based exploration applications that unlock actionable insights hidden in unstructured data, including a user’s own proprietary data, as well as public and third-party data.

• It brings together a functionally rich set of integrated, automated Watson APIs to:
  – Crawl, convert, enrich and normalize data.
  – Securely explore your proprietary content as well as free and licensed public content.
  – Apply additional enrichments, such as concepts, relations, and sentiment through natural language processing.
  – Simplify development while still providing direct access to APIs.

• Watson Discovery News, a public data set that has been pre-enriched with cognitive insights, is also included with Discovery. Watson Discovery News is a dataset of primarily English language news sources that is updated continuously, with approximately 300,000 new articles and blogs added daily.
References

- Watson API Explorer: https://watson-api-explorer.mybluemix.net/
- Watson Developer Cloud github: https://github.com/watson-developer-cloud