

An Incorporation of Artificial Intelligence Capabilities in Cloud Computing

Mandeep Kumar

MCA Student, Department of Computer Science, Central University of Haryana, India

Email: themandeepkumar@gmail.com

Abstract: Cloud providers like Google, Amazon, Microsoft and IBM have incorporating of Artificial Intelligence capabilities in cloud computing. They provides cloud machine learning platform and artificial intelligence cloud services like computer vision, powerful speech recognition, powerful text analysis, fast dynamic translation, smart search, intelligent language and intelligent knowledge. Artificial Intelligence is a power of new cloud computing generation. In this paper, discuss about artificial intelligence capabilities in cloud computing, in the form of cloud machine learning platforms and artificial intelligence cloud services.

Keywords: Cloud Computing, Artificial Intelligence, Cloud Machine Learning Platforms, Artificial Intelligence Cloud Services, Google Cloud, Amazon Web Services, Microsoft Azure, IBM Watson

I. Introduction

Today major Cloud Providers like Google, Amazon, Microsoft and IBM have started incorporating Artificial Intelligence capabilities. Combination of Artificial Intelligence and Cloud Computing are known as Intelligent Cloud Computing.

Artificial Intelligence

+ = Intelligent Cloud Computing

Cloud Computing

They are provides Artificial Intelligence as a Cloud service in the form of Cloud Machine Learning Platforms and Artificial Intelligence Cloud Services.

Cloud Machine Learning Platforms

+ = Artificial intelligence
as a Cloud Service

Artificial Intelligence Cloud Services

Google Cloud Machine Learning Platform is a fast, large scale and easy to use Machine Learning Services. It provides modern machine learning services, with pre-trained models and a service to generate your own tailored models. Google Cloud Vision API allows developers to easily integrate vision detection features within applications, including image labeling, face and landmark detection, Optical Character Recognition (OCR) and tagging of explicit content.

Amazon Machine Learning is a service that makes it easy for developers of all skill levels to use machine learning technology. Amazon Machine Learning provides visualization tools and wizards that guide you through the process of creating machine learning models without having to learn complex machine learning algorithms and technology.

Microsoft Azure Machine Learning is a fully managed cloud service which enables you to easily build, deploy and share predictive analytics solutions. Microsoft Cognitive Services provides an Intelligent Cloud Environment for building application with powerful algorithms using just a few lines of code.

IBM Watson is a technology platform that uses natural language processing and machine learning to reveal insights from large amounts of unstructured data.

II. Cloud Machine Learning Platform

A. Google Cloud Machine Learning Platform: It is a fast, large scale and easy to use Machine Learning Services. Google Cloud Machine Learning Platform provides number of features which are explained below:

- **Mainstream Machine Learning:** Google Cloud Machine Learning Platform provides modern machine learning services, with pre-trained models and a service to generate your own tailored models. Our neural net-based ML platform has better training performance and increased accuracy compared to other large scale deep learning systems. Our services are fast, scalable, and easy to use. Major Google applications use Cloud Machine

Learning, including Photos (image search), the Google app (Voice Search), Translate, and Inbox (Smart Reply). Our platform is now available as a cloud service to bring unmatched scale and speed to your business applications.

- **Large Scale Machine Learning Service:** Google Cloud Machine Learning makes it easy for you to build sophisticated, large scale machine learning models that cover a broad set of scenarios from building sophisticated regression models to image classification. It is a portable, fully managed and integrated with other Google Cloud Data Platform products such as Google Cloud Storage, Google Cloud Dataflow and Google Cloud Data lab so you can easily train your models.
- **Powerful Image Analysis:** Google Cloud Vision API enables you to understand the content of an image by encapsulating powerful machine learning models in an easy to use REST API. It quickly classifies images into thousands of categories, detects individual objects and faces within images and finds and reads printed words which contained within images.
- **Powerful Speech Recognition:** Google Cloud Speech API enables you to convert audio to text by applying neural network models in an easy to use API. The API recognizes over 80 languages and variants, to support your global user base. You can transcribe the text of users dictating to an application's microphone or enable command and control through voice among many other use cases.
- **Powerful Text Analysis:** Google Natural Language API reveals the structure and meaning of text by offering powerful machine learning models in an easy to use REST API. You can use it to extract information about people, places, events, and much more, mentioned in text documents, news articles or blog posts. You can also use it to understand sentiment about your product on social media or parse intent from customer conversations happening in a call center or a messaging app.
- **Fast, Dynamic Translation:** Google Cloud Translate API provides a simple programmatic interface for translating an arbitrary string into any supported language. Translate API is highly responsive, so websites and applications can integrate with Translate API for fast, dynamic translation of source text from the source language to a target language.

B. Amazon Machine Learning: Amazon Machine Learning is a service that makes it easy for developers of all skill levels to use machine learning technology. Amazon Machine Learning provides visualization tools

and wizards that guide you through the process of creating machine learning models without having to learn complex machine learning algorithms and technology. Once your models are ready, Amazon Machine Learning makes it easy to obtain predictions for your application using simple APIs, without having to implement custom prediction generation code, or manage any infrastructure.

Amazon Machine Learning is based on the same proven, highly scalable, machine learning technology used for years by Amazon's internal data scientist community. The service uses powerful algorithms to create Machine Language models by finding patterns in your existing data. Then Amazon Machine Learning uses these models to process new data and generate predictions for your application.

Amazon Machine Learning is highly scalable and can generate billions of predictions daily, and serve those predictions in real time and at high throughput with Amazon Machine Learning, there is no upfront hardware or software investment, and you pay as you go, so you can start small and scale as your application grows.

- C. Microsoft Azure Machine Learning:** It is a powerful cloud based analytics, now part of Cortana Intelligence suite. It is a fully managed cloud service which enables you to easily build, deploy and share predictive analytics solutions. Azure Machine Learning Studio includes hundreds of built-in packages and support for custom code. It was designed for applied machine learning. Use best in class algorithms and a simple drag and drop interface and go from idea to deployment in a matter of clicks. Azure Machine Learning means business. You can deploy your model into production as a web service in minutes a web service which can be called from any device, anywhere and which can use any data source.

III. Artificial Intelligence Cloud Services

- A. Microsoft Cognitive Services:** Microsoft Cognitive Services provides an Intelligent Cloud Environment for building application with powerful algorithms using just a few lines of code. They work across devices and platform such as iOS, Android and Windows, keep improving and are easy to set up.

Microsoft Cognitive Services are explaining below:

➤ Vision

- **Computer Vision API:** Distill actionable information from images.
- **Emotion API:** Personalize experiences with emotion recognition.

- **Face API:** Detect, identify, analyze, organize and tag faces in photos.
- **Video API:** Analyze, edit and process videos within your app.

➤ Speech

- **Bing Speech API:** Convert speech to text and back again, and understand its intent.
- **Custom Recognition Intelligent Service (CRIS):** Fine-tune speech recognition for anyone, anywhere.
- **Speaker Recognition API:** Give your app the ability to know who's talking.

➤ Language

- **Bing Spell Check API:** Detect and correct spelling mistakes within your app.
- **Language Understanding Intelligent Service (LUIS):** Teach your apps to understand commands from your users.
- **Linguistic Analysis API:** Easily parse complex text with language analysis.
- **Text Analytics API:** Detect sentiment, key phrases, topics, and language from your text.
- **Web Language Model API:** Leverage the power of language models trained on web-scale data.

➤ Knowledge

- **Academic knowledge API:** Explore relationships among academic papers, journals and authors.
- **Entity Linking Intelligence Service:** Contextually extend knowledge of people, locations and events.
- **Knowledge Exploration Service:** Add interactive search over structured data to your project.
- **Recommendations API:** Provide personalized product recommendations for your customers.

➤ Search

- **Bing Autosuggest API:** Give your app intelligent autosuggest options for searches.
- **Bing Image Search API:** Bring advanced image and metadata search to your app.
- **Bing News Search API:** Link your users to robust and timely news searches.
- **Bing Video Search API:** Trending videos, detailed metadata, and rich results.
- **Bing Web Search API:** Connect powerful search to your apps.

face and landmark detection, Optical Character Recognition (OCR) and tagging of explicit content.

Google Cloud Vision API provides services which are explained below:

- **Powerful Image Analysis:** Google Cloud Vision API enables developers to understand the content of an image by encapsulating powerful machine learning models in an easy to use REST API. It quickly classifies images into thousands of categories detects individual objects and faces within images, and finds and reads printed words contained within images. You can build metadata on your image catalog, moderate offensive content, or enable new marketing scenarios through image sentiment analysis. Analyze images uploaded in the request or integrate with your image storage on Google Cloud Storage.
- **Insight From Your Images:** Easily detect broad sets of objects in your images, from flowers, animals, or transportation to thousands of other object categories commonly found within images. Vision API improves over time as new concepts are introduced and accuracy is improved.
- **Detect Inappropriate Content:** Powered by Google Safe Search, easily moderate content from your crowd sourced images. Vision API enables you to detect different types of inappropriate content from adult to violent content.
- **Image Sentiment Analysis:** Vision API can analyze emotional facial attributes of people in your images, like joy, sorrow, and anger. Combine this with object detection and product logo detection, so you can assess how people feel about your logo.
- **Extract Text:** Optical Character Recognition (OCR) enables you to detect text within your images, along with automatic language identification. Vision API supports a broad set of languages.

Google Cloud Vision API provides number of features which are explained below:

- **Label Detection:** Detect broad sets of categories within an image, ranging from modes of transportation to animals.
- **Explicit Content Detection:** Detect explicit content like adult content or violent content within an image.
- **Logo Detection:** Detect popular product logos within an image.
- **Landmark Detection:** Detect popular natural and man-made structures within an image.

B. Google Cloud Vision API: Cloud Vision API allows developers to easily integrate vision detection features within applications, including image labeling,

- **Optical Character Recognition:** Detect and extract text within an image, with support for a broad range of languages, along with support for automatic language identification.
- **Face Detection:** Detect multiple faces within an image, along with the associated key facial attributes like emotional state or wearing headwear. Facial Recognition is not supported.
- **Image Attributes:** Detect general attributes of the image, such as dominant color.
- **Integrated REST API:** Access via REST API to request one or more annotation types per image. Images can be uploaded in the request or integrated with Google Cloud Storage.

C. IBM Watson: IBM Watson is a technology platform that uses natural language processing and machine learning to reveal insights from large amounts of unstructured data. The Watson Developers Cloud offers a variety of languages, speech, vision and data APIs to bring cognitive computing features to your app.

IV. Conclusion

Artificial Intelligence is a power of new cloud computing generation. Now a day major Cloud providers companies like Google, Amazon, Microsoft and IBM have incorporating of Artificial Intelligence capabilities in cloud computing. They provides cloud machine learning platform and AI cloud services likes computer vision, powerful speech recognition, powerful text analysis, fast and dynamic translation, smart search, intelligent language and intelligent knowledge. Hence, Artificial Intelligence improves the power of Cloud Computing and also a step of new generation of Cloud Computing.

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