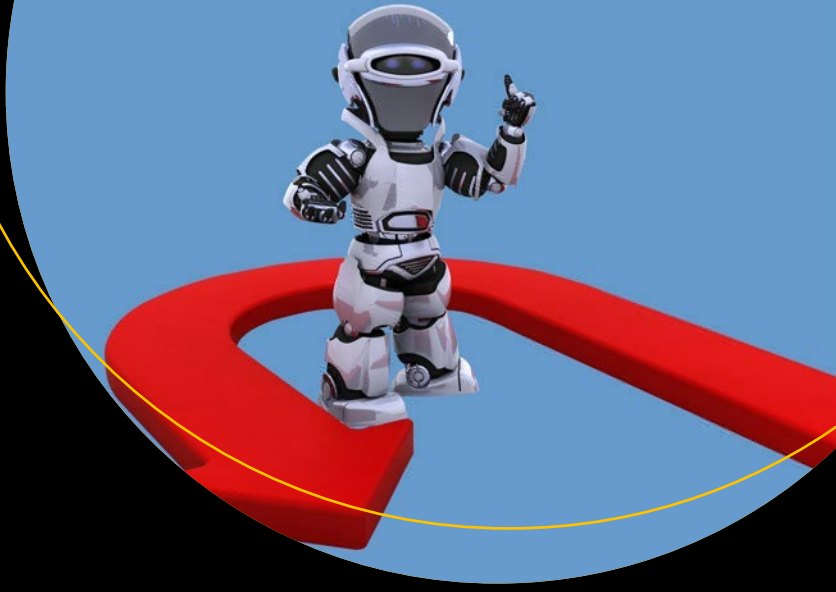

Developing Bots with QnA Maker Service

Integration with Azure Bot Service and Microsoft Bot Framework

Kasam Shaikh

Apress®

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Kasam Shaikh
Mumbai, Maharashtra, India

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To my father, the late Mr. Ahmed Kasam Shaikh, who is always a source of inspiration for me, and to my mentor, Mr. Sabarinath Iyer.

Table of Contents

About the Author

Kasam Shaikh is a certified Azure architect, global AI speaker, technical blogger, and a C# Corner MVP. He has more than 10 years of experience in the IT industry and is a regular speaker at various events on Azure. He is also a founder of DearAzure.net. He leads the Azure INDIA (azINDIA) online community, the fastest growing online community for learning Microsoft Azure. He has a concrete technical background with good hands-on experience in Microsoft technologies. At DearAzure.net, he has been organizing free online webinars and live events for learning Microsoft Azure. He also gives sessions and speaks on developing bots with Microsoft Azure cognitive and QnA Maker service at international conferences, online communities, and local user groups. He owns a YouTube channel and shares his experiences on his website at https://www.kasamshaikh.com.

About the Technical Reviewer

Adwait Churi is a certified Microsoft Azure Solution Architect and MuleSoft Certified Architect, a seasoned professional with 12+ years of experience (in the banking, financial service, and insurance fields), with LMS (Learning Management System), and in the healthcare and hospitality domains.

He is passionate about learning about technologies, including cloud, integration, micro-services, ETL, and DevOps. He has worked in various technologies, including Microsoft BizTalk Server, Microsoft Azure, MuleSoft, Microsoft Business Intelligence, and Microsoft SQL and has a range of experience in software application architecture and design, pre-sales, performance engineering, project management, and software development.

He also gives courses on Microsoft BizTalk Server, MuleSoft, and Microsoft Azure.

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CHAPTER 1

Eagle-Eye View of Azure Cognitive Services

What are Azure Cognitive Services? What problems do they solve in the real world? These are a few of the questions that might come to mind when we come across the term Azure Cognitive Services. This chapter will dive in and find answers to these questions.

We are going to explore the QnAMaker service, which is part of Azure Cognitive Services, so it's a good idea to build the context around Azure Cognitive Services first.

Let's start by taking a look at what cognitive services are all about.

The What and Why of Cognitive Services

You must have come across terms like artificial intelligence (AI), machine learning (ML), and deep learning. These are part of intelligent conversations around the industrial word. Let's look at what these actually are.

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Artificial Intelligence

One of the simpler, smarter definitions of AI was quoted by the American computer scientist John McCarthy in 1956. He said that, "AI involves machines that can perform tasks that are characteristic of human intelligence."

This might not be the exact meaning of AI but is very close. For me, AI is about resembling human attributes like understanding, predicting, and acknowledging, which are no doubt complex tasks to emulate. There are different ways to achieve artificial intelligence, and one of them is by implementing artificial intelligence through machine learning.

Machine Learning

According to Arthur Samuel in 1959, machine learning is "…a field of computer science that gives computers the ability to learn without being explicitly programmed". So, it's about enabling your machine to learn without having to punch in hardcoded commands.

In as simple a way as possible, I will try to explain how machine learning works! Consider these phases:

- You have raw data with different patterns.
- The machine learning algorithm analyzes the patterns in the data. Techniques like deep learning are used.
- After analyzing the patterns, the algorithm creates a machine learning model, which is an output of the process.
- This model recognizes the patterns.
- The application seeds the data so that the models can recognize any patterns.

This is not an easy task to perform. It requires lots of data pertaining to different cases and expert training models. The second complex part is creating a machine learning algorithm and testing it with a certain number of real-world cases. This comes with no guarantee of successful end results. The task here is to expose your new model to the application. Now this exposure should not compromise security, availability, or performance. Another set of complexity comes into existence.

You need machine learning to make the application intelligent. For this, you need to have data, algorithms, and models in place. This is where Azure Cognitive Services help.

Azure Cognitive Services

Cognitive services are a set of REST APIs that expose the machine learning model to the outer world and help infuse smart, intelligent algorithms to hear, speak, recognize, and interpret user input into the applications, websites, and bots. Cognitive services are sometimes called MLaaS—Machine Learning as a Services.

Azure Cognitive Services reside in the Microsoft public cloud, which guarantees a secure, highly available and smooth performance. That's all we need in order to consume REST APIs in our application and leverage the machine learning capabilities with ease. A few cognitive services do need data to be uploaded by the users, but those services provide the appropriate algorithm.

Using Azure Cognitive Services will help you leverage machine learning capabilities in your application, with Microsoft expertise in cleaning and training the data, with no burden of developing complex machine learning algorithms. These all come ready from Microsoft. And you don't have to worry about availability, performance, or security.

Who Offers Cognitive Services

Cognitive services make implementing machine learning easy by consuming APIs and seeding data if necessary. Cognitive services are part of Azure and the Microsoft public cloud, and they are hosted at Azure data centers.

At the time of this writing, Microsoft offers 23+ cognitive services. A few are still in preview but are mature enough to use with applications. This count is growing rapidly.

Microsoft is not the only vendor that offers cognitive services. Others major vendors offering cognitive services include:

- IBM Watson
- Amazon Web Service
- Google Cloud Platform

They don't have as many services as Microsoft, but they too are growing. There are many others apart from ones listed here and they have their own expertise in offerings. But Microsoft is leading the way and includes all the benefits of using its Bing data.

Azure Cognitive Services APIs at a Glance

After having a brief look of why cognitive services are useful, let's dive into the Microsoft Cognitive Service offering. The objective here is to be aware of the offerings and understand what they do to help our applications be smarter.

Note Microsoft Azure Cognitive Services are rapidly growing. The few services mentioned here could be renamed or removed or modified. I recommend you refer to Microsoft's official website for updated listings of their cognitive services.

Azure Cognitive Services are categorized in five different areas—Vision, Speech, Language, Knowledge, and Search.

I will explain at least one service and you can find out more using the provided links. It all comes with exposing REST APIs to consume and leverage the machine learning power in your applications.

Explaining all 23 services is not possible in one chapter. We also focus on the QnAMaker service offered by Microsoft Azure in coming chapters.

The objective here is to give you an overall view of the available services, so you understand how they can help you. Let's explore the services, one by one.

The Vision Category

As defined by Microsoft, the Vision category presents image-processing algorithms to smartly identify, caption, and moderate your pictures. As seen in Figure 1-1, at the time of writing this chapter, the following services are part of the Vision category.

```
https://azure.microsoft.com/en-in/services/cognitive-services/
computer-vision/
```

I provide a quick introduction to a few of them in a later part of this chapter.

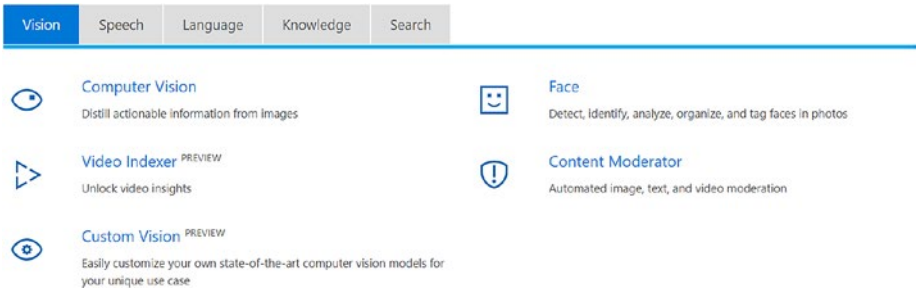

Figure 1-1. *Services under the Vision category*

Computer Vision

As described by Microsoft, Computer Vision enables you to extract rich information from images to categorize and process visual data and perform machine-assisted moderation of images to help curate your services.

Basically, it analyzes the image by type, color, etc. It provides lots of information about the image. It can tag the person's face and provide details like age and gender. It also gives score in percentages, for detecting images with adult content or racial issues. A score near to 1 means there's a high possibility that the presented feature is accurate.

This service is still growing and its accuracy is improving day by day. Let's look at an example. You can experience this service in action. Here you can select from a set of provided images or you can upload your own image or provide an image URL. To do this, visit `http://bit.ly/AzComputeVision`.

Figure 1-2 shows a sample image; let's go through the details it provides.

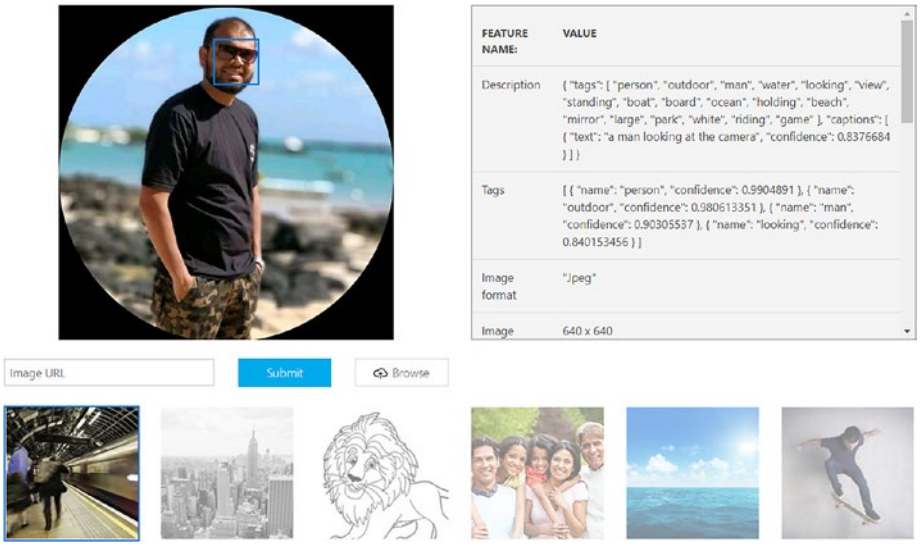

Figure 1-2. *The Computer Vision feature in action*

This random image has different options to select from. In Figure 1-3, notice that it has tagged my face as a person in the image.

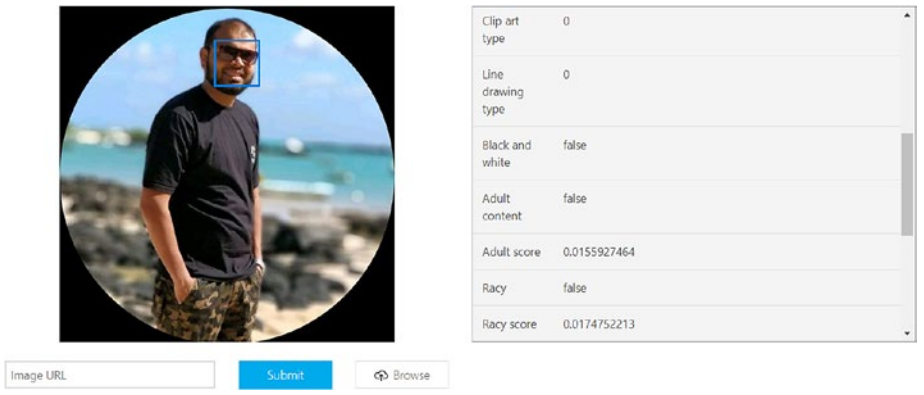

Figure 1-3. *Computer Vision in action*

Figure 1-3 shows some more details about clip art type, line drawing type, color, and adult content.

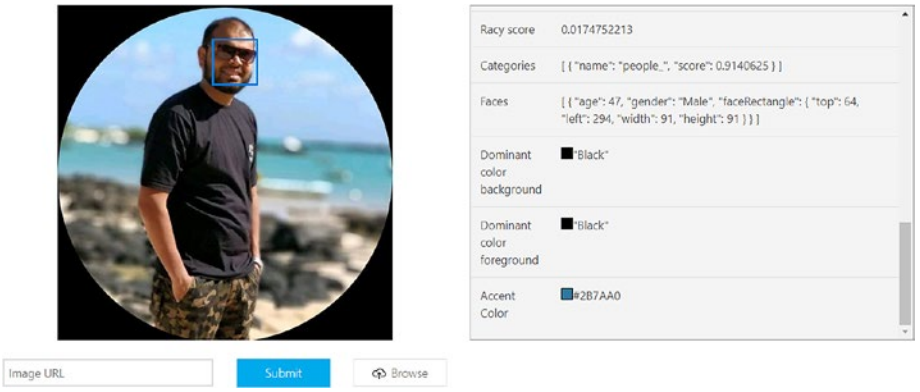

Figure 1-4. *Computer Vision identifies the people and colors in the image*

Figure 1-4 describes the person using the Faces attribute. It uses age, gender, and face coordinates and adds the background, foreground, and accent colors.

In some cases, these responses are not accurate and don't match the actual image. Let's see another image and then compare the differences in the response received. See Figure 1-5.

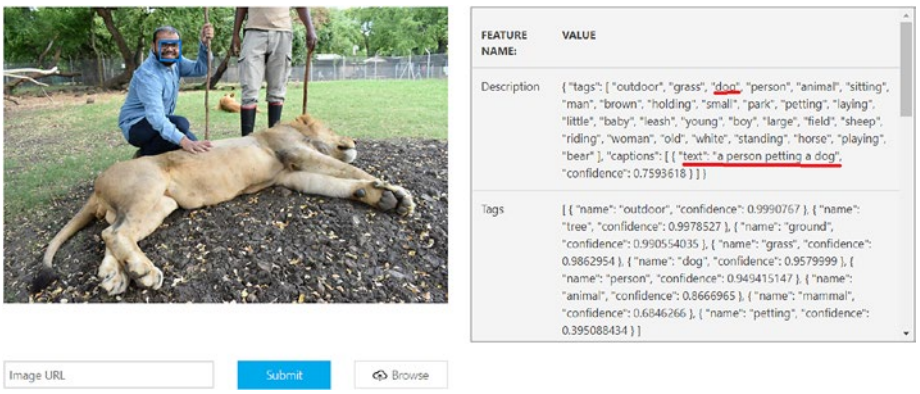

Figure 1-5. *Note the differences in the response*