

Module 3

Innovating with
Google Cloud
Artificial Intelligence

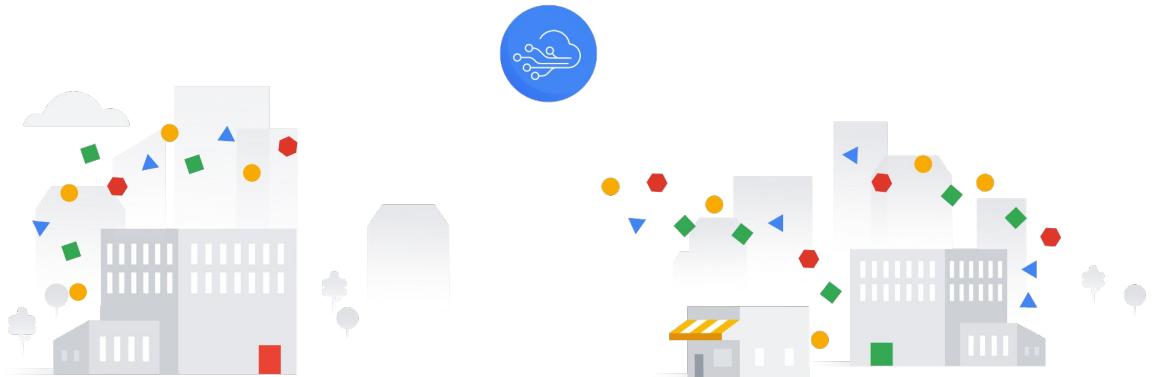
Lessons

- 01** AI and ML fundamentals
- 02** Google Cloud's AI and ML solutions

Google Cloud

Say: It's now time for module 3, "Innovating with Google Cloud Artificial Intelligence."

Digital transformation brings lots of data



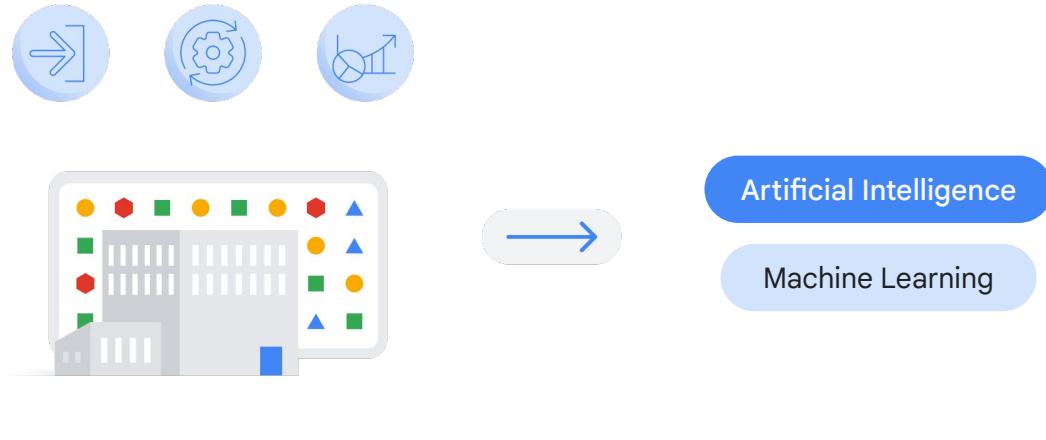
Data can be very laborious to collect, process, and analyze.

Google Cloud

Say: As organizations digitally transform, they can find themselves with lots of data. And as time progresses, the amount of data they have only grows.

Although that data is really valuable, it can be very laborious to collect, process, and analyze. New tools and methodologies are needed to manage what's being collected, analyze it for insights, and then act on those insights.

AI and ML can help



Google Cloud

Say: So, what do these organizations do? This is where artificial intelligence and machine learning come in. This section of the course, “Innovating with Google Cloud Artificial Intelligence,” was designed to help you:

- Explore important AI and machine learning, or ML, concepts and understand how they can bring value to your business.
- Learn about the AI and ML solutions that Google Cloud offers
- And understand how Google Cloud’s pre-trained APIs, AutoML, and custom AI and ML products can help transform your business.

Module 3

Innovating with
Google Cloud
Artificial Intelligence

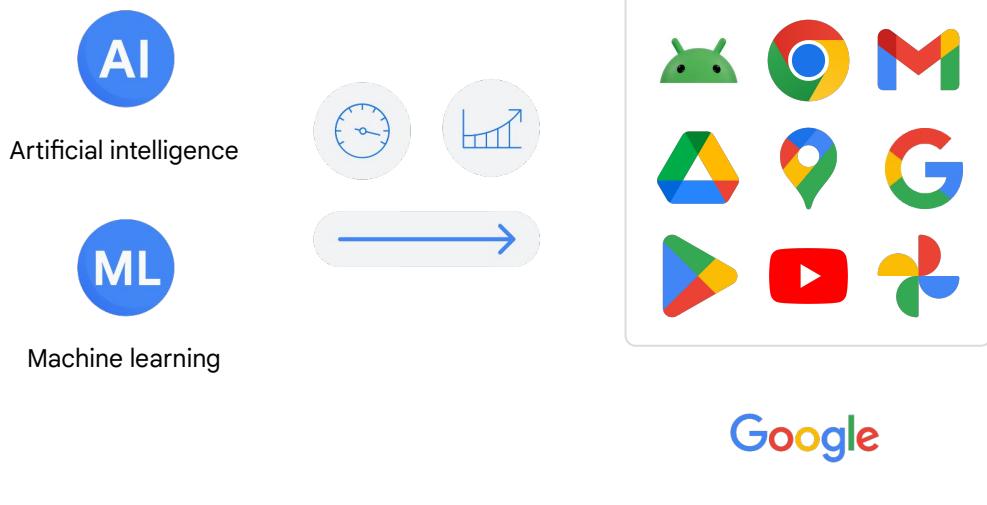
Lessons

- 01 AI and ML fundamentals
- 02 Google Cloud's AI and ML solutions

Google Cloud

Say: As you consider how AI and ML could provide a benefit to your business, understanding the basics is important.

AI and ML are integrated in Google's popular products



Say: Google has nine products with over one billion users—Android, Google Chrome, Gmail, Google Drive, Google Maps, Google Search, the Google Play Store, YouTube, and Google Photos—and artificial intelligence and machine learning were integrated into these products to make the user experience of each even more efficient and productive. This includes features like search in Photos, recommendations in YouTube, Smart Compose in Gmail, and traffic predictions in Google Maps.

And Google continues to innovate products powered by new technologies such as generative AI which can produce content for you.



The difference between AI and ML

Google Cloud

AI and ML defined



Artificial intelligence

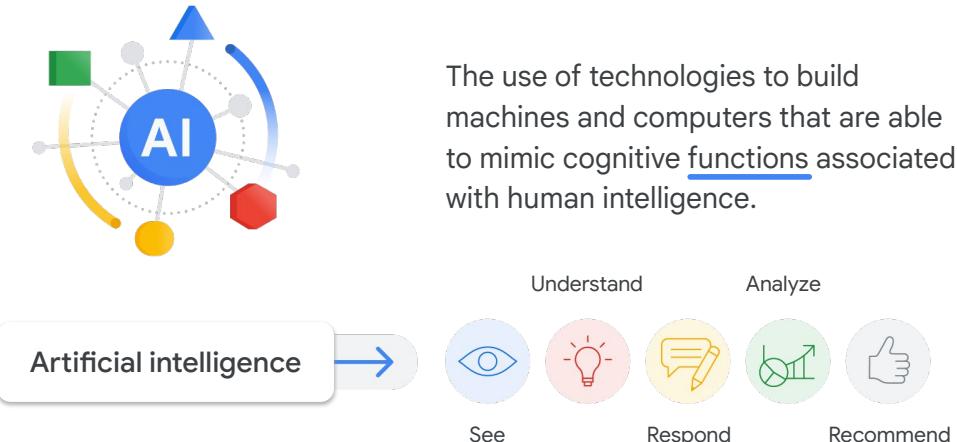


Machine learning

Google Cloud

Say: People commonly use the terms artificial intelligence (AI) and machine learning (ML) interchangeably. The confusion is understandable, because artificial intelligence and machine learning are closely related. However, these trending technologies differ in several ways, including scope and application. So before we advance, let's define each of the terms.

Artificial intelligence defined



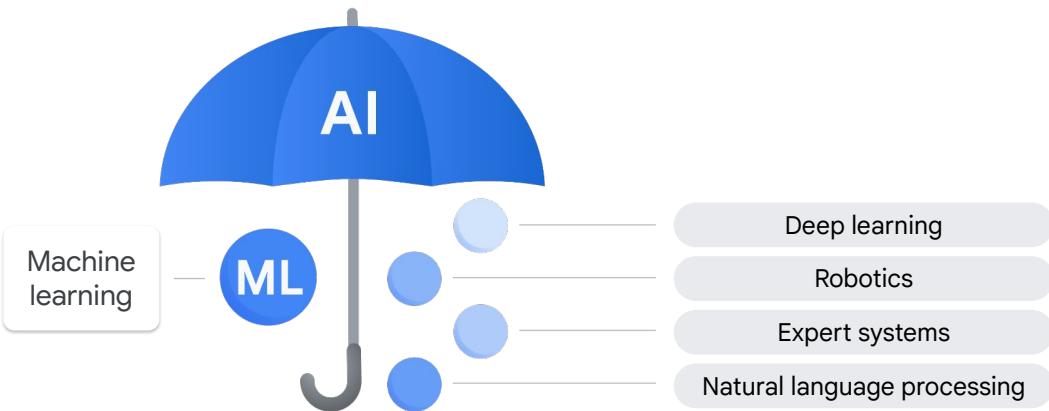
The use of technologies to build machines and computers that are able to mimic cognitive functions associated with human intelligence.

Google Cloud

Say: **Artificial intelligence** is a **broad field**, which refers to the use of technologies to build machines and computers that can mimic cognitive functions associated with human intelligence. These functions include being able to see, understand, and respond to spoken or written language, analyze data, make recommendations, and more.

Although artificial intelligence is often thought of as a system in itself, it's a set of technologies implemented in a system to let it reason, learn, and act to solve a complex problem.

ML sits under the AI umbrella



Google Cloud

Say: One helpful way to remember the difference between the two is to imagine them as umbrella categories. Artificial intelligence is the overarching term that covers a variety of specific approaches and algorithms. Machine learning sits beneath that umbrella, but so do other major subfields, such as deep learning, robotics, expert systems, and natural language processing.

Machine learning is a subset of AI



ML lets a machine learn from data without being explicitly programmed.

It relies on various **models** to:

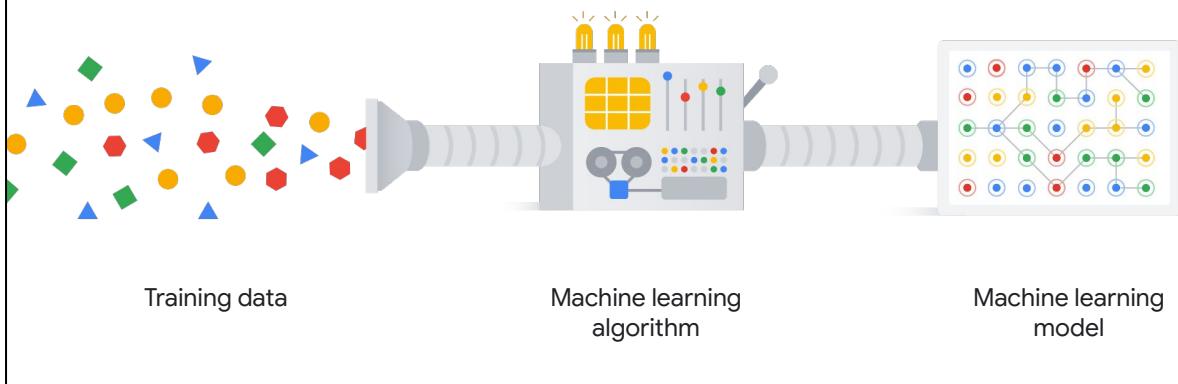
- Analyze large amounts of data
- Learn from the insights
- Make predictions and informed decisions

Google Cloud

Say: **Machine learning** is a *subset of AI* that lets a machine learn from data without being explicitly programmed.

It relies on various models to analyze large amounts of data, learn from the insights, and then make predictions and informed decisions.

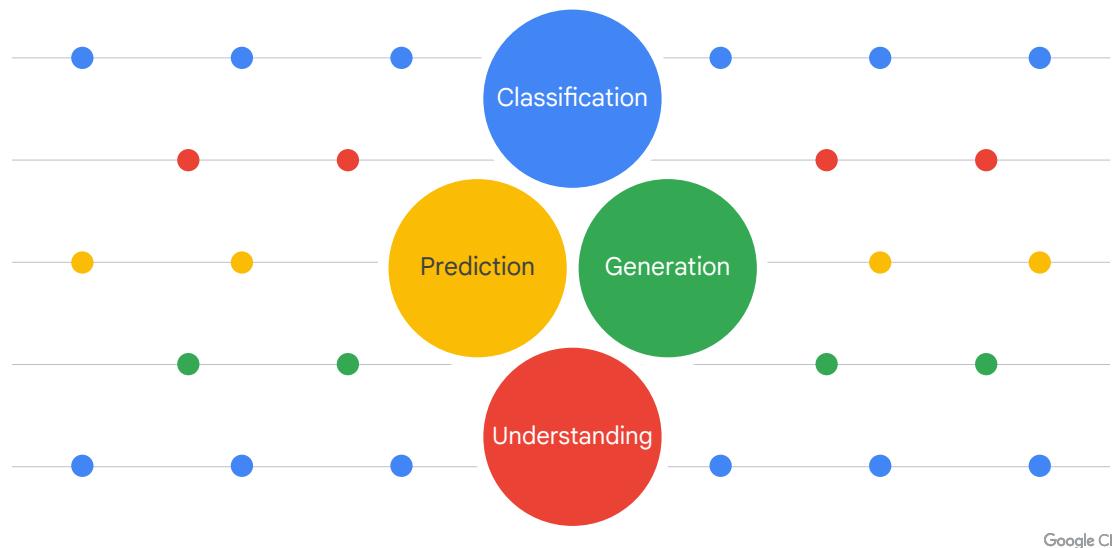
ML algorithms improve performance over time as they are trained or exposed to more data



Google Cloud

Say: Machine learning algorithms improve performance over time as they are *trained* or exposed to more data. Machine learning models are the output, or what the program learns from running an algorithm on training data. When more data is used, the model improves.

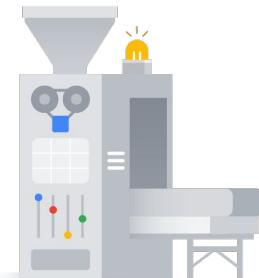
AI is evolving from analysis to creation



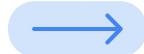
Say: Until recently, AI has primarily focused on **analyzing** massive amounts of data. It excelled at tasks like identifying patterns, finding anomalies, and making predictions on topics like customer behavior and market trends. However, we're now witnessing a profound shift in AI's capabilities.

The next generation of AI, powered by *generative models*, now **creates** entirely new content.

Generative AI



A type of artificial intelligence that can produce new content



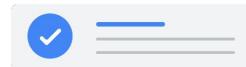
Text



Images

Synthetic data

Google Workspace

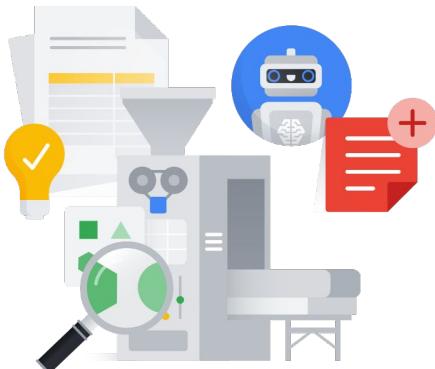


Google Cloud

Say: Generative AI is a type of artificial intelligence that can actually create new content—including text, images, audio, and synthetic data. Google applies generative AI to products like Google Workspace to help users easily automate different types of tasks, like generating summaries of long documents.

Google also provides development tool kits, such as generative AI APIs to developers, to help them create customized products and services.

Generative AI use cases



Generative AI can be used in:

- ✓ Conversational bots
- ✓ Content generation
- ✓ Document synthesis
- ✓ Product discovery

Google Cloud

Say: Generative AI can be used in a variety of applications, such as conversational bots, content generation, document synthesis, and product discovery.

Quiz

Question

What is generative AI?

- A. A type of artificial intelligence that can understand and respond to human emotions
- B. A type of artificial intelligence that can produce new content, including text, images, and audio
- C. A type of artificial intelligence that can make decisions and take actions
- D. A type of artificial intelligence that can create and sustain its own consciousness

Google Cloud

Do: Read the question out loud. Ask the class to refrain from sharing their answers (either out loud or in the chat window) for about 10 seconds.

Say: What is generative AI?

- A. A type of artificial intelligence that can understand and respond to human emotions
- B. A type of artificial intelligence that can produce new content, including text, images, and audio
- C. A type of artificial intelligence that can make decisions and take actions
- D. A type of artificial intelligence that can create and sustain its own consciousness

Quiz

Answer

What is generative AI?

- A. A type of artificial intelligence that can understand and respond to human emotions
- B. A type of artificial intelligence that can produce new content, including text, images, and audio
- C. A type of artificial intelligence that can make decisions and take actions
- D. A type of artificial intelligence that can create and sustain its own consciousness



Google Cloud

Say: The correct answer is B.

- A. A type of artificial intelligence that can understand and respond to human emotions
 - Why this is the **incorrect** answer: This better describes affective AI or emotion AI, a field related to, but not interchangeable with, generative AI.
- B. A type of artificial intelligence that can produce new content, including text, images, and audio
 - Why this is the **correct** answer: Generative AI focuses on creating novel content across various modalities, such as an AI tool generating product descriptions from a list of features or a system writing a personalized marketing email.
- C. A type of artificial intelligence that can make decisions and take actions
 - Why this is the **incorrect** answer: While some generative AI models incorporate decision-making, the core is content creation, not autonomous action or broad decision-making ability.
- D. A type of artificial intelligence that can create and sustain its own consciousness
 - Why this is the **incorrect** answer: This describes a theoretical construct of artificial consciousness. Current generative AI does not possess this level of capability.

Quiz

Question

Which of these is a generative AI use case?

- A. Self-driving cars
- B. Spam filtering
- C. Conversational bots
- D. Image recognition

Google Cloud

Do: Read the question out loud. Ask the class to refrain from sharing their answers (either out loud or in the chat window) for about 10 seconds.

Say: Which of these is a generative AI use case?

- A. Self-driving cars
- B. Spam filtering
- C. Conversational bots
- D. Image recognition

Quiz

Answer

Which of these is a generative AI use case?

- A. Self-driving cars
- B. Spam filtering
- C. Conversational bots
- D. Image recognition



Google Cloud

Say: The correct answer is C.

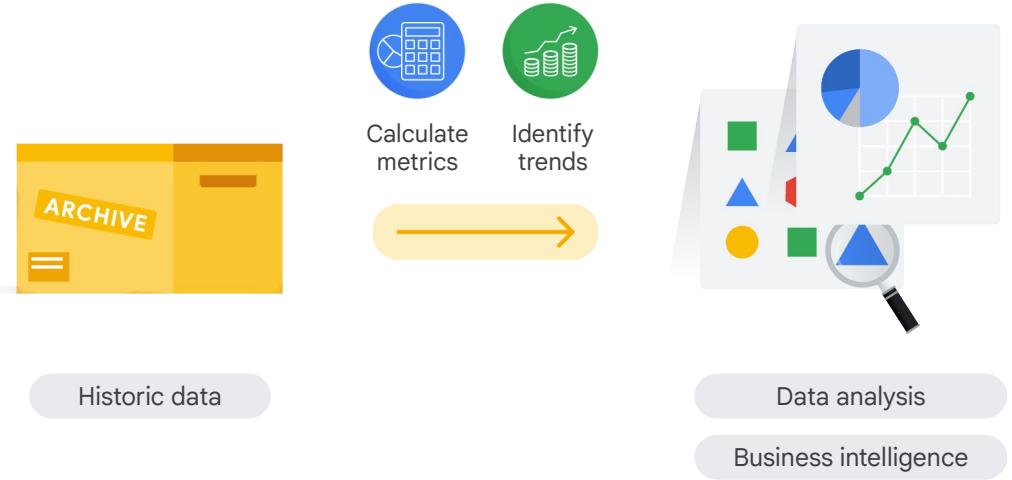
- A. Self-driving cars
 - Why this is the **incorrect** answer: These heavily rely on computer vision, pathfinding, sensor fusion, and decision-making systems. While AI is crucial, their primary mode isn't generating new content.
- B. Spam filtering
 - Why this is the **incorrect** answer: This primarily involves classification – assigning a 'spam' or 'not spam' label based on analyzed patterns. It's not directly concerned with producing new content.
- C. Conversational bots
 - Why this is the **correct** answer: Conversational bots (particularly advanced ones like ChatGPT) often use generative AI to craft creative, context-aware, and fluent responses. Their ability to produce text that flows like a human conversation demonstrates a core generative AI strength.
- D. Image recognition
 - Why this is the **incorrect** answer: Similar to spam filtering, image recognition is about categorization and understanding existing imagery rather than generating new visual content.



How AI and ML differ from data analytics and business intelligence

Google Cloud

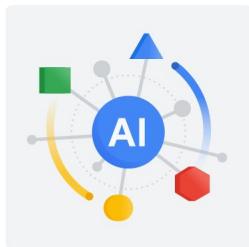
Backward-looking data



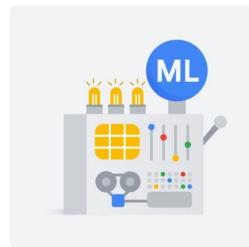
Say: Within your organization, perhaps you're familiar with a specific dashboard that analysts view every day. Or maybe managers review a particular report each month.

Both the dashboard and the report are examples of *backward-looking data*. They look at what happened in the past. Most data analysis and business intelligence is based on historical data, used to calculate metrics or identify trends.

To create value, you need to use data to make decisions for future business



Artificial intelligence



Machine learning



Google Cloud

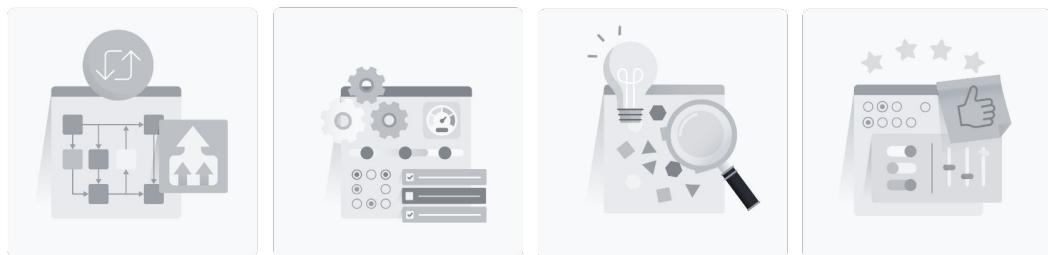
Say: But to *create value* in your business, you need to use that data to make decisions for *future business*. This is where artificial intelligence and machine learning come in. They are the key to unlocking these capabilities.

03



Problems that ML is suited to solve

Four common business problems ML is suited to solve

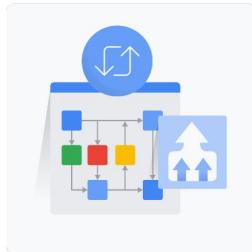


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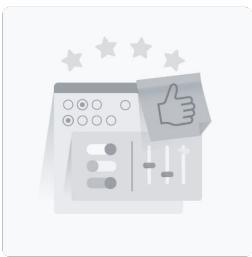
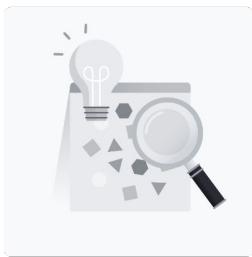
Say: Machine learning lets computer systems continuously adjust and enhance themselves as they accrue more “experiences.” For this reason, when more data is put into them, the results are more accurate.

With this in mind, ML is suited to solve four common business problems.

Four common business problems ML is suited to solve

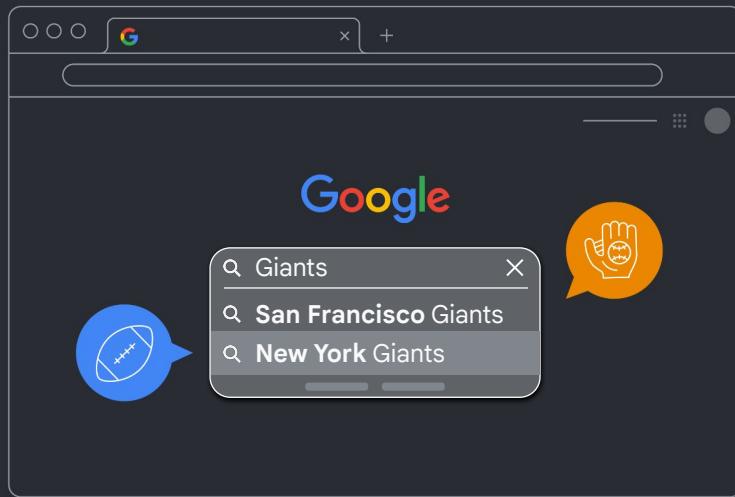


Replacing or
simplifying rule
based systems

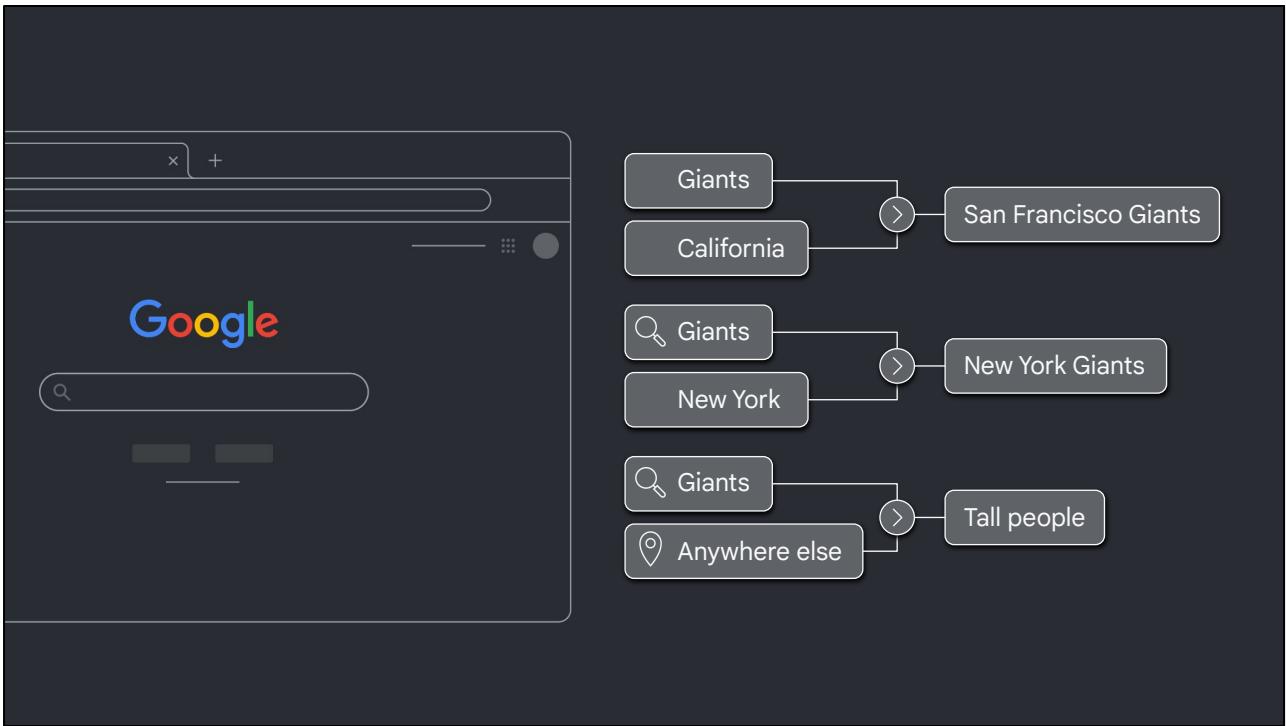


Google Cloud

Say: The first is **replacing or simplifying rule-based systems**. Let's use Google Search as an example.



Say: Suppose you want to search for the Giants, a US sports team. If you type in "giants," should the search results show you the San Francisco Giants or the New York Giants? One's a baseball team based in California, and the other's an American football team based in New York.

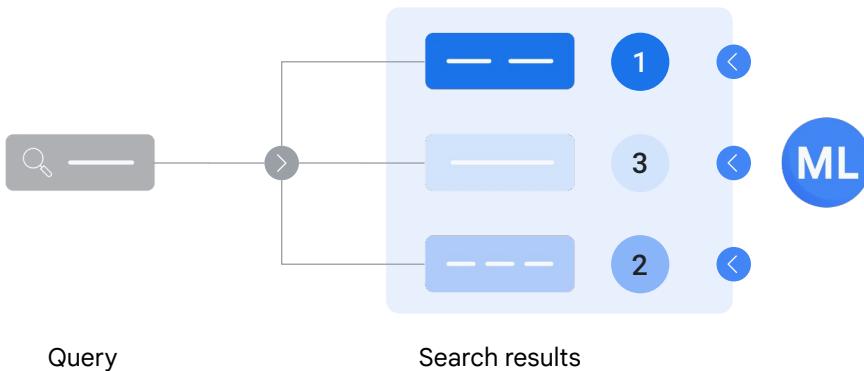


Say: In years gone by, the search engine used hand-coded rules to decide which sports team to show a user:

- > If the query is “giants” and the user is in the Bay area, show them results about San Francisco Giants.
- > If the user is in the New York area, show them results about NY Giants.
- > If the user is anywhere else, show them results about tall people.

This was for just one query. If you multiply this process by millions of different queries and users each day, you can probably imagine how complex the whole codebase became.

A perfect problem for ML to solve

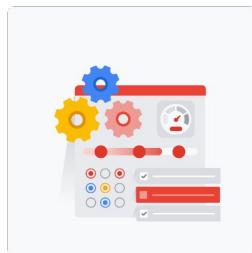


If all the data that's available shows which search results users clicked on per query, a machine learning model can be trained to predict the rank for search results.

Google Cloud

Say: This is a perfect problem for ML to solve. If all the data that's available shows which search results users clicked on per query, a machine learning model can be trained to predict the rank for search results.

Four common business problems ML is suited to solve



Automate
processes

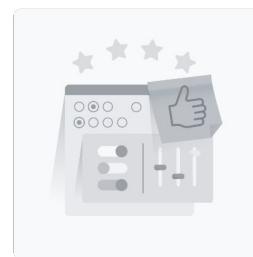


ML is designed to make predictions
and repeated decisions at scale.

Google Cloud

Say: A second business problem ML can help solve relates to **automating processes**.
ML is designed to make predictions and repeated decisions at scale.

Four common business problems ML is suited to solve



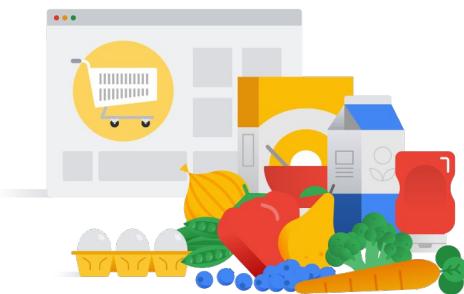
Understanding unstructured data

Google Cloud

Say: So far, you heard about ML problems that use structured data to make predictions at scale.

A third type of business problem that ML can help solve is **understanding unstructured data** like images, videos, and audio.

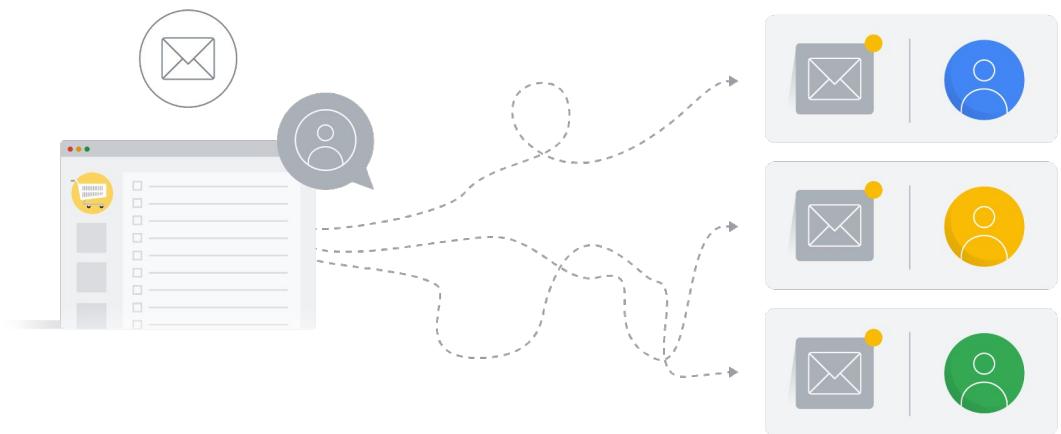
Example: Ocado



Google Cloud

Say: This example comes from Ocado, one of the world's largest online-only grocery supermarkets.

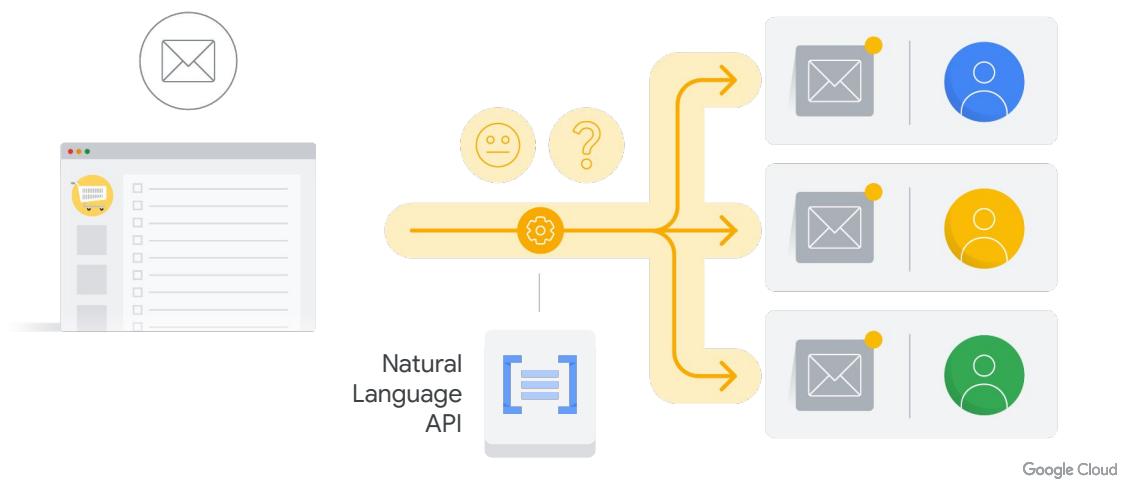
When Ocado received emails, they would all go to a central mailbox for sorting and forwarding by a human



Google Cloud

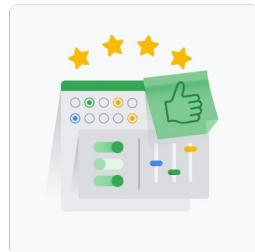
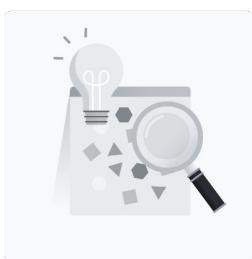
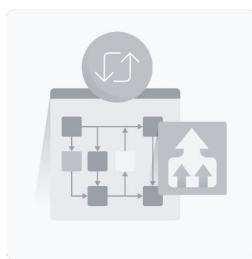
Say: Previously, when Ocado received emails, they would all go to a central mailbox for sorting and forwarding by a human. This process was time consuming and led to a poor customer experience.

Ocado used ML to identify the customer's sentiment and the topic of each message



Say: To improve and scale this process, Ocado used ML's ability to process natural language to identify the customer's sentiment and the topic of each message so that they could route it immediately to the relevant department. This eliminated multiple rounds of reading and triaging, and ultimately improved customer satisfaction and retention.

Four common business problems ML is suited to solve

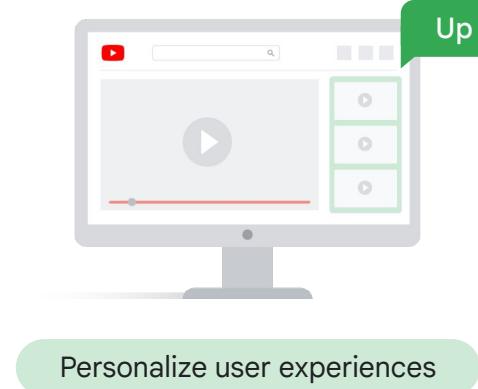


Personalization

Google Cloud

Say: And finally, there is **personalization**.

Example: YouTube



Google Cloud

Say: Many businesses use ML to personalize user experiences, and YouTube is a great example of personalization in action. When you watch a video on YouTube, you've probably noticed there's a list of recommended videos that are "Up Next."

When your video finishes, a new video will play, and YouTube wants it to be interesting and useful for you. By using ML to provide personalized recommendations, YouTube can deliver a better customer experience.

Many businesses use the same approach

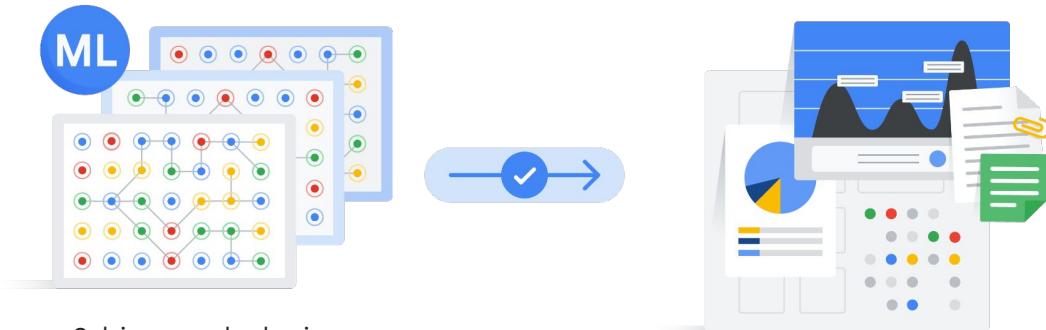


Google Cloud

Say: Many businesses use this same approach to surface product recommendations on their websites that are personalized to individual users.

Other businesses use personalization to surface new content, like music recommendations or films to stream.

ML models aren't standalone solutions



Solving complex business challenges requires combinations of models

Google Cloud

Say: It's important to remember that ML models aren't standalone solutions, and that solving complex business challenges requires combinations of models.

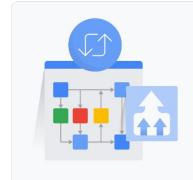
There are, of course, many more applications of machine learning for businesses, and you can learn even more about them in our machine learning courses.

Discussion

We've presented four common business problems ML can solve.

- Which of these problems are you experiencing in your organization?
- How can ML solve these problems?

Replacing or simplifying rule based systems



Automate processes



Understanding unstructured data



Personalization



Google Cloud

Say: Let's pause for a quick discussion. We've presented four common business problems ML can solve.

Ask:

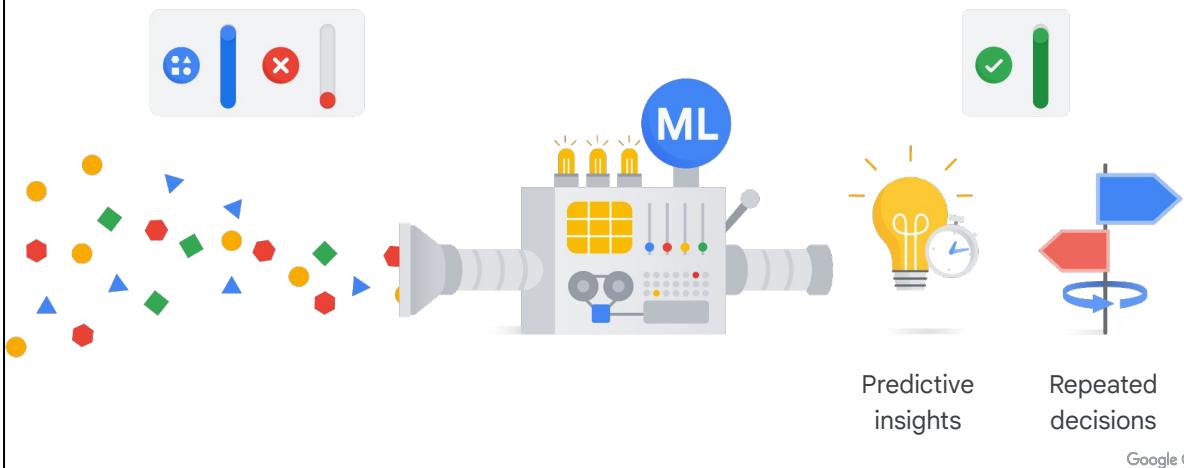
- Which of these problems are you experiencing in your organization?
- How can ML solve these problems?



Why ML requires high-quality data

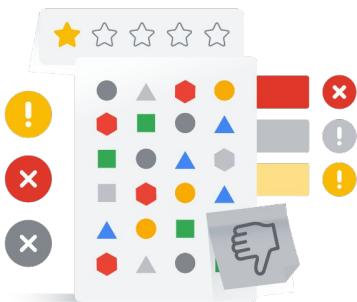
Google Cloud

Data is used by ML models to derive predictive insights and make repeated decisions



Say: Data is used by machine learning models to derive predictive insights and make repeated decisions. However, the accuracy of those predictions, relies on large volumes of data that are correct and free of errors.

An ML model can't make accurate predictions by learning from incorrect data



Low quality data is:

- ✖ Not aligned to the problem
- ✖ Biased in some way

Google Cloud

Say: Data is considered low quality if it's not aligned to the problem or is biased in some way. If you feed an ML model low quality data, it's like teaching a child with incorrect information.

An ML model can't make accurate predictions by learning from incorrect data.

Data is evaluated against 6 dimensions to assess quality



Completeness



Uniqueness



Timeliness



Validity



Accuracy



Consistency

Google Cloud

Say: So how can you ensure that you have quality data when training an ML model?

To assess its quality, data is evaluated against 6 dimensions: **completeness, uniqueness, timeliness, validity, accuracy, and consistency.**

Let's explore what each of these mean in more detail.



Completeness



The completeness of the data refers to whether all the required information is present.

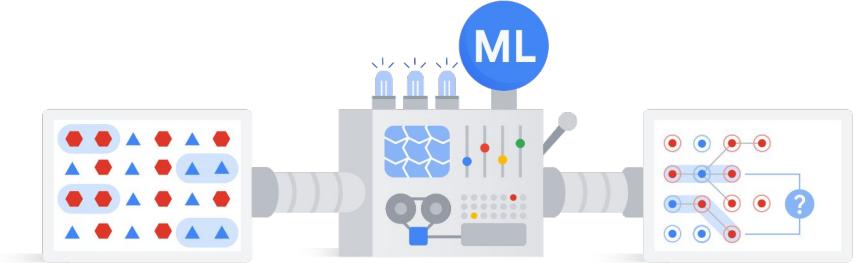
Google Cloud

Say: The **completeness** of the data refers to whether all the required information is present. If the data is incomplete, then the model will not learn all the patterns that are necessary to make accurate predictions.

Take, for example, the training of an ML model that's reliant on a dataset of customer transactions. If some transactions are missing critical information such as the date of the transaction, the accurate training of the model will be affected.



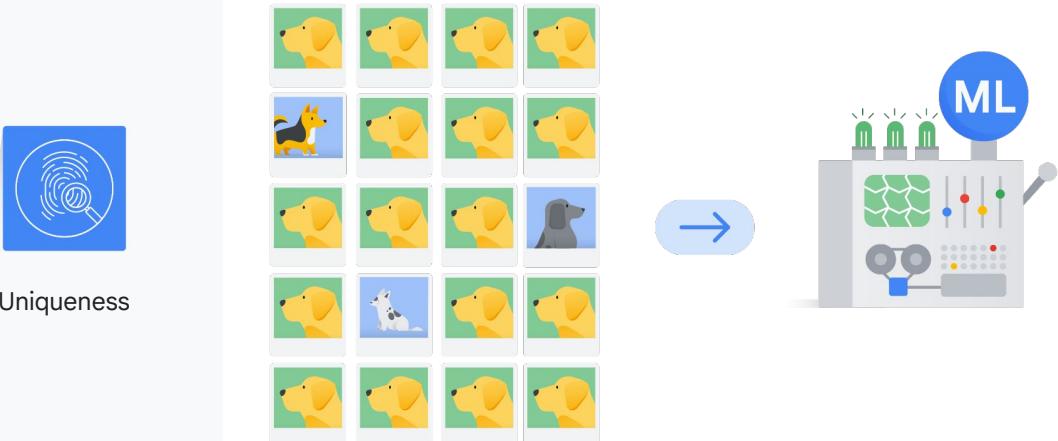
Uniqueness



If a model is trained on a data set with a high number of duplicates, the ML model might not learn accurately.

Google Cloud

Say: Data should be **unique**. If a model is trained on a data set with a high number of duplicates, the ML model might not learn accurately. This is because it will be confused by the duplicate records and won't be able to accurately identify patterns.



Google Cloud

Say: For example, if you're training a model to identify a breed of dog from a photo it's important to have images of many different unique breeds.

If the dataset contains many thousands of images but most of them are just photos of labradors, the model will find it difficult to correctly identify most other breeds accurately.



Timeliness



Timely data is up-to-date and reflects the current state of the phenomenon that is being modeled.

Google Cloud

Say: The **timeliness** of the data refers to whether the data is up-to-date and reflects the current state of the phenomenon that is being modeled. If the data is not timely, then the model might be making predictions based on outdated or irrelevant information.

Training an ML model to predict stock market fluctuations might rely on a dataset of stock prices. If the data is several months old, it's untimely for making current predictions.



Validity

08-12-2019



YYYY/mm/dd

When data conforms to a set of predefined standards and definitions, such as type and format.

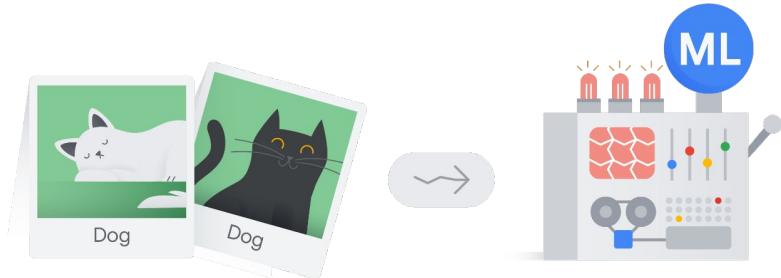
Google Cloud

Say: **Validity** means that the data conforms to a set of predefined standards and definitions such as type and format. Validity also ensures that data is in an acceptable range.

An example of invalid data is a date of 08-12-2019 when the standard format is defined as "YYYY/mm/dd."



Accuracy



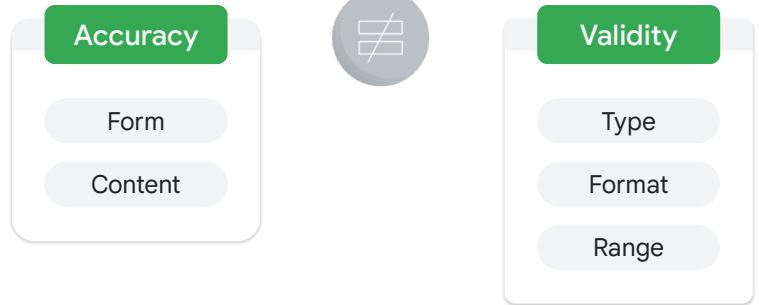
Reflects the correctness of the data, such as the accurate number of units sold or image labels.

Google Cloud

Say: **Accuracy** reflects the correctness of the data, such as the correct birth date or the accurate number of units sold. For example, in a dataset of images, some images might be labeled as dogs when they actually show cats.

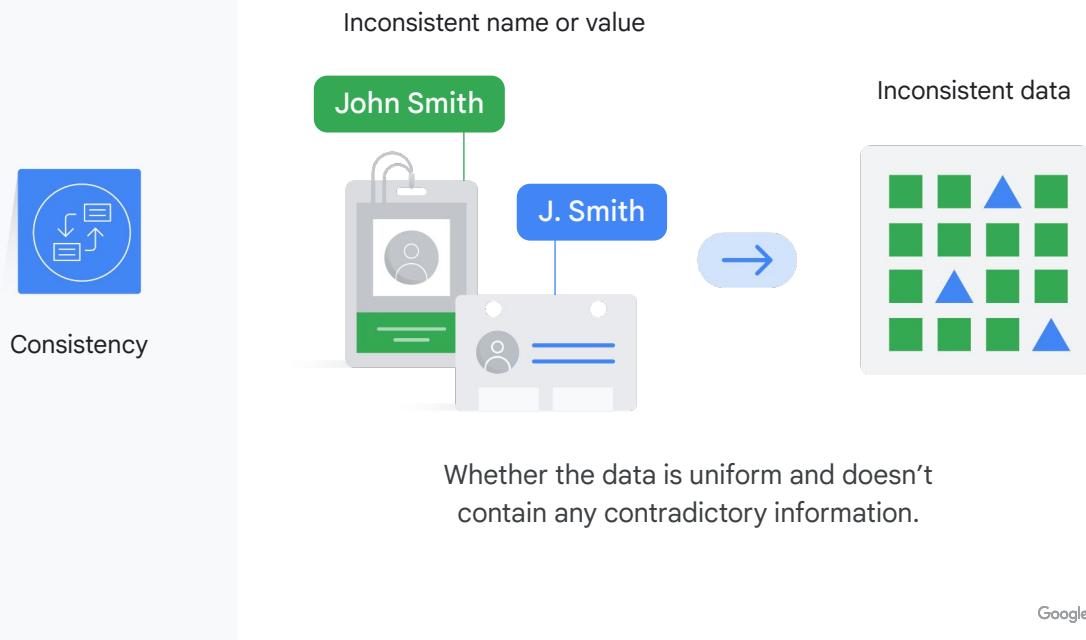


Accuracy



Google Cloud

Say: Note how accuracy is different from validity. Whereas validity focuses on type, format, and range, accuracy is focussed on form and content.



Say: Finally, the **consistency** of the data refers to whether the data is uniform and doesn't contain any contradictory information. If data is inconsistent, then an ML model might be unable to make accurate predictions.

If the same entity appears with different names or values across different parts of the data, it would lead to inconsistent data. For example, in a dataset of customer information, the same customer might appear as "John Smith" in one place and "J. Smith" in another.

It's your responsibility to provide a model with complete and correct data



Completeness



Uniqueness



Timeliness



Validity



Accuracy



Consistency

Google Cloud

Say: Remember, data is the only lens through which a model views the world. Anything the model can't see, it assumes doesn't exist, so it's your responsibility to provide the model with complete and correct data.

The good news is that most of these problems can be solved simply by getting more high-quality data. But you have to be purposeful in collecting that data.

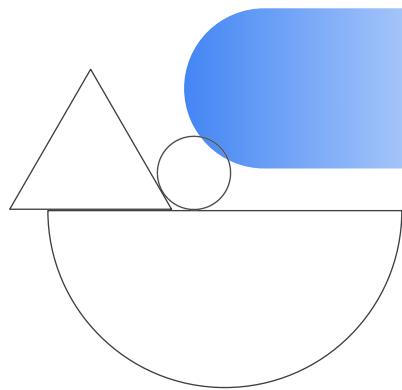
Activity

⌚ 5 min

🌐 Class

🔒 Page 17

You work for a lead generation company.
Which data quality dimension will be
impacted by each of these events?



Google Cloud

Say: Let's put what you've just learned into practice. You work for a lead generation company. On the slides that follow, you'll be shown a list of events. Which data quality dimension will be impacted by each of these events?

Answer options: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

1

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

2

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

3

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Say: Let's start with the first column.

Read: You're driving traffic to a website but there's a spike in traffic due to automated bots clicking the links.

Options include: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

2

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

3

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Say: The correct answer is **accuracy**. Now let's move on to the second column.

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

2

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

3

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Ask: You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Options include: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

3

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Say: The correct answer is **completeness**. Now let's move on to the third column.

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

3

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Ask: You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Options include: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Say: The correct answer is **consistency**. Now let's move on to the fourth column.

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

4

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Ask: At the year end you've amassed 50,000, but it turns out that 20% are duplicates from customers who had filled out the information previously.

Options include: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

Uniqueness

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Say: The correct answer is **uniqueness**. Now let's move on to the fifth column.

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

Uniqueness

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

5

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Ask: You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

Options include: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

Uniqueness

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

Validity

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Say: The correct answer is **validity**. Now let's finish up with sixth column.

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

Uniqueness

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

Validity

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

6

Google Cloud

Ask: You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

Options include: Validity, Consistency, Accuracy, Timeliness, Completeness, Uniqueness

Activity

You work for a lead generation company. Which data quality dimension will be impacted by each of these events?

You're driving traffic to a website, but there's a huge spike in traffic that can be attributed to automated bots clicking the links.

Accuracy

You're launching a survey campaign, collecting names and email addresses, but neither of those fields are marked as required, so some users leave one or the other blank.

Completeness

You're driving traffic for a dropshipping campaign. The procurement team is collecting zip codes in a five-digit format and the marketing team is collecting them in a nine digit format.

Consistency

At the year end you've amassed 50,000 leads, but 20% are duplicates from customers who had filled out the information previously.

Uniqueness

You're launching a global survey campaign that collects phone numbers in 10-digit US phone number format.

Validity

You're using data to score leads but the scoring model isn't being updated to reflect changes in the market.

Timeliness

Google Cloud

Say: The correct answer is **timeliness**.



The importance of responsible AI and explainable AI

Google Cloud

It's critical that AI is used responsibly



Responsible AI

Google has established:

- ✓ Principles that guide Google AI applications
- ✓ Best practices to share our work with communities outside of Google
- ✓ Programs to operationalize our efforts

Google Cloud

Say: AI has significant potential to help solve challenging problems, including advancing medicine, understanding language, and fueling scientific discovery. To realize that potential, it's critical that AI is used **responsibly**. AI is transforming industries and solving important, real-world challenges at scale. This vast opportunity carries with it a deep responsibility to build AI that works for everyone.

To that end, Google has established principles that **guide Google AI applications**, which are best practices to share our work with communities outside of Google, and programs to operationalize our efforts.

Google's AI principles

AI should be socially beneficial.

AI should avoid creating or reinforcing unfair bias.

AI should be built and tested for safety.

AI should be accountable to people.

AI should incorporate privacy design principles.

AI should uphold high standards of scientific excellence.

AI should be made available for uses that accord with these principles.



Google Cloud

Say: The principles state that AI should:

- Be socially beneficial.
- Avoid creating or reinforcing unfair bias.
- Be built and tested for safety.
- Be accountable to people.
- Incorporate privacy design principles.
- Uphold high standards of scientific excellence.
- And be made available for uses that accord with these principles.

When Google will not design or deploy AI



For technologies that cause or are likely to cause overall harm



For weapons or other technologies whose principal purpose or implementation is to cause or directly facilitate injury to people



For technologies that gather or use information for surveillance, violating internationally accepted norms



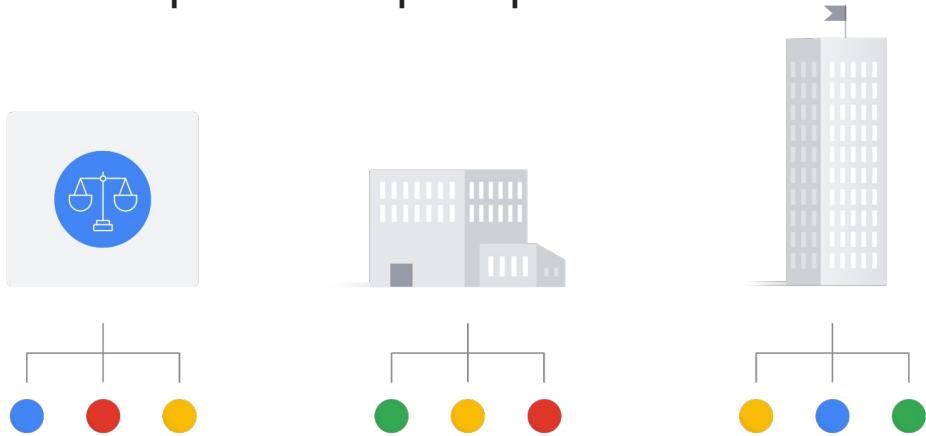
For technologies whose purpose contravenes widely accepted principles of international law and human rights

Google Cloud

Say: In addition to these principles, Google **will not design or deploy AI** in the following application areas:

- Technologies that cause or are likely to cause overall harm
- Weapons or other technologies whose principal purpose or implementation is to cause or directly facilitate injury to people
- Technologies that gather or use information for surveillance, violating internationally accepted norms
- And technologies whose purpose contravenes widely accepted principles of international law and human rights

Organizations should develop their own set of responsible AI principles



Google Cloud

Say: Although these are Google's own guiding AI principles, we urge other organizations to develop their own set of principles that encourage responsible AI development.

Other important considerations



Organizations should:

- ✓ Debug and improve ML model performance.
- ✓ Help others understand model behavior.
- ✓ Detect and resolve bias, drift, and other gaps.
- ✓ Have human-interpretable explanations of ML models to help grow end-user trust and improve transparency.

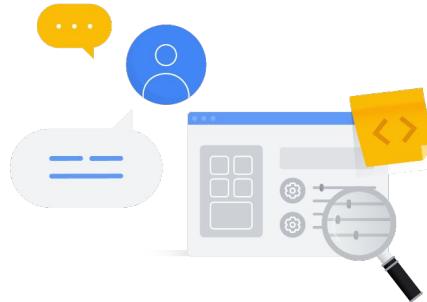
Google Cloud

Say: It's also important for organizations to debug and improve ML model performance and help others understand their models' behavior.

Organizations building ML models also need help with detecting and resolving bias, drift, and other gaps in their data and models.

In addition, having human-interpretable explanations of your ML models will help grow end-user trust and improve transparency.

Explainable AI



Google Cloud's set of tools and frameworks to help you understand and interpret predictions made by your machine learning models

Google Cloud

Say: Explainable AI is Google Cloud's set of tools and frameworks to help you understand and interpret predictions made by your machine learning models.

These tools are natively integrated with several Google products and services to ensure transparent AI development.

Discussion

What are your thoughts around Google's AI principles?

Which principles resonate with you the most, or are of concern to your organization?

- AI should be socially beneficial.
- AI should avoid creating or reinforcing unfair bias.
- AI should be built and tested for safety.
- AI should be accountable to people.
- AI should incorporate privacy design principles.
- AI should uphold high standards of scientific excellence.
- AI should be made available for uses that accord with these principles.



Google Cloud

Say: Let's pause for a quick discussion. What are your thoughts around Google's AI principles?

Ask:

- Which principles resonate with you the most or are of concern to your organization?

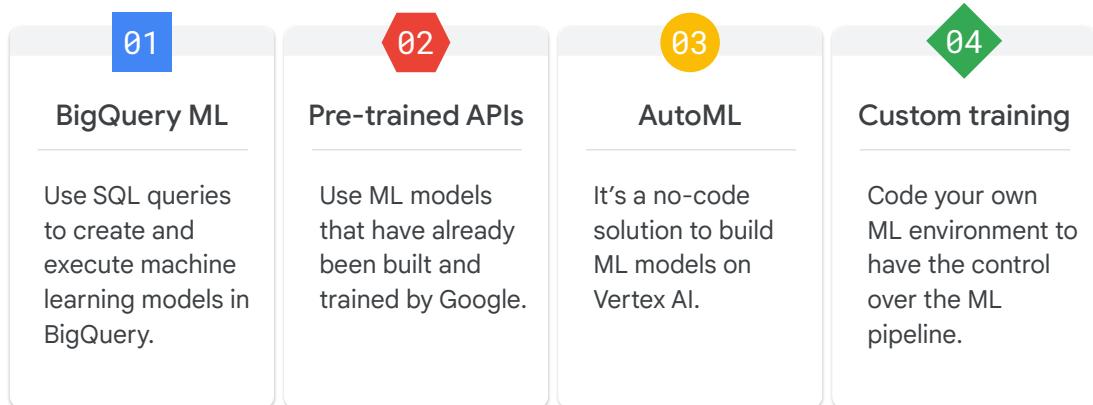
Module 3

Innovating with
Google Cloud
Artificial Intelligence

Lessons

- 01 AI and ML fundamentals
- 02 Google Cloud's AI and ML solutions

ML options on Google Cloud



Google Cloud

Say: Historically, artificial intelligence and machine learning were not accessible to ordinary people. Most of the people capable of developing AI and ML solutions were specialty engineers, who were scarce in number and expensive to hire. The reality is that ML is more accessible now than ever before, which allows more people to build, even those without the technical expertise.

Google Cloud offers four options for building machine learning models.

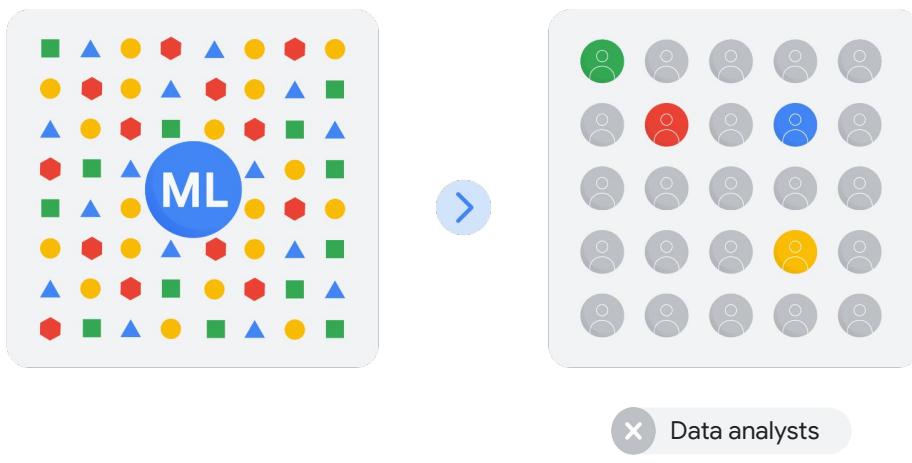
1. The first option is **BigQuery ML**. This is a tool for using SQL queries to create and execute machine learning models in BigQuery. If you already have your data in BigQuery and your problems fit the predefined ML models, this could be your choice.
2. The second option is to use **pre-trained APIs**, or application programming interfaces. This option lets you use machine learning models that were built and trained by Google, so you don't have to build your own ML models if you don't have enough training data or sufficient machine learning expertise in-house.
3. The third option is **AutoML**, which is a no-code solution, letting you build your own machine learning models on Vertex AI through a point-and-click interface.
4. And finally, there's **custom training**, through which you can code your very own machine learning environment, the training, and the deployment, which gives you flexibility and provides control over the ML pipeline.



BigQuery ML

Google Cloud

ML on large data sets requires extensive programming and knowledge of ML frameworks

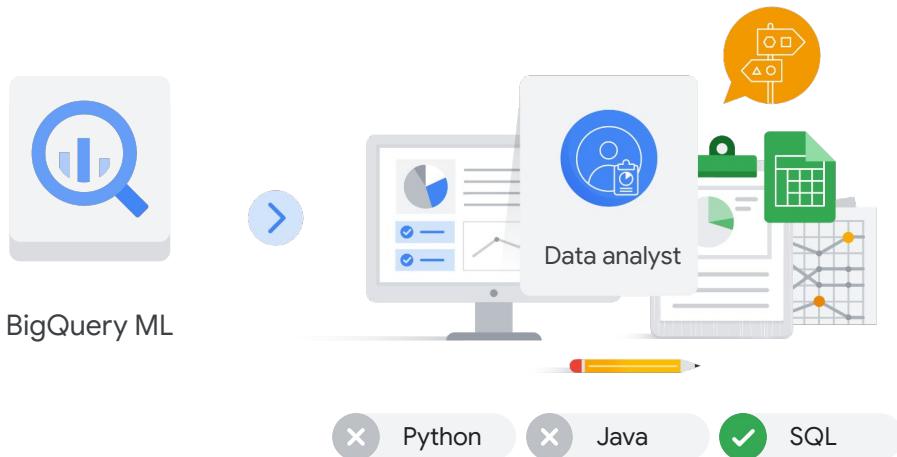


Google Cloud

Say: Machine learning on large datasets requires extensive programming and knowledge of ML frameworks. These requirements restrict solution development to a very small set of people within each company, and they exclude data analysts who understand the data but have limited machine learning knowledge and programming expertise.

Although BigQuery started solely as a data warehouse, over time it has evolved to provide additional features that support the data-to-AI lifecycle.

BigQuery ML empowers data analysts

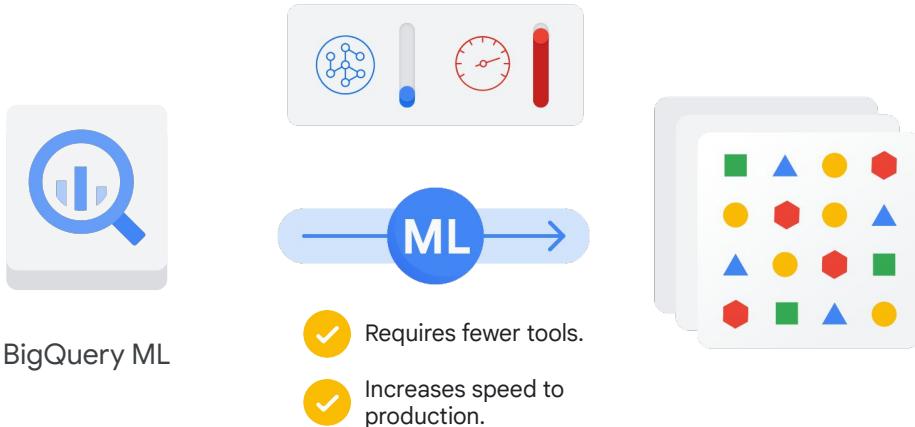


Google Cloud

Say: **BigQuery ML** democratizes the use of machine learning by empowering data analysts, the primary data warehouse users, to build and run models by using existing business intelligence tools and spreadsheets. Predictive analytics can guide business decision-making across the organization.

Using Python or Java to create an ML solution isn't necessary. Models are trained and accessed directly in BigQuery by using SQL, which is a language familiar to data analysts.

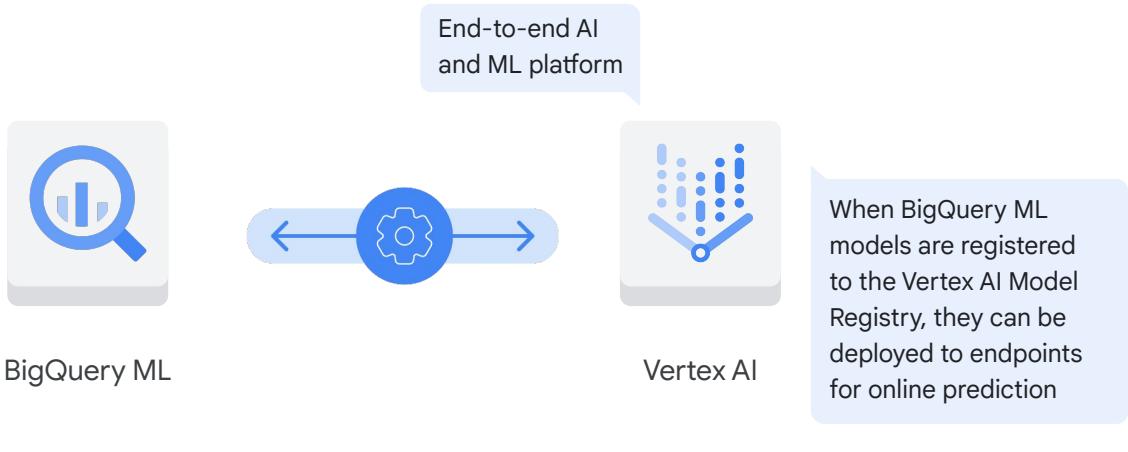
BigQuery ML brings machine learning to the data



Google Cloud

Say: BigQuery ML brings machine learning to the data. It reduces complexity, because fewer tools are required. It also increases speed to production, because moving and formatting large amounts of data for Python-based ML frameworks is not required for model training in BigQuery.

BigQuery ML integrates with Vertex AI



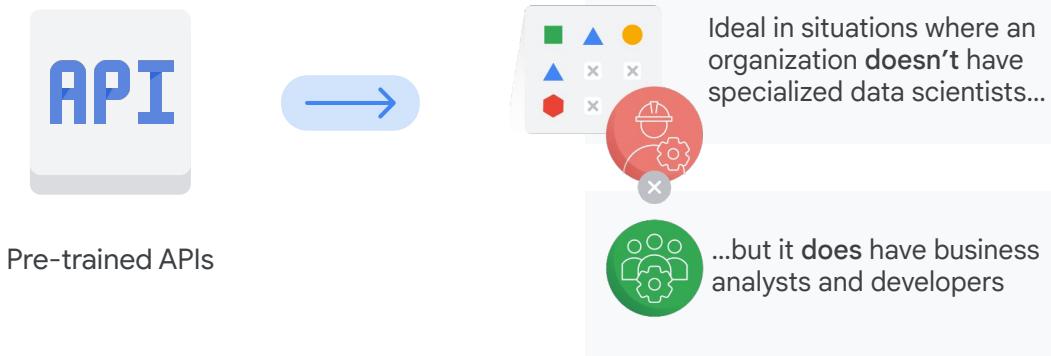
Say: BigQuery ML also integrates with Vertex AI, Google Cloud's end-to-end AI and ML platform. When BigQuery ML models are registered to the Vertex AI Model Registry, they can be deployed to endpoints for online prediction.



Pre-trained APIs

Google Cloud

Pre-trained APIs are a great option if you don't have your own training data

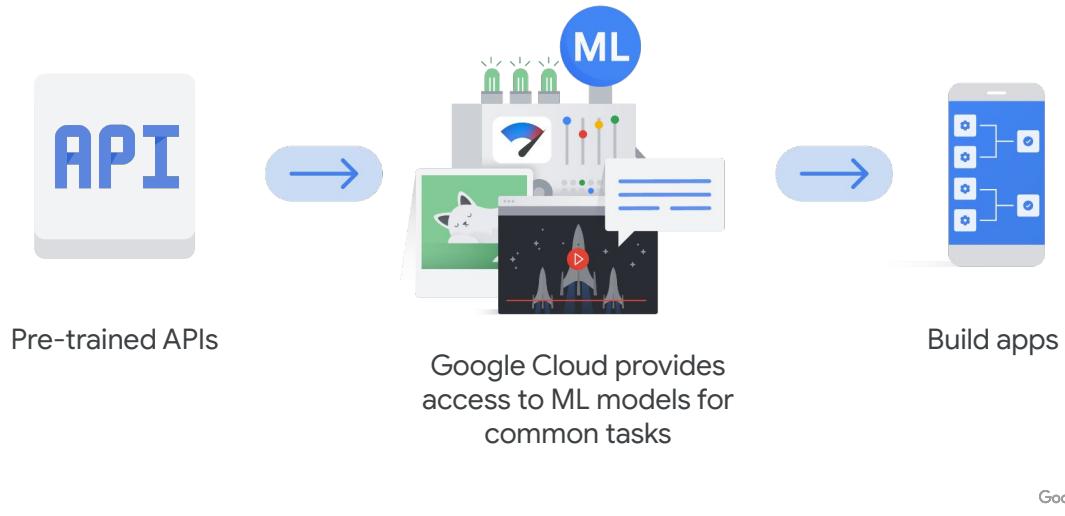


Google Cloud

Say: Google Cloud's **pre-trained APIs** are a great option if you don't have your own training data. These are ideal in situations where an organization doesn't have specialized data scientists, but it does have business analysts and developers.

This is the fastest and effortless machine learning approach, but is less customizable than the others.

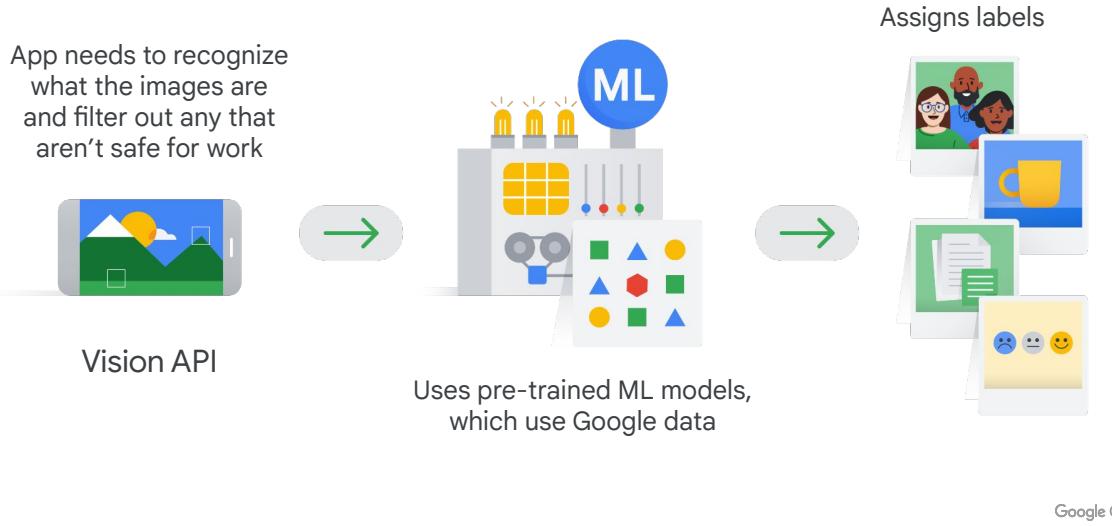
Pre-trained APIs can help developers build smart apps quickly



Say: Google Cloud's pre-trained APIs can help developers build smart apps quickly by providing access to ML models for common tasks like analyzing images, videos, and text.

APIs can be deployed in a Virtual Private Cloud, on-premises, or in Google's public cloud, regardless of the level of ML experience.

Example: A mobile app that users submit photos to



Say: Let's imagine a developer building a mobile app that users will submit photos to. The developer needs the app to recognize what the images are and filter out any that aren't safe for work.

The developer might choose [Vision API](#). This offers powerful pre-trained machine learning models, which use Google data, to automatically detect faces, objects, text, and even sentiment in images. The developer can use Vision API to assign labels to images and quickly classify them into millions of predefined categories.

Natural Language API

The API can be used to:

- Discover syntax, entities, and sentiment in text.
- Classify text into a predefined set of categories.



A business has a contact form on its website that receives many daily messages

Google Cloud

Say: The [Natural Language API](#) is another out-of-the-box pre-trained API. If a business has a contact form on its website that receives many messages every day, this data can be difficult and time-intensive to manually handle, categorize, and action.

Natural Language API discovers syntax, entities, and sentiment in text, and classifies text into a predefined set of categories. In this case, it can decide if comments represent complaints, praise, an attempt to learn more about your business, and more.

Google's pre-trained APIs



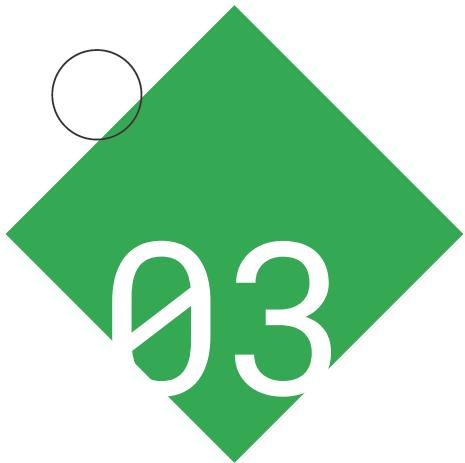
- The **Cloud Translation API** converts text from one language to another.
- The **Speech-to-Text API** converts audio to text for data processing.
- The **Text-to-Speech API** converts text into high-quality voice audio.
- The **Video Intelligence API** recognizes motion and action in video.

Google Cloud

Say: Google also offers several other pre-trained APIs:

- The **Cloud Translation API** converts text from one language to another.
- The **Speech-to-Text API** converts audio to text for data processing.
- The **Text-to-Speech API** converts text into high-quality voice audio.
- And the **Video Intelligence API** recognizes motion and action in video.

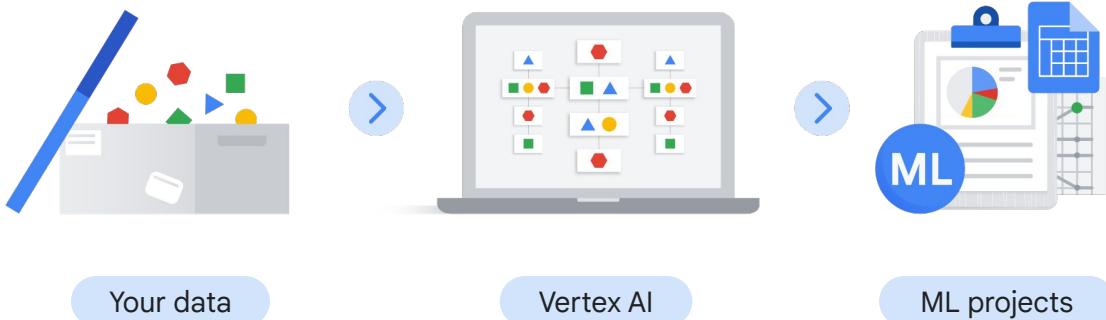
How well a machine learning model is trained depends on how much data is available to train it. As you might expect, Google has lots of images, text, and ML researchers to train its pre-trained models. This means less work for you and a faster return on your investment.



AutoML

Google Cloud

Training models with your own data

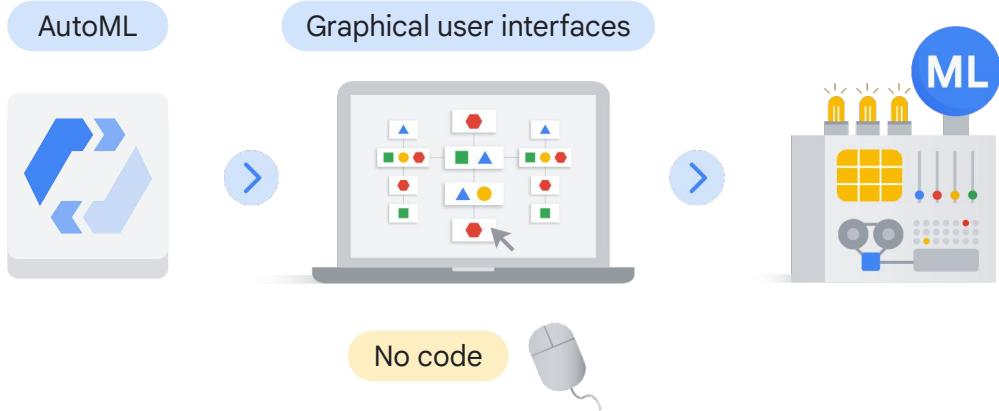


Google Cloud

Say: Another more custom way to use ML to solve problems is to train models by using your own data. This is where Vertex AI comes in. Vertex AI brings together Google Cloud services for building ML under one, unified user interface.

You can use your own training data with Vertex AI to manage and build ML projects.

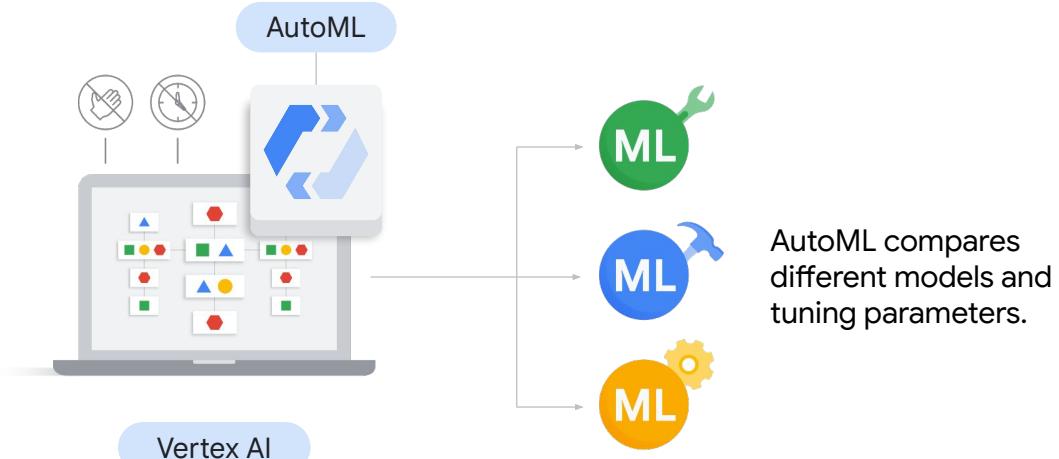
AutoML on Vertex AI lets you build and train ML models from end-to-end using GUIs



Google Cloud

Say: AutoML on Vertex AI lets you build and train machine learning models from end-to-end by using graphical user interfaces, often referred to as GUIs, without writing a line of code.

AutoML chooses the best machine learning model for you

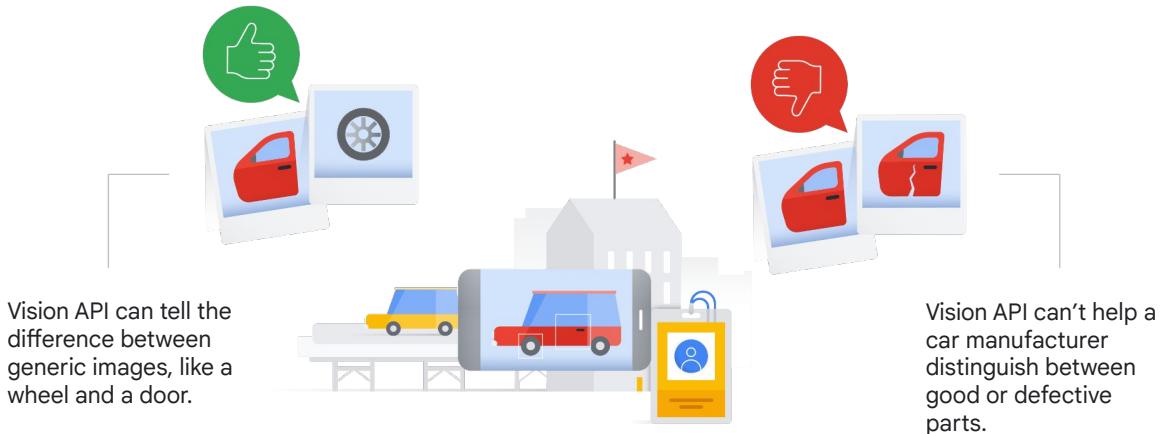


Google Cloud

Say: This means that after your data is ingested into Vertex AI, AutoML chooses the best machine learning model for you by comparing different models and tuning parameters. What once required lots of manual work is done automatically and quickly, which results in a trained model that is both accurate and customized to your data.

This lets machine learning practitioners focus on the problems that they are trying to solve, instead of the details of machine learning. AutoML is a great option for businesses that want to produce a customized ML model but are not willing to spend too much time coding and experimenting with thousands of models.

Back to the image recognition example: Vision API



Google Cloud

Say: Let's go back to our image recognition example, which used Vision API, a pre-existing model trained with Google data.

Imagine you work for a car manufacturing company. Vision API can tell you the difference between generic images found in Google databases, like the difference between a wheel and a door, but it can't help a car manufacturer distinguish between good or defective parts.

AutoML Vision can be trained on specialized data



Upload a batch of image and train a classification model through the AutoML GUI

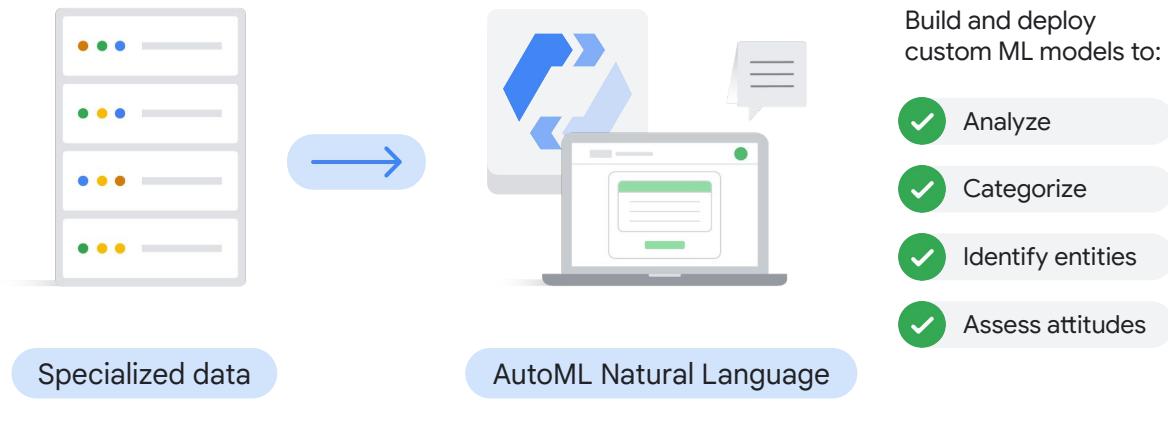
AutoML Vision

Google Cloud

Say: In this case, a developer could use an **AutoML Vision** instance, and train it with your specialized data. This automates the training of your machine learning models, which means that you could upload a batch of images and train an image classification model through the easy-to-use graphical interface of AutoML.

Models can be further optimized and deployed directly from the cloud.

AutoML feature: AutoML Natural Language



Google Cloud

Say: Now let's focus on another feature of AutoML. Earlier you saw how the Natural Language API could be used for processing entries into an online contact form. But if your text examples don't fit neatly into the Natural Language API's sentiment-based or vertical-topic-based classification scheme, and you want to use your own specialized data instead, you need to use AutoML Natural Language.

AutoML Natural Language lets you build and deploy custom machine learning models that analyze documents, categorize them, identify entities within them, or assess attitudes within them.

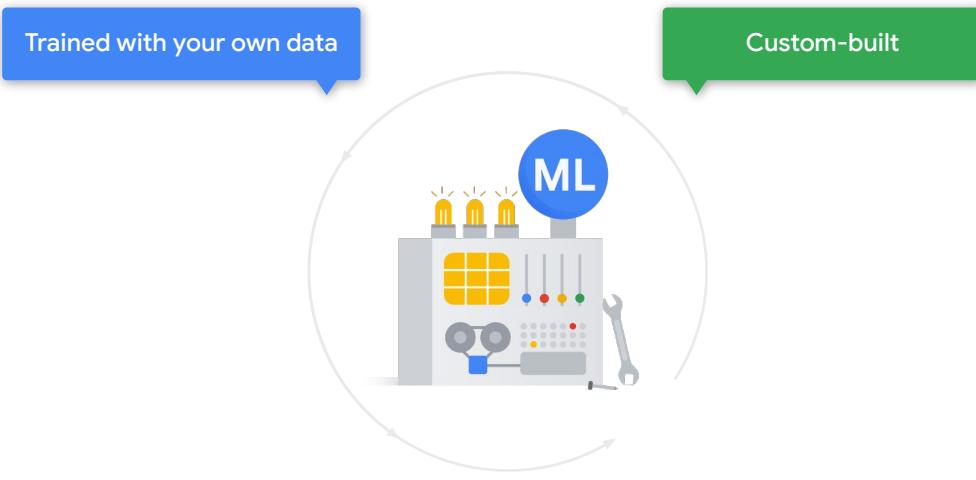
You can use the AutoML user interface to upload your training data and test your custom model without a single line of code. Vertex AI makes this customization possible.



Custom models

Google Cloud

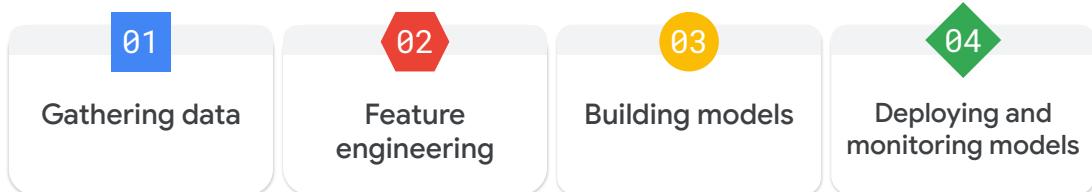
Custom models can be built with Vertex AI



Google Cloud

Say: Vertex AI is also the essential platform for creating **custom end-to-end machine learning models**. This means not only are models trained with your own data, but the models are custom-built as well.

Vertex AI provides a suite of products to help at each stage of the ML workflow

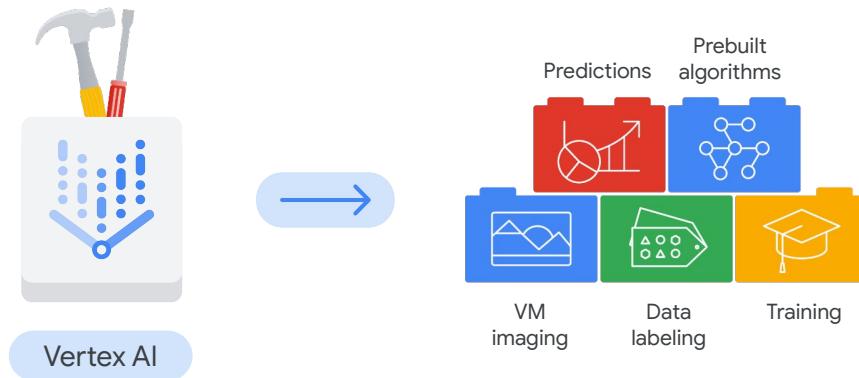


Google Cloud

Say: Vertex AI provides a suite of products to help at each stage of the ML workflow, from gathering data, to feature engineering, building models, and finally deploying and monitoring those models.

As this approach is fully custom-built end-to-end, its process takes the longest and requires a specialized team of data scientists and engineers. However, these fully custom ML models are the most specialized to your needs, and give your business the most differentiation and innovative results.

Vertex AI contains tools that assist programmers



Google Cloud

Say: Vertex AI contains tools that assist programmers with virtual machine imaging, and data labeling, training, and predictions. It also provides prebuilt algorithms.

It's important to remember that, although these tools are the building blocks to using your data at every stage, there is no one-size-fits-all approach. Every use case requires a different combination of tools and products.

Discussion

ML options on Google Cloud

How do you foresee using these approaches in your organization?

- BigQuery ML
- Pre-trained APIs
- AutoML
- Custom training



Google Cloud

Say: Let's pause for a quick discussion. You've seen Google Cloud's 4 different ML options:

- BigQuery ML
- Pre-trained APIs
- AutoML
- Custom training

Ask:

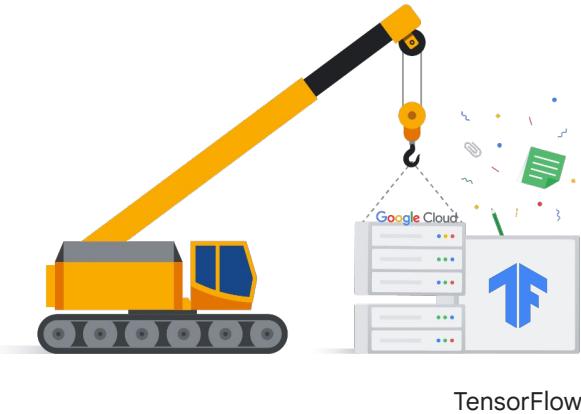
- How do you foresee using these approaches in your organization?



TensorFlow

Google Cloud

An end-to-end open source ML platform



All machine learning models are built on top of Google Cloud's AI foundational infrastructure.

A part of this foundation is TensorFlow.

Google Cloud

Say: All machine learning models are built on top of Google Cloud's AI foundational infrastructure. A part of this foundation is TensorFlow, which is an end-to-end open source platform for machine learning.

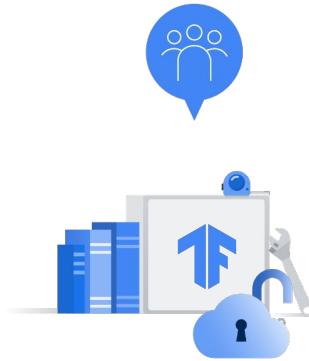
TensorFlow has a flexible ecosystem of tools, libraries, and community resources



Allows researchers to innovate in ML



Allows developers to build and deploy
ML powered applications

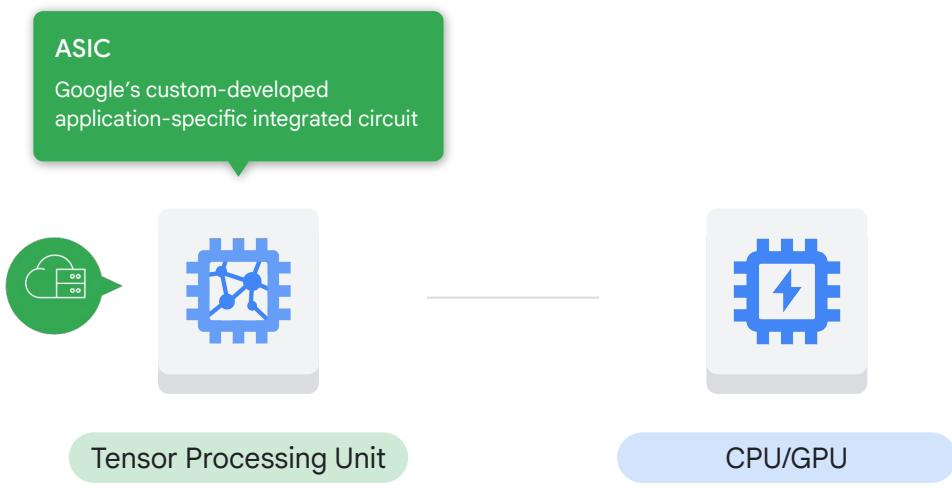


Google Cloud

Say: TensorFlow has a flexible ecosystem of tools, libraries, and community resources that enable researchers to innovate in ML and developers to build and deploy ML powered applications.

First developed for Google's internal use, TensorFlow is now open source so that everyone can benefit.

TensorFlow uses the Tensor Processing Unit (TPU)

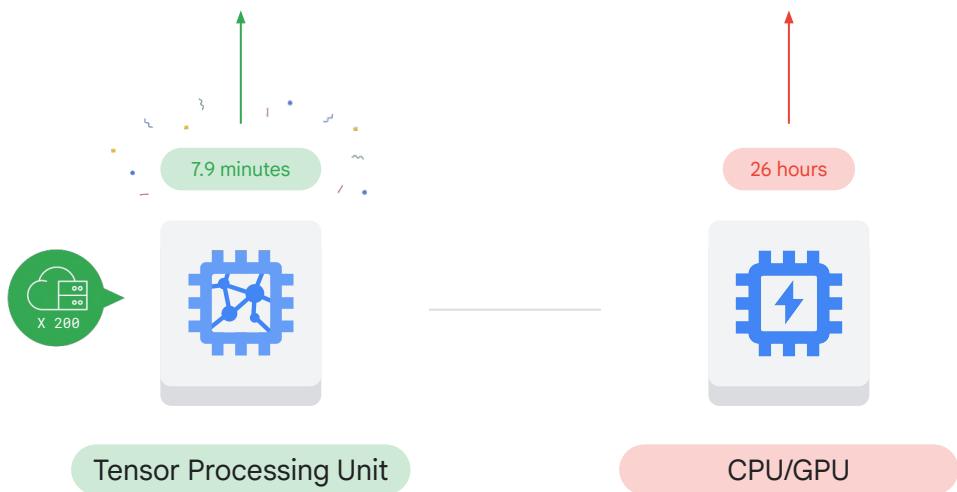


Google Cloud

Say: TensorFlow takes advantage of the Tensor Processing Unit, or TPU, which is Google's custom-developed application-specific integrated circuit (ASIC) used to accelerate machine learning workloads.

TPUs act as domain-specific hardware, as opposed to general-purpose hardware with CPUs and GPUs.

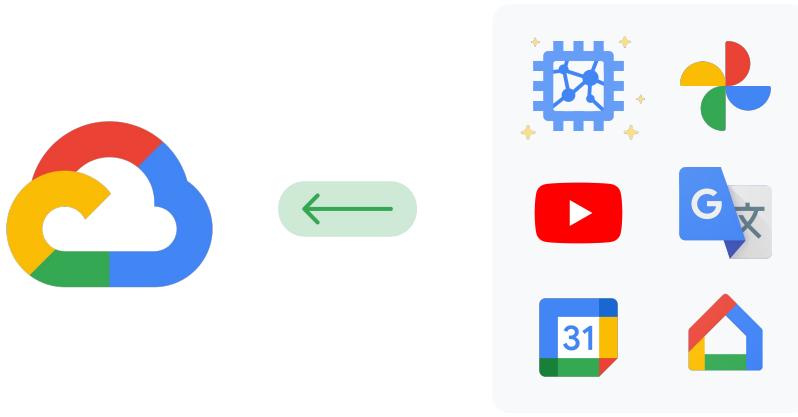
Computing speed is fast with a TPU



Google Cloud

Say: With TPUs, the computing speed increases more than 200 times. This means that instead of waiting 26 hours for results with a single state-of-art GPU, you only need to wait for 7.9 minutes for a full Cloud TPU pod to deliver the same results.

Cloud TPUs have been integrated across Google products



Google Cloud

Say: Cloud TPUs have been integrated across Google products, and this state-of-the-art hardware and supercomputing technology is available with Google Cloud products and services.

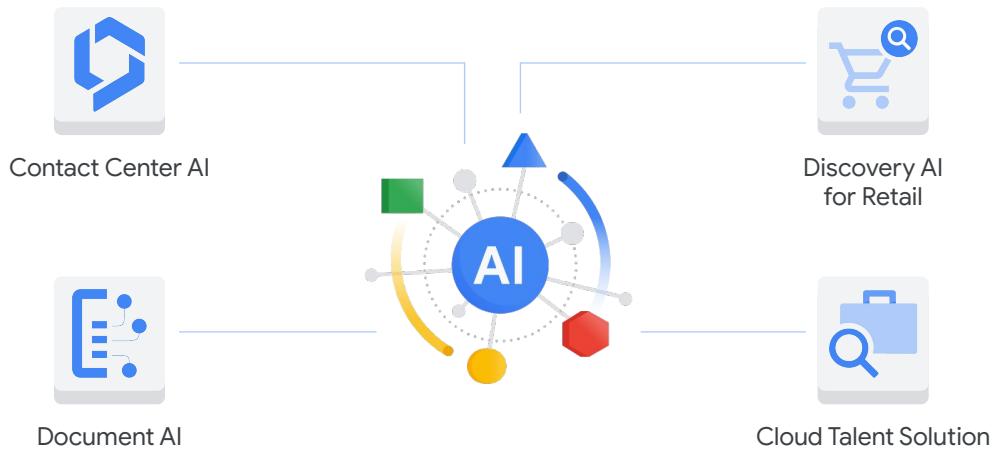
06



AI solutions

Google Cloud

Google Cloud's AI solutions

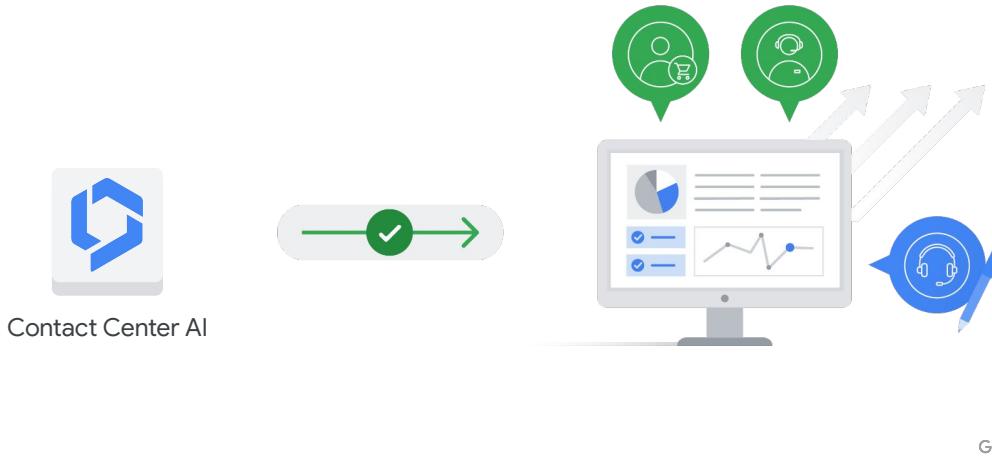


Google Cloud

Say: Beyond the customizable options, Google Cloud has also created a set of full AI solutions aimed to solve specific business needs.

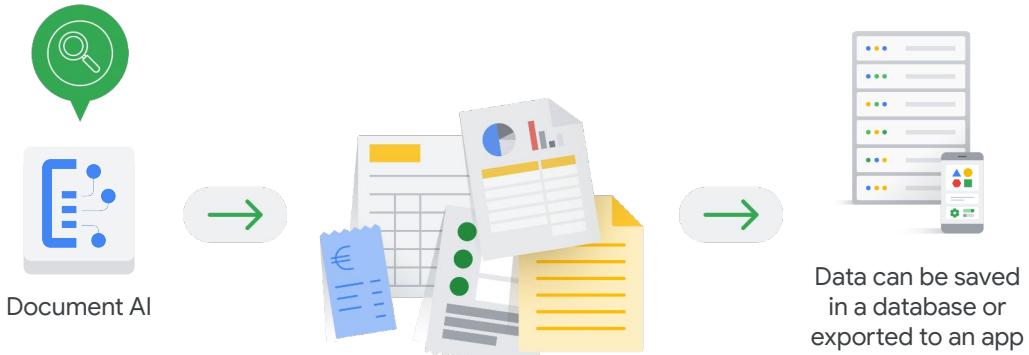
Let's explore each.

Contact Center AI provides models for speaking with customers and assisting human agents



Say: **Contact Center AI** provides models for speaking with customers and assisting human agents, increasing operational efficiency and personalizing customer care to transform your contact center.

Document AI extracts and classifies information from unstructured documents

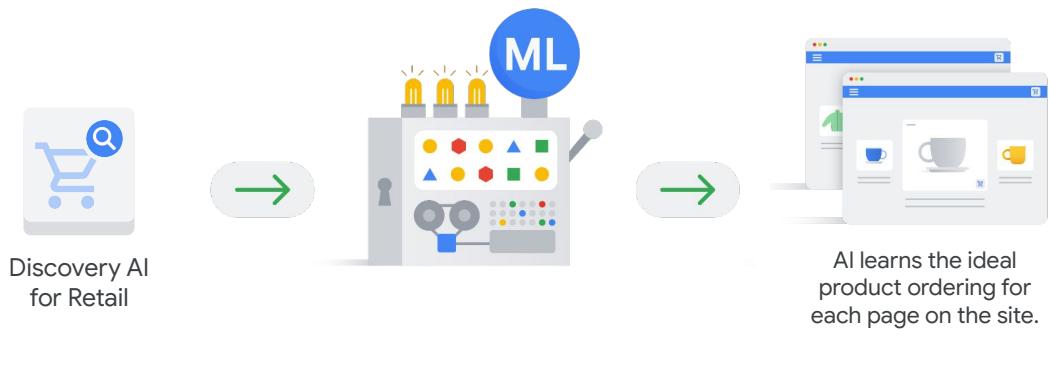


Google Cloud

Say: Document AI unlocks insights by extracting and classifying information from unstructured documents such as invoices, receipts, forms, letters, and reports.

The extracted data can then be saved in a database or exported to another application for further analysis.

Discovery AI for Retail uses ML to order products on a retailer's ecommerce site



Say: **Discovery AI for Retail** uses machine learning to select the optimal ordering of products on a retailer's ecommerce site when shoppers choose a category, like "winter jackets" or "kitchenware."

Over time, the AI learns the ideal product ordering for each page on the site by using historical data, optimizing how and what products are shown for accuracy, relevance, and likelihood of making a sale.

Cloud Talent Solution uses AI with job search and talent acquisition capabilities



Google Cloud

Say: And **Cloud Talent Solution** uses AI with job search and talent acquisition capabilities, matches candidates to ideal jobs faster, and allows employers to attract and convert higher quality candidates.

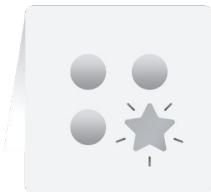
These are just some of the fully built AI solutions offered by Google Cloud.



Considerations when selecting Google Cloud AI/ML solutions

Google Cloud

Considerations when selecting which AI or ML solution to employ

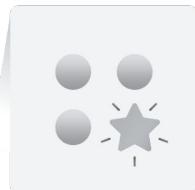
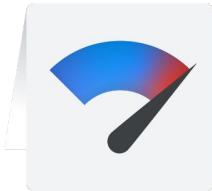


Google Cloud

Say: Google Cloud offers a range of AI and ML solutions and products, but there are several decisions and tradeoffs to consider when selecting which to employ.

How quickly do you need to get your model to production?

Speed



Google Cloud

Say: The first consideration is **speed**: how quickly do you need to get your model to production?

Speed



AI projects take 3-36 months to plan and implement.



Pre-trained APIs



Custom training

Quickest: There are no model training requirements.

Longest: It builds the ML model from the beginning.

Google Cloud

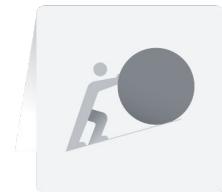
Say: AI projects can typically take anywhere from three to 36 months to plan and implement, depending on the scope and complexity of the use case, but business decision makers often underestimate the time it will take.

Pre-trained APIs require no model training because that time-consuming task has already been carried out.

Custom training usually takes the longest time because it builds the ML model from the beginning, unlike AutoML and BigQuery ML.

How unique does your model need to be?

Differentiation



Google Cloud

Say: The next consideration is **differentiation**: how unique is your model, or how unique does it need to be?

Differentiation



Google Cloud offers a range of out-of-the-box solutions

They're quick to start.

Image recognition

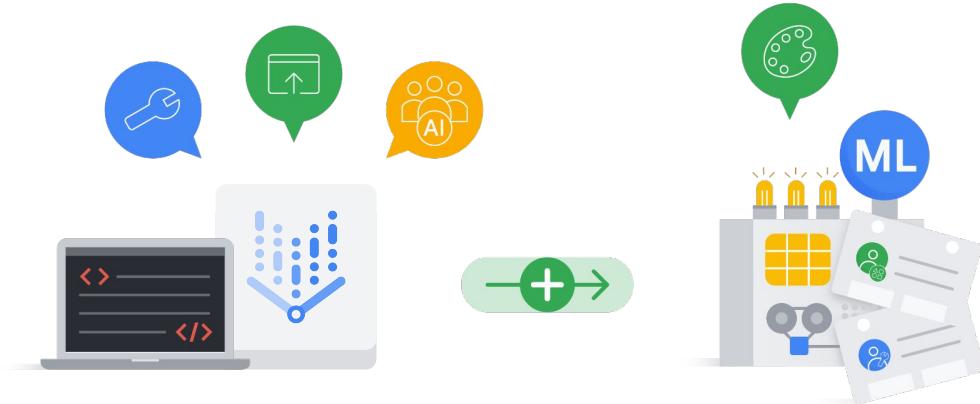
Chat bots

Google Cloud

Say: Google Cloud offers a range of out-of-the-box solutions for organizations that want to quickly use ML models in their day-to-day business operations.

These include image recognition solutions and chatbots, which are quick to deploy and can be applied in various use cases.

Differentiation



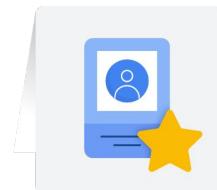
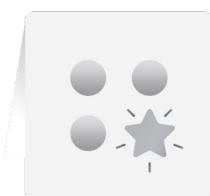
Vertex AI gives ML engineers and data scientists full control of the ML workflow.

Google Cloud

Say: Alternatively, Vertex AI, which is Google Cloud's unified platform for building, deploying, and managing AI solutions, can give ML engineers and data scientists full control of the ML workflow. Vertex AI custom training lets you train and serve custom models with code on Vertex Workbench, which results in highly bespoke ML models.

What expertise does your project require?

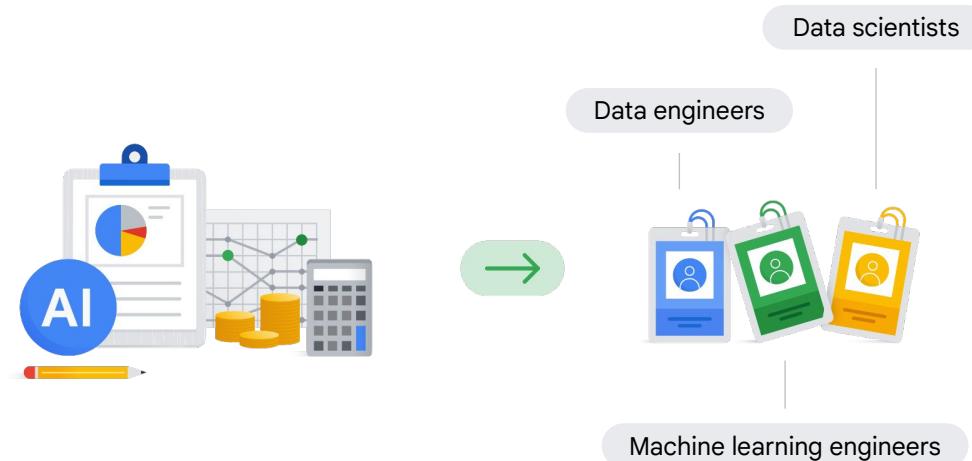
Expertise



Google Cloud

Say: Another consideration is the **expertise** required when embarking on an AI or ML project.

Expertise



Google Cloud

Say: Infusing AI into business processes requires roles such as data engineers, data scientists, and machine learning engineers, among others.

Organizations should consider their current team and then determine a people strategy, which could include reusing or repurposing existing resources, upskilling and training current staff, or hiring or working with outside consultants or contractors.

Google Cloud's AI and ML products require different types of expertise



Data analysts

Business intelligence teams

ML engineers

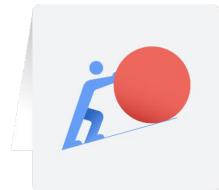
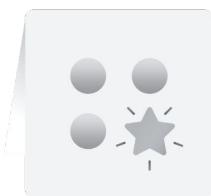
Data scientists

Google Cloud

Say: Google Cloud's AI and ML products vary from those that can be employed by data analysts and business intelligence teams, right up to those more suited to ML engineers and data scientists.

What effort is required to build the AI solution?

Effort



Google Cloud

Say: The final consideration is the **effort** required to build an AI solution.

Scenario

Your company is looking to implement an AI solution to improve product recommendations. There's a lot of historical data on customer purchases, but the data is not well structured. In addition to data on customer purchases, your company also has access to customer demographics, product reviews, and social media data.

Considering the tradeoffs of speed, differentiation, expertise, and effort, which of the following options should your company consider?

Pre-trained APIs are quick to deploy and can be used to generate recommendations based on a variety of factors, such as customer purchase history, product popularity, and customer demographics.

AutoML can be used to build a product recommendation model based on the company's historical purchase data.

Custom training can be used to build a product recommendation model that takes into account all of the company's data, including structured data, unstructured data, and external data sources.



Google Cloud

Say: Discussion time! Imagine this scenario: Your company is looking to implement an AI solution to improve product recommendations. There's a lot of historical data on customer purchases, but the data is not well structured. In addition to data on customer purchases, your company also has access to customer demographics, product reviews, and social media data.

Ask:

- Considering the tradeoffs of **speed, differentiation, expertise, and effort**, which of the following options should your company consider?
 - Pre-trained APIs are quick to deploy and can be used to generate recommendations based on a variety of factors, such as customer purchase history, product popularity, and customer demographics.
 - AutoML can be used to build a product recommendation model based on the company's historical purchase data.
 - Custom training can be used to build a product recommendation model that takes into account all of the company's data, including structured data, unstructured data, and external data sources.

Determining effort depends on several factors



- The complexity of the problem
- The amount of data available
- The experience of the team

Google Cloud

Say: This depends on several factors, including the complexity of the problem, the amount of data available, and the experience of the team.

Google Cloud can help provide solutions for projects at both ends of the scale; however, any AI undertaking will generally require much time, effort, and expertise to have a worthwhile impact on business operations.

Quiz

Question

Artificial intelligence is best suited for replacing or simplifying rule-based systems. Which is an example of this in action?

- A. Implementing AI to develop a new product or service that has never been seen before.
- B. Using AI to replace a human decision-maker in complex situations, such as those involving life-or-death choices.
- C. Using a reinforcement learning algorithm to train autonomous drones for package delivery.
- D. Training a machine learning model to predict a search result ranking.

Google Cloud

Do: Read the question out loud. Ask the class to refrain from sharing their answers (either out loud or in the chat window) for about 10 seconds.

Say: Artificial intelligence is best suited for replacing or simplifying rule-based systems. Which is an example of this in action?

- A. Implementing AI to develop a new product or service that has never been seen before.
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Quiz

Answer

Artificial intelligence is best suited for replacing or simplifying rule-based systems. Which is an example of this in action?

- A. Implementing AI to develop a new product or service that has never been seen before.
- B. Using AI to replace a human decision-maker in complex situations, such as those involving life-or-death choices.
- C. Using a reinforcement learning algorithm to train autonomous drones for package delivery.
- D. Training a machine learning model to predict a search result ranking.



Google Cloud

Say: The correct answer is D.

- A. Implementing AI to develop a new product or service that has never been seen before.
 - Why this is the **incorrect** answer: This focuses on innovation and creativity – tasks where AI models often perform poorly relative to humans for true novelty. AI systems are primarily pattern-recognition machines, extrapolating and improving on existing concepts rather than producing wholly original ideas.
- B. Using AI to replace a human decision-maker in complex situations, such as those involving life-or-death choices.
 - Why this is the **incorrect** answer: There are significant risks and moral issues with trusting AI models in situations where their output will have severe, long-term consequences. Human review is, and likely will always be, essential in scenarios like this.
- C. Using a reinforcement learning algorithm to train autonomous drones for package delivery.
 - Why this is the **incorrect** answer: Reinforcement learning involves the AI discovering its own 'rules' for optimum behavior, not directly simplifying a previously human-developed set of directions.
- D. Training a machine learning model to predict a search result ranking.
 - Why this is the **correct** answer: This is the best example because it directly involves replacing a complex set of hand-crafted search ranking rules with a machine learning model capable of learning

- patterns from user data. This leads to more relevant results and a much simpler system to maintain than an elaborate rule-based engine.

Quiz

Question

An online retailer wants to help users find specific products faster on their website. One idea is to allow shoppers to upload an image of the product they're looking to purchase. Which of Google's pre-trained APIs could the retailer use to expand this functionality?

- A. Vision API
- B. Natural Language API
- C. Speech-to-Text API
- D. Video Intelligence API

Google Cloud

Do: Read the question out loud. Ask the class to refrain from sharing their answers (either out loud or in the chat window) for about 10 seconds.

Say: An online retailer wants to help users find specific products faster on their website. One idea is to allow shoppers to upload an image of the product they're looking to purchase. Which of Google's pre-trained APIs could the retailer use to expand this functionality?

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Quiz

Answer

An online retailer wants to help users find specific products faster on their website. One idea is to allow shoppers to upload an image of the product they're looking to purchase. Which of Google's pre-trained APIs could the retailer use to expand this functionality?

- A. Vision API
- B. Natural Language API
- C. Speech-to-Text API
- D. Video Intelligence API



Google Cloud

Say: The correct answer is A.

- A. Vision API
 - Why this is the **correct** answer: The Vision API directly supports the image search feature. Users upload a picture, and the Vision API processes it to understand what's in the image. The retailer can then match those features to products in their catalog.
- B. Natural Language API
 - Why this is the **incorrect** answer: The Natural Language API focuses on analyzing text and language (understanding sentiment, extracting entities, classifying text), which isn't helpful for processing images as the primary input.
- C. Speech-to-Text API
 - Why this is the **incorrect** answer: The Speech-to-Text API transcribes spoken audio into text, which is unrelated to directly analyzing images as a search parameter.
- D. Video Intelligence API
 - Why this is the **incorrect** answer: The Video Intelligence API analyzes videos to identify objects, changes between shots, labels content, etc. While it could process an image as a single frame, it's overkill for simple image search and less specifically suited for this use case than the Vision API.

Quiz

Question

Which Google Cloud AI solution is designed to help businesses improve their customer service?

- A. Document AI
- B. Contact Center AI
- C. Discovery AI for Retail
- D. Cloud Talent Solution

Google Cloud

Do: Read the question out loud. Ask the class to refrain from sharing their answers (either out loud or in the chat window) for about 10 seconds.

Say: Which Google Cloud AI solution is designed to help businesses improve their customer service?

- A. Document AI
- B. Contact Center AI
- C. Discovery AI for Retail
- D. Cloud Talent Solution

Quiz

Answer

Which Google Cloud AI solution is designed to help businesses improve their customer service?

- A. Document AI
- B. Contact Center AI
- C. Discovery AI for Retail
- D. Cloud Talent Solution



Google Cloud

Say: The correct answer is B.

- A. Document AI
 - Why this is the **incorrect** answer: This solution focuses on extracting structured information from documents like forms and invoices, primarily meant to automate data entry processes. While it might indirectly handle support documents, that's not its core purpose.
- B. Contact Center AI
 - Why this is the **correct** answer: This solution is designed specifically to help businesses improve their customer service. It offers features like virtual agents (conversational AI chatbots that can handle common inquiries 24/7), real-time guidance for human agents during calls, and the ability to analyze call transcripts to identify trends, inefficiencies, and customer sentiment.
- C. Discovery AI for Retail
 - Why this is the **incorrect** answer: This offering is narrowly focused on product optimization for retail and e-commerce, improving features like search, recommendations, and personalization. It's not geared towards the broader interactions involved in customer support.
- D. Cloud Talent Solution
 - Why this is the **incorrect** answer: This is an AI-powered recruitment tool aimed at matching job candidates to open positions and managing the application process. It's focused on HR workflows rather than customer-facing service interactions.

