Google Cloud

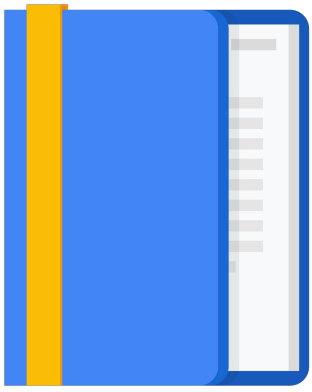
Analytics and AI: Introduction

Agenda

What is AI?

From Ad-hoc Data Analysis to Data Driven Decisions

Options for ML models on GCP



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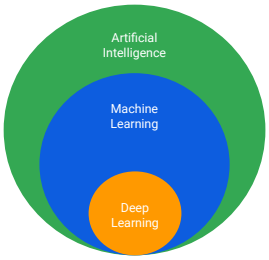
Machine Learning is a type of AI, and deep learning is a type of machine learning



Class of problems we can solve when **computers think/act like humans**

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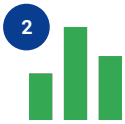
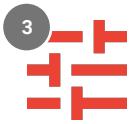
ML is a way to use standard algorithms to derive predictive insights from data and make repeated decisions

Algorithm



Data



Predictive insight

Decision

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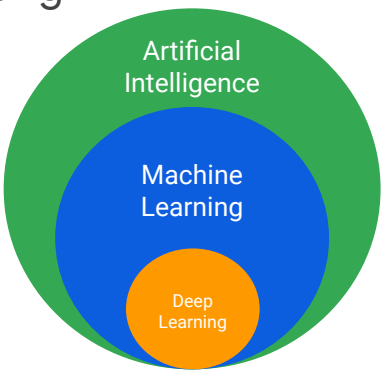
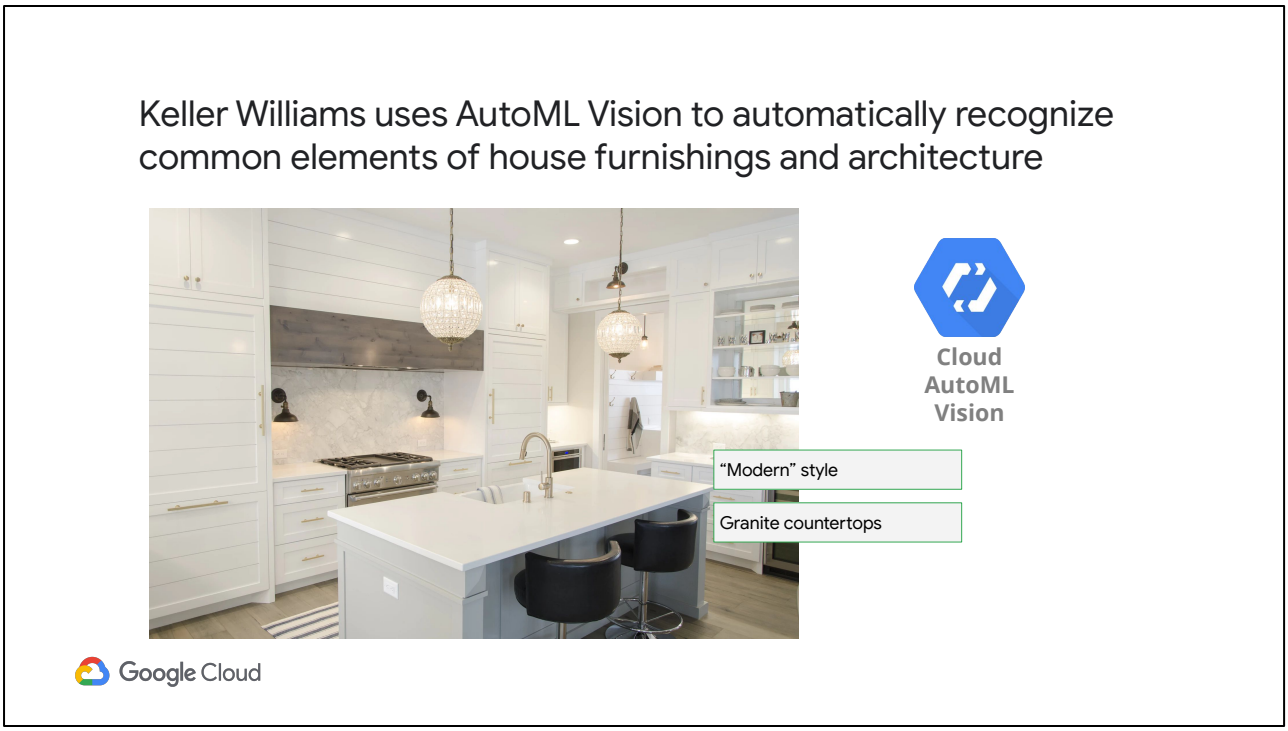
Why are Machine Learning and Deep Learning so exciting?



Class of problems we can solve when **computers think/act like humans**

Scalably solve those problems using **data** examples (**not custom code**)

Even when that data consists of **unstructured data** like images, speech, video, natural language text, etc.



Keller Williams, a U.S. real estate company, uses AutoML Vision to automatically recognize specific features of houses like built-in bookcases.

This helps agents get houses listed faster and buyers find houses that meet their needs.

Neil Dholakia, Chief Product Officer says “By training a custom model to recognize common elements of furnishings and architecture, customers can automatically search home listing photos for specific features like granite countertops like ‘modern.’”

This application of machine learning quickly allows

Keller Williams realtors to record a video walkthrough of a new home and use the object detection capabilities of AutoML Vision to find and tag key aspects of the home that customers would want to search on.

A big benefit for their organization is that they already had many existing images and videos of home walkthroughs already. They simply fed them into the pre-built AutoML Vision model and customized it. All without writing a line of code. You'll learn more about AutoML Vision and practice creating models with it later in this course. [pause]

[SPEAKER]
https://cloud.google.com/blog/products/gcp/empowering-businesses-and-developers-do-more-ai

[SPEAKER] https://unsplash.com/photos/G7sE2S4Lab4

Kewpie uses ML to sort out the bad potatoes in baby food

Original process required humans to identify low-quality ingredients, which was expensive and stressful.

Machine learning was used to replicate the quality control process.

kewpie

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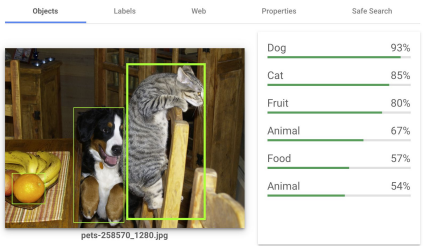
Kewpie manufactures baby food. In this case, quality is not necessarily a matter of safety—because the food itself is safe—but discoloration can concern parents. So Kewpie turned to Google and our partner Brainpad to build a solution that leverages image recognition to detect low-quality potato cubes. The ML algorithm enabled them to free people from the tiring work of inspection and focus on other important work.

https://www.blog.google/products/google-cloud/how-ai-can-help-make-safer-baby-food-and-other-products/

Play around with the power of AI yourself...

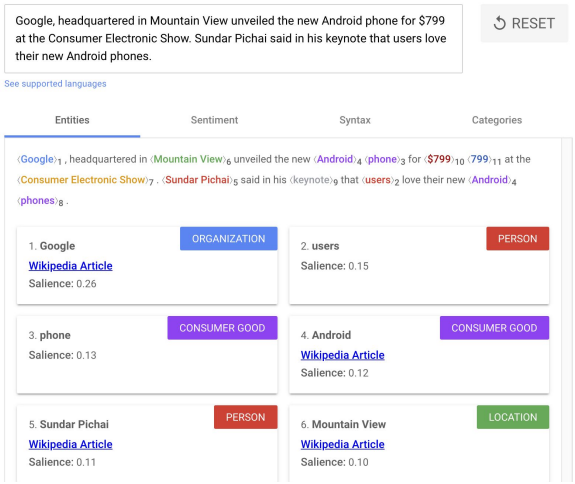


cloud.google.com/vision/

- Object detection
- Labeling and confidence
- Web lookup
- Pre-trained (call the API)

https://pixabay.com/photos/pets-playful-playing-young-dog-258570/

Try Google's natural language API



cloud.google.com/natural-language/

- Entity extraction
- Sentiment analysis
- Sentence structure
- Pre-trained (call the API)

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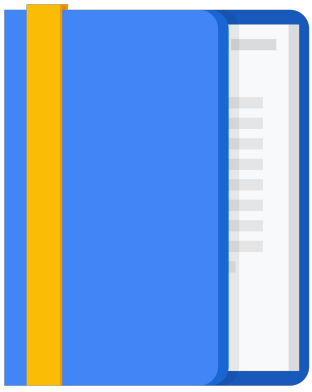

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Imagine you're the owner of a bicycle rental business (in London). How do you stock enough bicycles?

Commuter Bikes

If rental is likely to be for a **short duration**, we need to have commuter bikes in stock

Road Bikes

If rental is likely to be for a **long duration**, we need to have road bikes in stock

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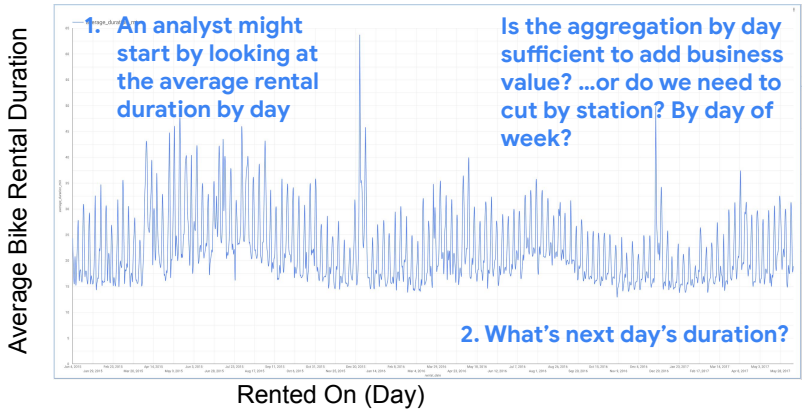
https://pixabay.com/illustrations/bicycle-bike-transport-cycle-wheel-1283785/
https://pixabay.com/vectors/racing-bicycle-racer-racing-bike-161449/

You hire a data analyst to help get you insights on how to keep the right bicycles in stock



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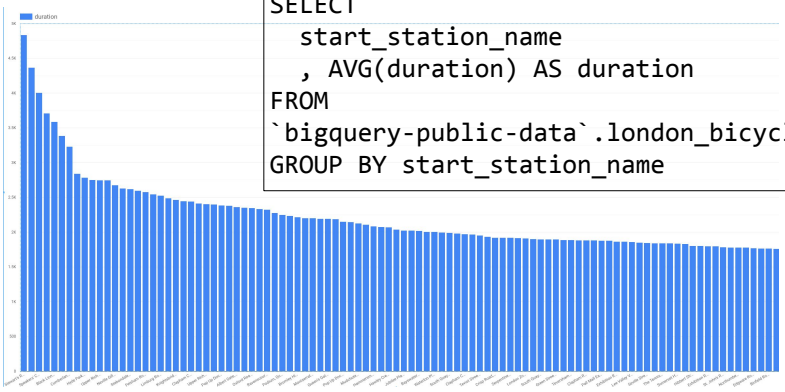
Does the duration of a rental vary by station?




```
SELECT
  start_station_name
  , AVG(duration) AS duration
FROM
`bigquery-public-data`.london_bicycles.cycle_hire
GROUP BY start_station_name
```

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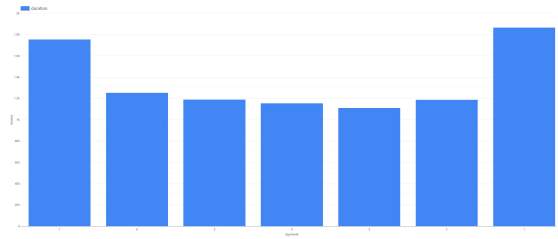
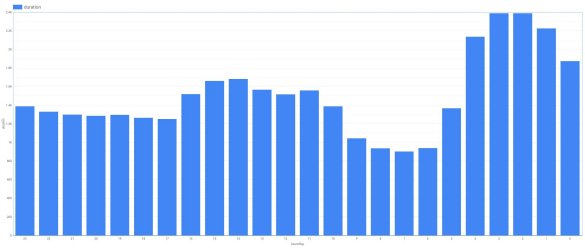
How about the day of the week? Hour of day?



```
SELECT
  EXTRACT(dayofweek
  FROM
    start_date) AS dayofweek,
  AVG(duration) AS duration
FROM
  `bigquery-public-data`.london_bicycles.cycle_hire
GROUP BY
  dayofweek
```



```
SELECT
  EXTRACT(hour
  FROM
    start_date) AS hourofday,
  AVG(duration) AS duration
FROM
  `bigquery-public-data`.london_bicycles.cycle_hire
GROUP BY
  hourofday
```

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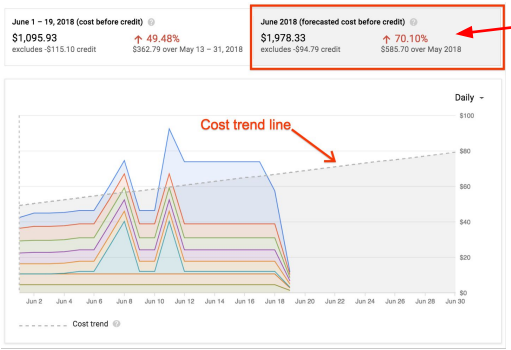
This ad-hoc analysis is great but...

- A lot of manual, repetitive work involved for the data analyst
- Any decisions made will be based on hunches on how all these factors interact
- Wouldn't it be better if we could automate this analysis?

What we need is a ML model to be able to make predictions

- Goal: Augment our dashboards with predicted values
  e.g. prediction for the duration of a rental



As an example, Google augments GCP cost dashboards (descriptive) with forecasted (predictive) usage costs

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https://cloudplatform.googleblog.com/2018/07/predict-your-future-costs-with-google-cloud-billing-cost-forecast.html

Use the ML model to anticipate what type of bike/how many to stock at your locations

- The ML model takes some of the drudgery out of ad-hoc analysis to help you make truer data-driven decisions
- Can build a ML model in BigQuery or AI Platform or AutoML

```
CREATE OR REPLACE MODEL
  bike_model.model_bucketized TRANSFORM(* EXCEPT(start_date),
  IF
    (EXTRACT(dayofweek
      FROM
        start_date) BETWEEN 2 AND 6,
      'weekday',
      'weekend') AS dayofweek,
    ML.BUCKETIZE(EXTRACT(HOUR
      FROM
        start_date),
      [5, 10, 17]) AS hourofday )
OPTIONS
  (input_label_cols=['duration'],
    model_type='linear_reg') AS
SELECT
  duration,
  start_station_name,
  start_date
FROM
  `bigquery-public-data`.london_bicycles.cycle_hire
```

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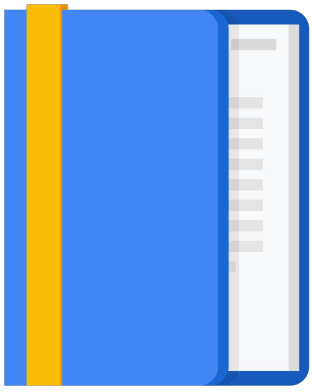

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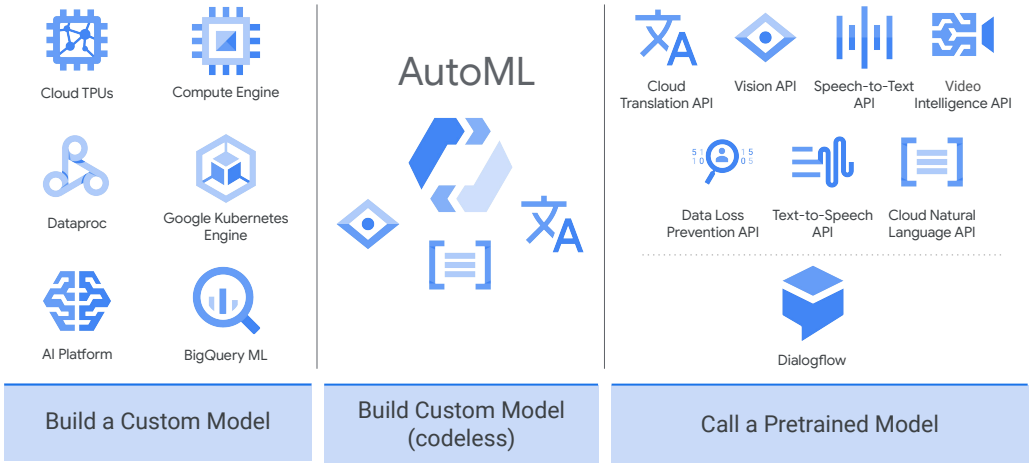
Leverage pretrained models or build your own



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Module Summary

- AI's impact on industry is huge
- Predictive modeling takes data-driven decision making to a new level
- The typical data science workflow