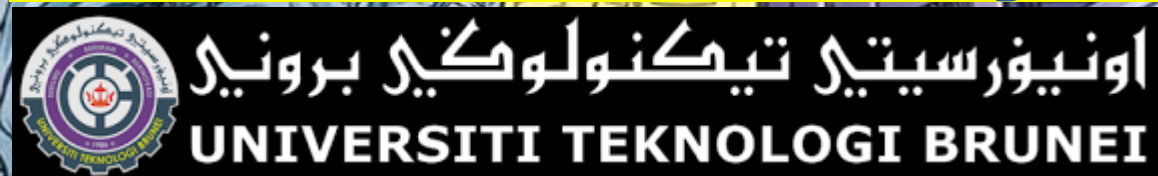


# Coding Conquest 2022

## AI for Mobile Apps (AI4MA)



### Session 2: Enhancing Mobile Apps with AI



اونیورسیتی تیکنولوجی برونی  
UNIVERSITI TEKNOLOGI BRUNEI

*Prof. Somnuk Phon-Amnuaisuk*  
*UTB, SCI June 2022*

Picture: credited <https://www.cyberpunk.net>



# meme

A meme (/ˈmiː m/ meem), a neologism coined by Richard Dawkins, is "an idea, behavior, or style that spreads from person to person within a culture". A meme acts as a unit for carrying cultural ideas, symbols, or practices that can be transmitted from one mind to another through writing, speech, gestures, rituals, or other imitable phenomena with a mimicked theme.



# Outline

- Intelligent Mobile Applications
- Examples of domains and use cases
- Enhancing mobile apps with AI



# Intelligent Mobile Apps

- Enabling technologies
  - ICT technology
  - Pervasive computing, Cognitive computing, Creative computing and Mixed reality
- Potential applications
  - Education, Fin tech, Industry 4.0
  - Health, Music and Art
- Signatures of intelligent mobile apps
  - Data-driven, adaptive to context
  - Support personalized features
  - Support proactive features



Marconi is awarded a patent for radio



1896

First experimental FM radio station is granted a construction permit in the U.S.

1937

Color TV is commercially transmitted

1963

Bell launches first commercial cellular network in Chicago

1978

Motorola DynaTAC 8000X ("brick") is the first commercial cellphone available in the U.S.



1983

First commercial GSM call: emergence of 2G cellular systems

1991



Motorola StarTAC debuts

1996

3G cellular systems appear

2000

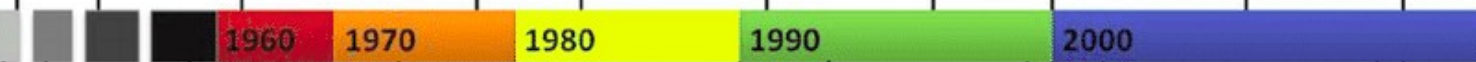
Apple's iPhone is launched



2007

IEEE 802.22 is published. It is the first standardized air interface based on cognitive radio techniques for the opportunistic use of TV bands.

2011



1906

A spark-gap transmitter is used to make the first radio audio broadcast

1873



Maxwell first describes theoretical basis of the propagation of electromagnetic waves

1954



A pocket transistor radio, TR-1, is introduced

1973

First public phone call on a cell phone is made to a land line

1982

26 European national phone companies begin developing GSM

1993

First smartphone (IBM's Simon) is released, offering email service



1990

North American cellular network incorporates Digital AMPS

1999



Wi-Fi Alliance is formed as a trade association



Bluetooth®

First Bluetooth headset for cellular phones is released

2002

FCC allows the shut down of analog cellular networks

2010



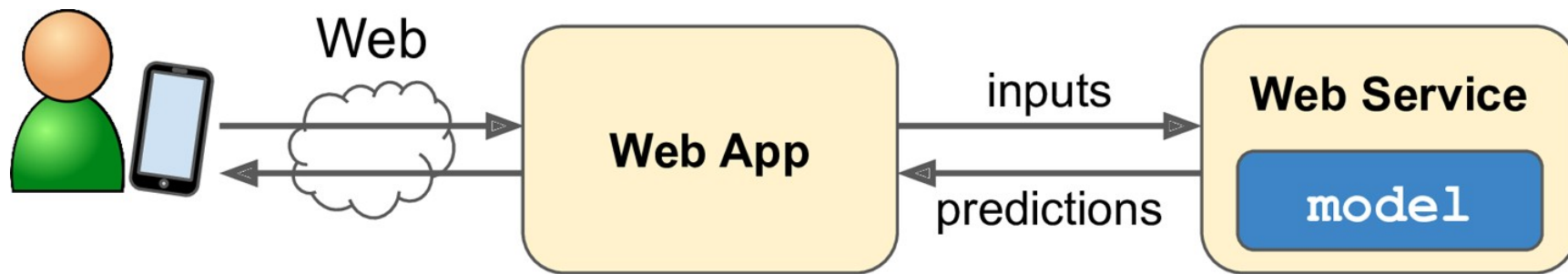
iPad and 4G handsets become available

2011



Worldwide, approx. 30,000,000 apps are downloaded each day

# Intelligent Mobile Apps



- Mobile app is an application designed to run on mobile devices e.g., phone, watch and glass, etc.
- Web app is application software that runs on a webserver.
- Web applications are accessed by the users through a web browser.

# Impact Radar for 2022



**Range**

- 6 to 8 Years
- 3 to 6 Years
- 1 to 3 Years
- Now (0 to 1 Years)

**Mass**

- Low
- Medium
- High
- Very High

[gartner.com](https://www.gartner.com)

Source: Gartner

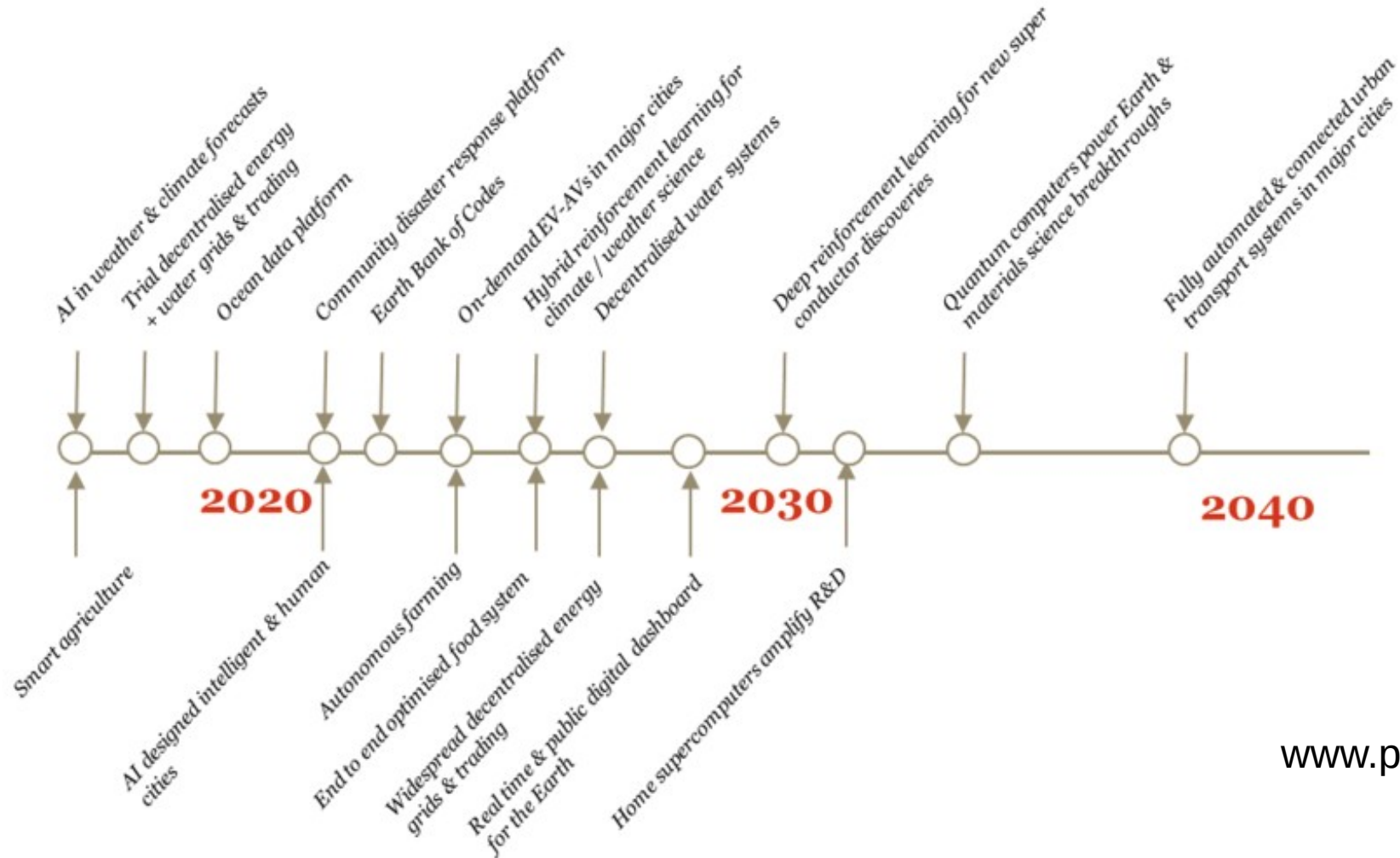
© 2021 Gartner, Inc. and/or its affiliates. All rights reserved. CTMKT\_1574277

**Gartner**

These trends center around four key themes:

- 1) The smart world: Change how people interact with the world around them.
- 2) Productivity revolution: Build on core AI technologies and extend computing ability.
- 3) Ubiquitous and transparent security: Underscore the importance of protecting an increasingly digital world.
- 4) Critical enablers: Act as an additive force to bring the emerging technologies and trends together, and heighten the benefits by reshaping business practices, processes, methods, models and/or functions in markets where they are applied.

## AI for the Earth game-changers: indicative timeline







# Enhancing Mobile Apps with AI

Goal: well-beings

- Security Functions e.g., authentication
- Automated Reply/Chatbot Functions
- Real-Time Language Translation
- Emotion Recognition
- User Modeling, Behaviour Profiling
- Personal secretariat, Personal Advisor, Personal doctor, etc.

TensorFlow (v2.9.1)

TensorFlow.js

r1.15

TensorFlow Lite

Versions...

TFX

# An end-to-end open source machine learning platform

TensorFlow

For JavaScript

For Mobile &amp; Edge

For Production

The core open source library to help you develop and train ML models. Get started quickly by running Colab notebooks directly in your browser.



# TensorFlow & Keras

- TensorFlow is a free and open-source software library for machine learning. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks.
- Keras is an API designed for human beings, not machines. Keras follows best practices for reducing cognitive load: it offers consistent & simple APIs, it minimizes the number of user actions required for common use cases, and it provides clear & actionable error messages.

# TensorFlow JS <https://www.tensorflow.org/js/demos>



## LipSync by YouTube

See how well you synchronize to the lyrics of the popular hit "Dance Monkey." This in-browser experience uses the Facemesh model for estimating key points around the lips to score lip-syncing accuracy.

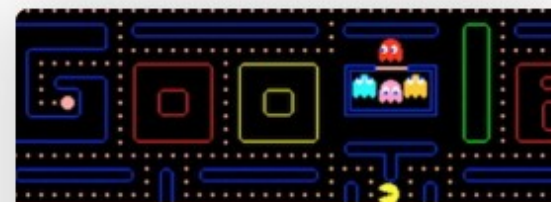
[Explore demo](#) ↗ [View code](#) 🔗



## Emoji Scavenger Hunt

Use your phone's camera to identify emojis in the real world. Can you find all the emojis before time expires?

[Explore demo](#) ↗ [View code](#) 🔗



## Webcam Controller

Play Pac-Man using images trained in your browser.

[Explore demo](#) ↗ [View code](#) 🔗



## Teachable Machine

No coding required! Teach a machine to recognize images and play sounds.

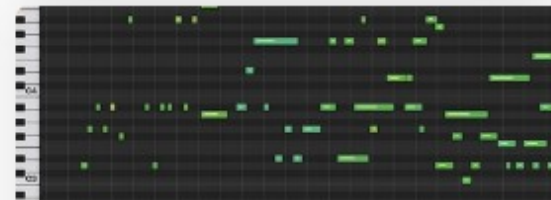
[Explore demo](#) ↗ [View code](#) 🔗



## Move Mirror

Explore pictures in a fun new way, just by moving around.

[Explore demo](#) ↗ [View code](#) 🔗



## Performance RNN

Enjoy a real-time piano performance by a neural network.

[Explore demo](#) ↗ [View code](#) 🔗

# Ex. Smart City

<https://aliga.sk/en/what-the-heck-is-a-smart-city/>

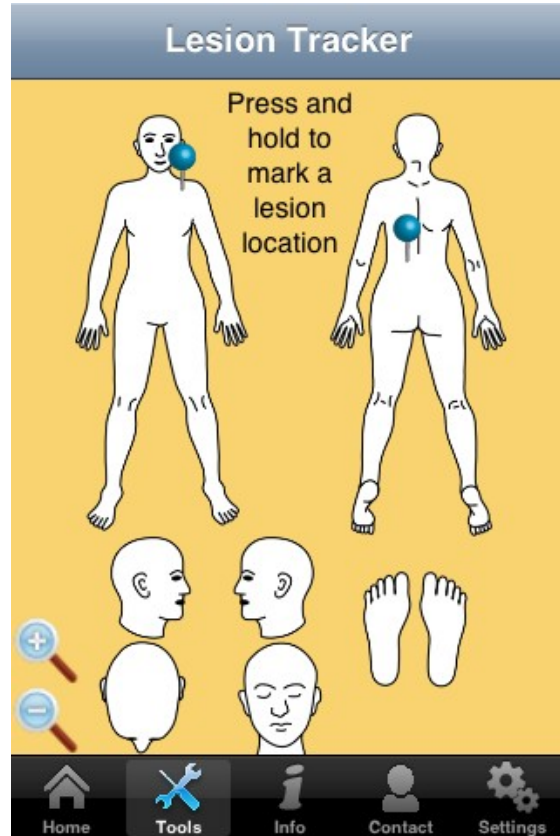
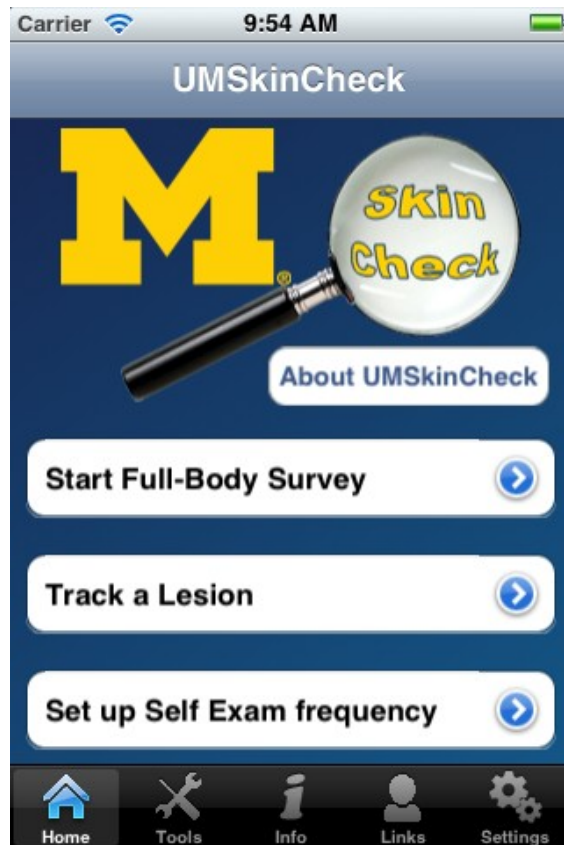




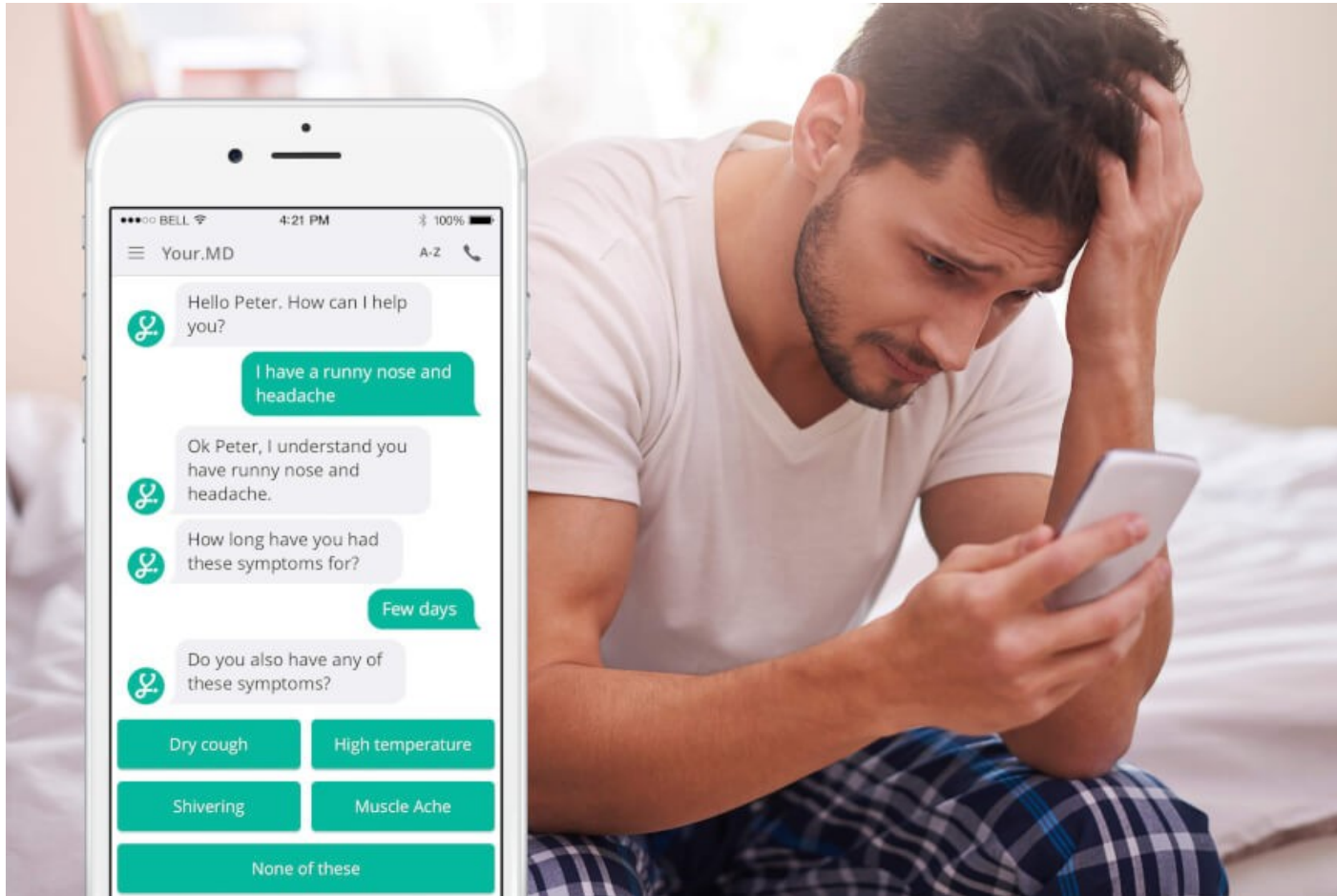
# Ex. Traffic Monitoring



# Ex. Health Application



# Ex. Health Application





## Ex. Photo Translation



## Ex. OCR

Mild Splendour of the various-vested Night!  
Mother of wildly-working visions! hail!  
I watch thy gliding, while with watery light  
Thy weak eye glimmers through a fleecy veil;  
And when thou lovest thy pale orb to shroud  
Behind the gather'd blackness lost on high;  
And when thou dartest from the wind-rent cloud  
Thy placid lightning o'er the awaken'd sky.

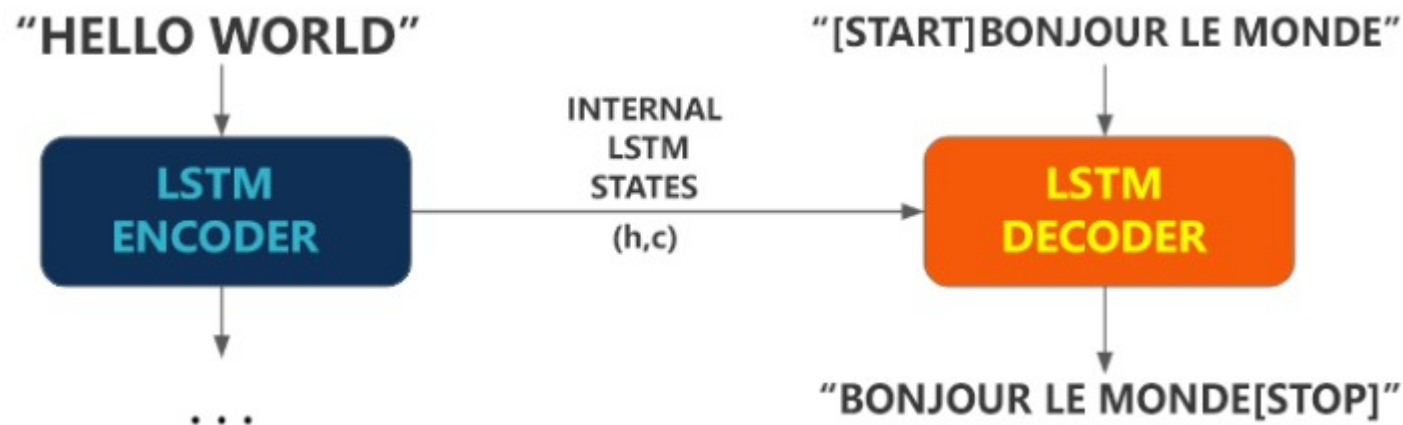


[Click here to recognize text in the demo image](#), or drop an English image anywhere on this page.

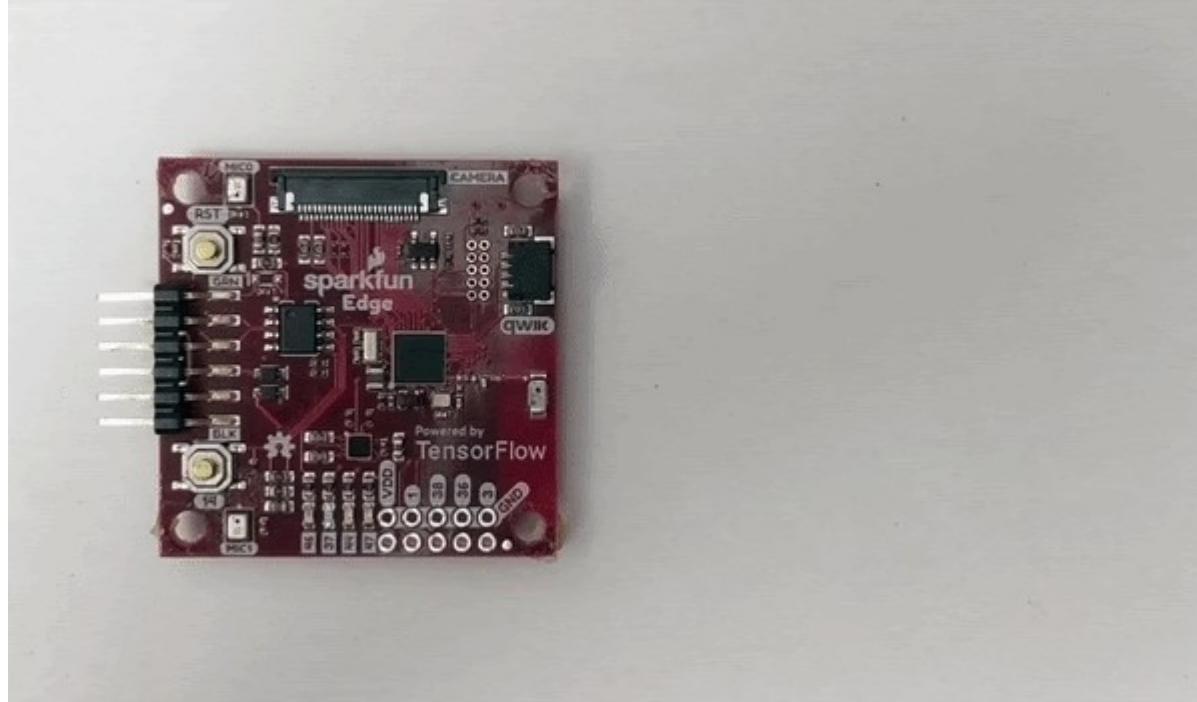


# Ex. Text Translation

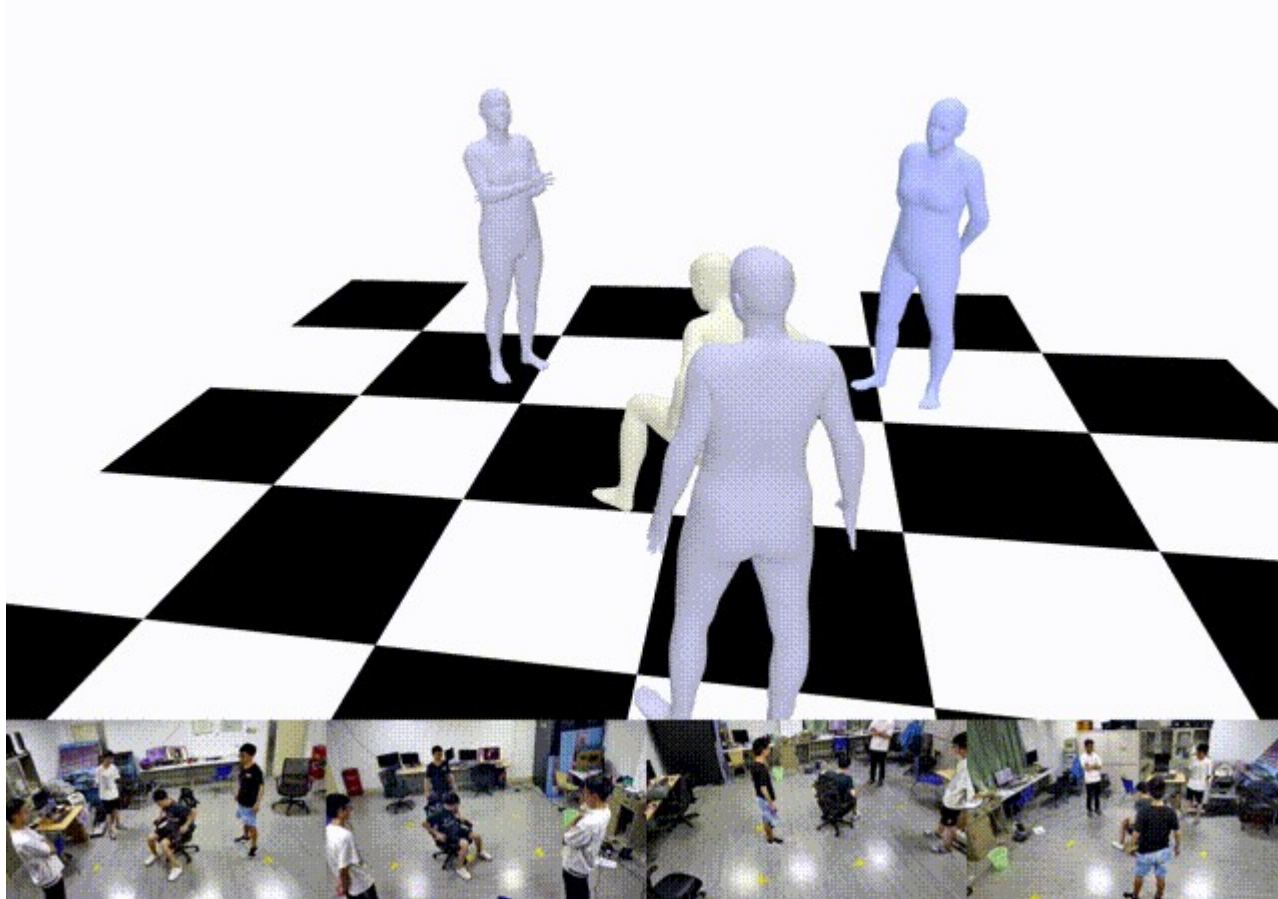
<https://storage.googleapis.com/tfjs-examples/translation/dist/index.html>



# Ex. Text to Speech, Speech to Text



## Ex. Object Detection



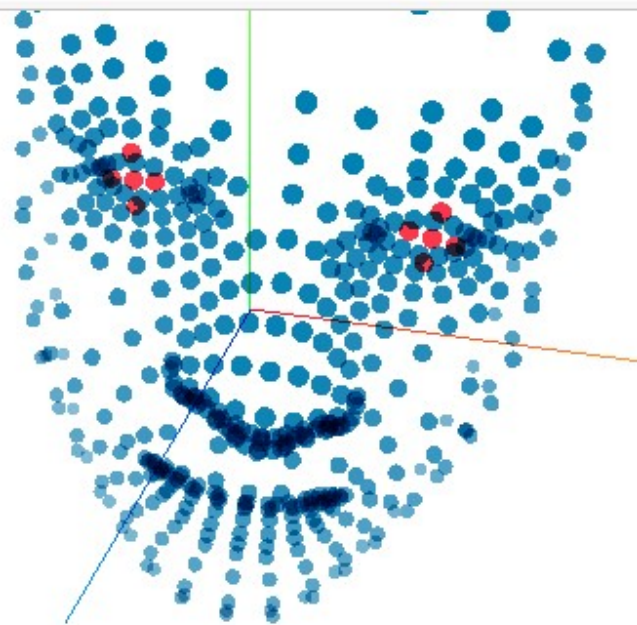
# Ex. Pose Detection





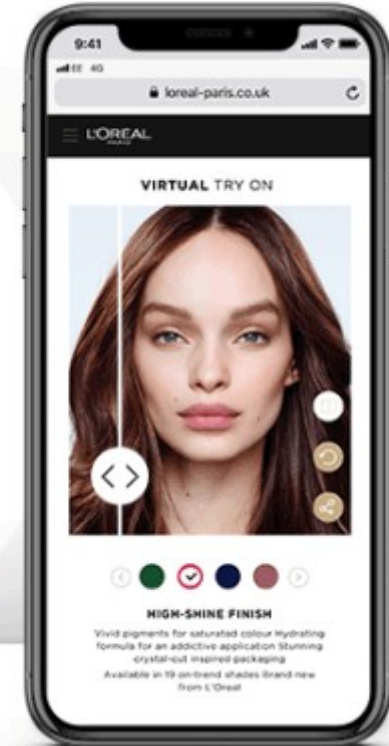
# Ex. Face Landmarks Detection

- <https://storage.googleapis.com/tfjs-models/demos/facemesh/index.html>





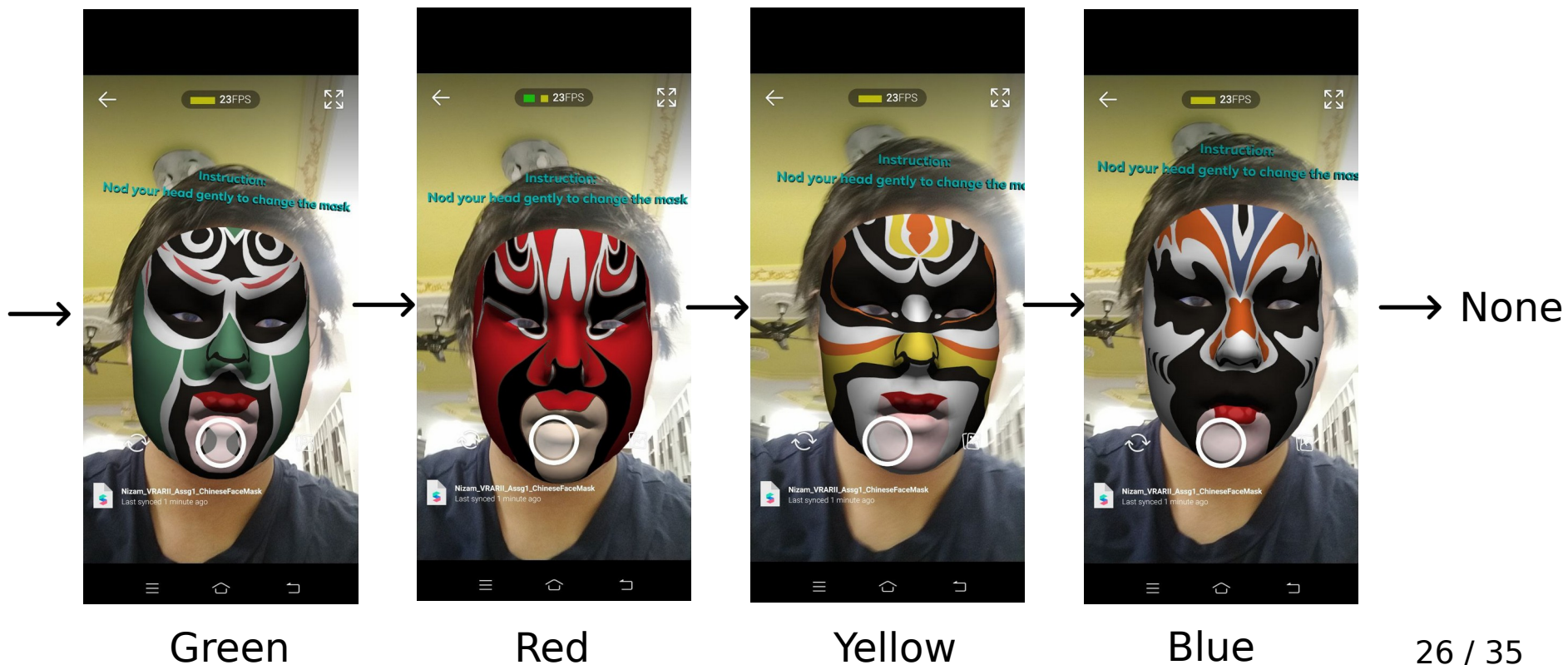
# Ex. Virtual makeup Application



# Ex. Face Landmarks & Pose Detection



# Ex. Application from SparkAR



# Augmented Reality from SparkAR





# AR + Mobile Computing





# Enhancing Intelligent Mobile App

## 1. SELECT YOUR PLATFORM

Android / iOS

Mobile Web

## 2. SELECT PROBLEM DOMAIN

Audio / Speech

Natural Language

Vision

Other

## 3. SELECT USE CASE

☐ Body Pose Estimation

☐ Body Segmentation

☐ Face Detection

☐ Face Landmark Detection










☐ Hand Pose Estimation

☐ Image Classification

☐ Object Detection

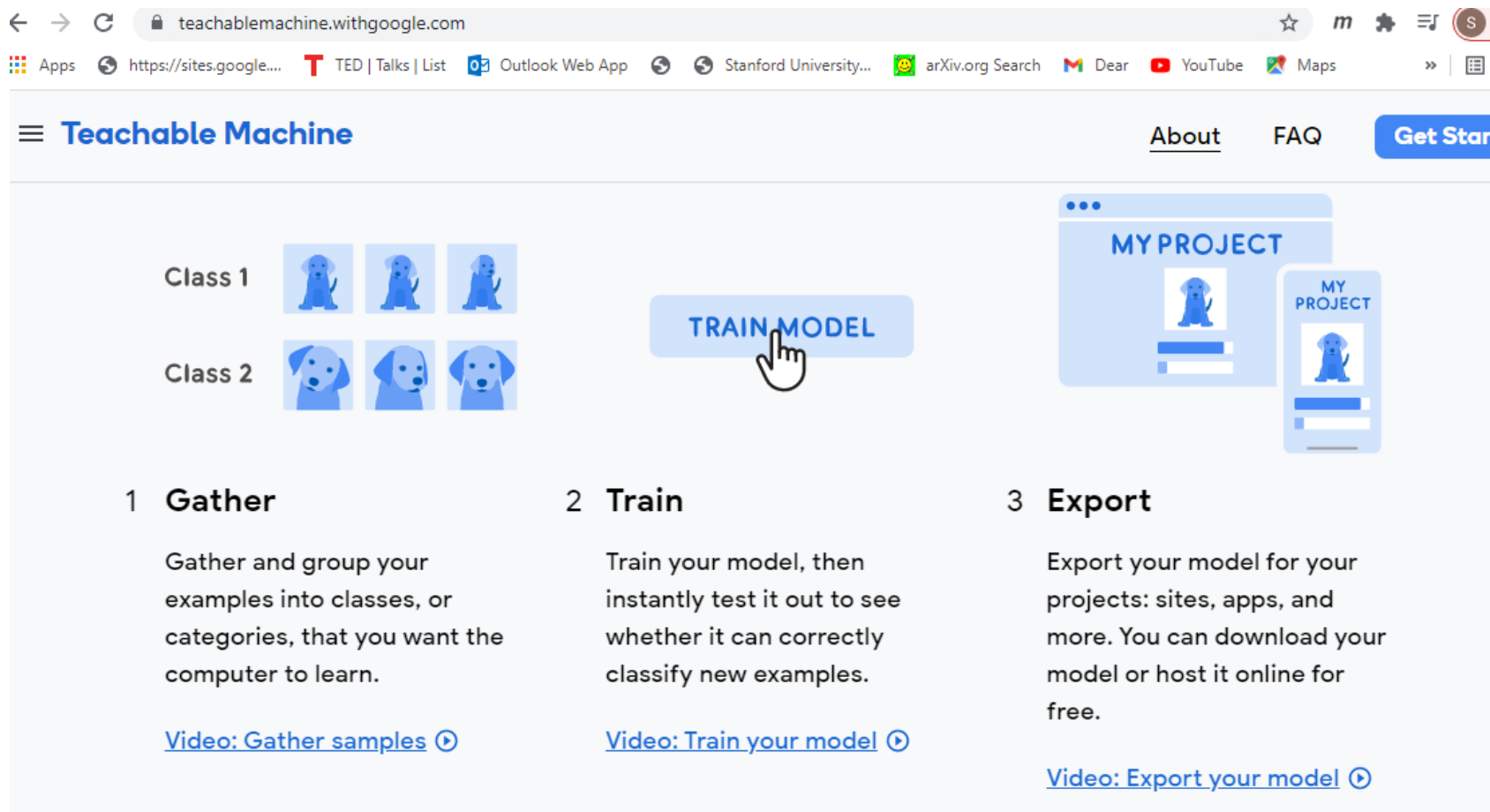
☒ Semantic Segmentation

# TensorFlow.js Demo

 <p><b>Image classification</b> Classify images with labels from the ImageNet database (MobileNet). <a href="#">View code</a></p>	 <p><b>Object detection</b> Localize and identify multiple objects in a single image (Coco SSD). <a href="#">View code</a></p>	 <p><b>Body segmentation</b> Segment person(s) and body parts in real-time. <a href="#">View code</a></p>
 <p><b>Pose detection</b> Unified pose detection API for using one of three models that help detect atypical poses and fast body motions with real time performance. <a href="#">View code</a></p>	 <p><b>Text toxicity detection</b> Score the perceived impact a comment may have on a conversation, from "Very toxic" to "Very healthy" (Toxicity). <a href="#">View code</a></p>	 <p><b>Universal sentence encoder</b> Encode text into embeddings for NLP tasks such as sentiment classification and textual similarity (Universal Sentence Encoder). <a href="#">View code</a></p>
 <p><b>Speech command recognition</b> Classify 1-second audio snippets from the speech commands dataset (speech-commands). <a href="#">View code</a></p>	 <p><b>KNN Classifier</b> Utility to create a classifier using the K-Nearest-Neighbors algorithm. Can be used for transfer learning. <a href="#">View code</a></p>	 <p><b>Simple face detection</b> Detect faces in images using a Single Shot Detector architecture with a custom encoder (Blazeface). <a href="#">View code</a></p>

# Teachable Machine

<https://teachablemachine.withgoogle.com/>




The screenshot shows the Teachable Machine web interface. At the top, there's a navigation bar with 'Teachable Machine' on the left and 'About', 'FAQ', and 'Get Started' on the right. The main content area is divided into three columns representing the training workflow: Gather, Train, and Export. In the 'Gather' column, there are two rows of dog icons labeled 'Class 1' and 'Class 2'. In the 'Train' column, there is a large blue button labeled 'TRAIN MODEL' with a hand cursor pointing at it. In the 'Export' column, there is a graphic showing a desktop monitor and a smartphone, both displaying 'MY PROJECT' with a dog icon. Below each column is a numbered heading and a description of the step, followed by a video link.

← → ↻ 🔒 teachablemachine.withgoogle.com ☆ m ⚙️ ☰ (S)


📱 Apps 🌐 <https://sites.google.com/> 📺 TED | Talks | List 📧 Outlook Web App 🌐 Stanford University... 😊 arXiv.org Search 📧 Dear 📺 YouTube 📍 Maps » 📅

≡ **Teachable Machine** About FAQ **Get Started**


**Class 1**

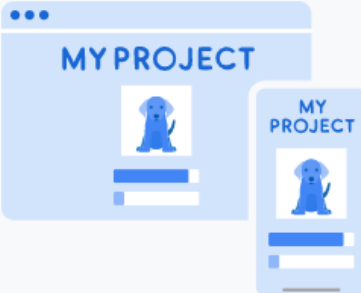


**Class 2**



**TRAIN MODEL**





- 1 Gather**

Gather and group your examples into classes, or categories, that you want the computer to learn.

[Video: Gather samples](#) ▶
- 2 Train**

Train your model, then instantly test it out to see whether it can correctly classify new examples.

[Video: Train your model](#) ▶
- 3 Export**

Export your model for your projects: sites, apps, and more. You can download your model or host it online for free.

[Video: Export your model](#) ▶



## Advertising & Marketing

Audience Segmentation & Targeting  
Real-Time Advertising

[More »](#)



## Automotive

Connected Mobility  
Data Collection  
Virtual Showroom

[More »](#)



## Consumer Packaged Goods

Direct to Consumer eCommerce  
Personalization  
Supply Chain Planning & Visibility

[More »](#)



## Financial Services

Fintech Blueprint on the AWS Cloud  
SWIFT Client Connectivity on AWS



## Game Tech

Game Infrastructure for Session-Based Games  
Game Services  
Workstations

[More »](#)



## Healthcare, Life Sciences, and Genomics

Clinical Information Systems  
Interoperability  
Tertiary Analysis & ML

[More »](#)



## Manufacturing & Industrial

Computer Aided Engineering  
Industrial Data Platform  
Maintenance & Asset Optimization

[More »](#)



## Media & Entertainment

Cloud Editing  
Machine Learning-Generated Content Insights  
Video Streaming

[More »](#)



## Retail

Warehouse Management  
Traditional POS Checkout  
Web Store

[More »](#)



## Travel & Hospitality

Contact Center Modernization  
Modernization for Systems & Solutions  
Single View of the Traveler/Guest

[More »](#)



## Public Sector

Digital Services, Code, and Data  
Emergency Responses



## Cross-Industry

Commercial Revenue Planning  
Demand Planning  
Knowledge Management

[More »](#)

# Azure

Select a category:

[AI + machine learning](#)

[Analytics](#)

[Compute](#)

[Containers](#)

[Databases](#)

[Developer tools](#)

[DevOps](#)

[Hybrid + multicloud](#)

[Identity](#)

[Integration](#)

[Internet of Things](#)

[Management and governance](#)

[Media](#)

[Migration](#)

[Mixed reality](#)

[Mobile](#)

[Networking](#)

## AI + machine learning

Create the next generation of applications using artificial intelligence capabilities for any developer and any scenario

[Learn more](#)

### Anomaly Detector

Easily add anomaly detection capabilities to your apps.

### Azure Cognitive Search

Enterprise scale search for app development

### Azure Machine Learning

Use an enterprise-grade service for the end-to-end machine learning lifecycle

### Azure Cognitive Services

Add cognitive capabilities to apps with APIs and AI services

### Computer Vision

Distill actionable information from images

### Azure Bot Services

Create bots and connect them across channels

### Azure Databricks

Design AI with Apache Spark™-based analytics

### Azure Open Datasets

Cloud platform to host and share curated open datasets to accelerate development of machine learning models

### Azure Video Indexer

Easily extract meaningful insights from audio and video files using media AI

### Content Moderator


Automated image, text, and video moderation



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A full stack cloud platform with over 170 products and services covering data, containers, AI, IoT, and blockchain.


Use your existing infrastructure—even edge or other public clouds—with IBM Cloud services, APIs, access policies, security controls and compliance with [IBM Cloud Satellite](#).



AI / machine learning



Analytics



Automation



Blockchain



Compute



Containers



Databases



Developer tools



Integration



Internet of things



Logging and  
monitoring



Networking



# Q & A

- End of this lecture