Face recognition is a method for identifying an unknown person or authenticating the identity of a specific person from their face.

The early facial recognition algorithms rely on biometrics. One complication in process of facial recognition is adjusting the faces to a normalized view to account for head rotation and tilt before extracting the metrics. This class of algorithms is called geometric.

Another approach to face recognition is to normalize and compress 2-D facial images, and to compare these with a database of similarly normalized and compressed images. This class of algorithms is called photometric.

Skin texture analysis maps the lines, patterns, and spots on a person’s face to another feature vector. And that can improve the recognition accuracy by 20 to 25 percent.  
  
NIST, the US National Institute of Standards and Technology, has been performing tests of facial recognition algorithms, the Face Recognition Vendor Test , since 2000. The image datasets used are mostly law enforcement mug shots, but also include in-the-wild still images, such as those found in Wikimedia, and low-resolution images from webcams.  
  
Related NIST face recognition testing programs have studied demographic effects, detection of face morphing, identification of faces posted on social media, and identification of faces in video.

Face recognition applications mostly fall into three major categories: security, health, and marketing. Security includes law enforcement, Health applications of facial recognition include patient check-ins, real-time emotion detection, Marketing and retail applications of face recognition include identification of loyalty program members

There have been several issues, starting with the 2009 face tracking software that could track whites but not Blacks, and continuing with the 2015 MIT study that showed that the facial recognition software of the time worked much better on white male faces than female and/or Black faces.  
  
In 2019, San Francisco became the first major American city to block police and other law enforcement agencies from using face recognition software; Microsoft called for federal regulations on facial recognition; and MIT showed that Amazon Rekognition had more trouble determining female gender than male gender from face images, as well as more trouble with Black female gender than white female gender.  
  
In June 2020, Microsoft announced that it will not sell and has not sold its face recognition software to the police; Amazon banned police from using Rekognition for a year; and IBM abandoned its facial recognition technology.

Given the potential privacy threat from face recognition, there have been many efforts to hack or spoof the technology.

To detect printed images, vendors use a liveness test, such as waiting for the subject to blink, or perform motion analysis, or use infrared to distinguish a live face from a printed image.

There are also several open source face recognition algorithms, of varying quality, and a few major cloud services that offer face recognition.  
  
The Azure Face API does face detection that perceives faces and attributes in an image, performs person identification that matches an individual in your private repository of up to 1 million people, and performs perceived emotion recognition.  
  
There are dozens of face datasets available for downloading that can be used for recognition training. Not all face datasets are equal: They tend to vary in image size, number of people represented, number of images per person, conditions of images, and lighting. Law enforcement also has access to non-public face datasets, such as current mugshots and driver’s license images.  
  
Some of the larger face databases are Labeled Faces in the Wild; FERET, used for the early NIST tests; the Mugshot database used in the ongoing NIST FRVT and Labeled Wikipedia Faces

Google has one of the largest machine learning stacks in the industry, currently centering on its Google Cloud AI and Machine Learning Platform.

Google is one of the top sources of tools and infrastructure for developers, data scientists, and machine learning experts, but historically Google AI hasn’t been all that attractive to business analysts who lack serious data science or programming backgrounds.

The Google Cloud AI and Machine Learning Platform includes AI building blocks, the AI platform and accelerators, and AI solutions. The AI solutions are fairly new and aimed at business managers rather than data scientists. They may include consulting from Google or its partners.

The AI building blocks, which are pre-trained but customizable, can be used without intimate knowledge of programming or data science.

There is lots of competition in the AI market and lots of competition in the public cloud market. AWS does most of what Google does, and is also very good, but generally charges higher prices.

Google Cloud AI Building Blocks are easy-to-use components that you can incorporate into your own applications to add sight, language, conversation, and structured data.

AutoML Tables is a little different, in that it automates the process a data scientist would use to find the best machine learning model for a tabular data set.

The Google Cloud AutoML services provide customized deep neural networks for language pair translation, text classification, object detection, image classification, and video object classification and tracking. They require tagged data for training, but don’t require significant knowledge of deep learning, transfer learning, or programming.

Google Cloud AutoML customizes Google’s battle-tested, high-accuracy deep neural networks for your tagged data.

Rather than starting from scratch when training models from your data, AutoML implements automatic deep transfer learning and neural architecture search for language pair translation and the other services listed above.

Google Cloud AutoML helps you to create a model that works, without requiring that you know how to perform transfer learning or how to design neural networks.

The usual data science process for many regression and classification problems is to create a table of data for training, clean and condition the data, perform feature engineering, and try to train all of the appropriate models on the transformed table, including a step to optimize the best models’ hyperparameters.

AutoML Tables automatically searches through Google’s model zoo for structured data to find the best model for your needs, ranging from linear/logistic regression models for simpler data sets to advanced deep, ensemble, and architecture-search methods for larger, more complex ones.

The Google Cloud Vision API is a pre-trained machine learning service for categorizing images and extracting various features.

The Google Cloud Translation API can translate over a hundred language pairs, can auto-detect the source language if you don’t specify it, and comes in three flavors: Basic, Advanced, and Media Translation.