

# Machine Learning with TensorFlow.js and IBM Watson Webinar

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# Hi, I'm Dave

I'm a developer advocate for IBM in San Francisco. I also help organize:

- The SF JavaScript Meetup
- IBM Developer SF Meetup
- ForwardJS San Francisco && Ottawa

I participate in meetups, hackathons, webinars and write articles about technology for IBM and other organizations.

**Warning: I am a lowly developer**





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# ↳ The Machine Learning Ecosystem



# Projected market for machine learning technologies, 2024

Source: [Forbes](#)

\$30.6B

Enterprises who use ten or more AI applications

Source: [Forbes](#)

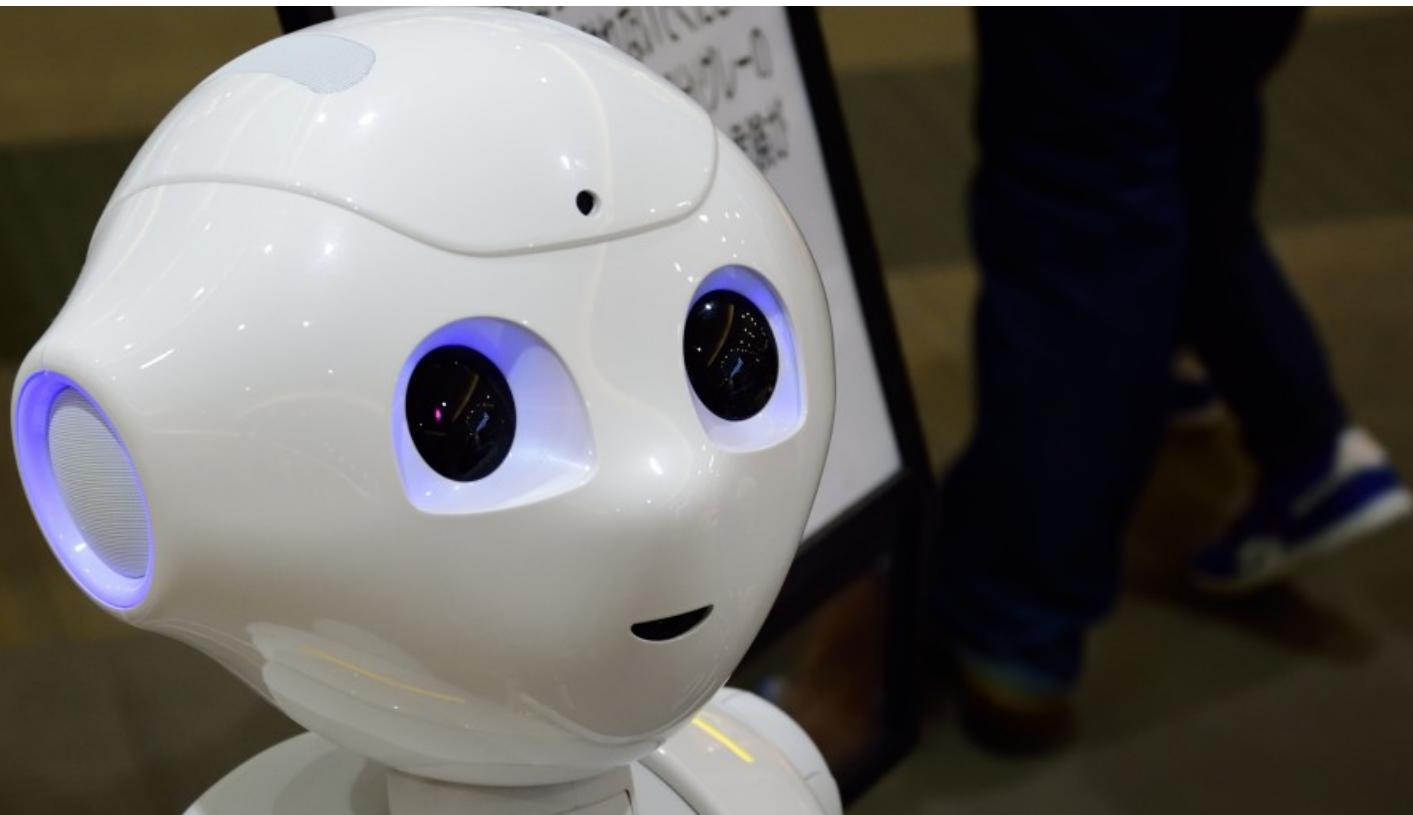
10%

Total investment in machine learning  
applications in Q1 2019

\$28 . 5B

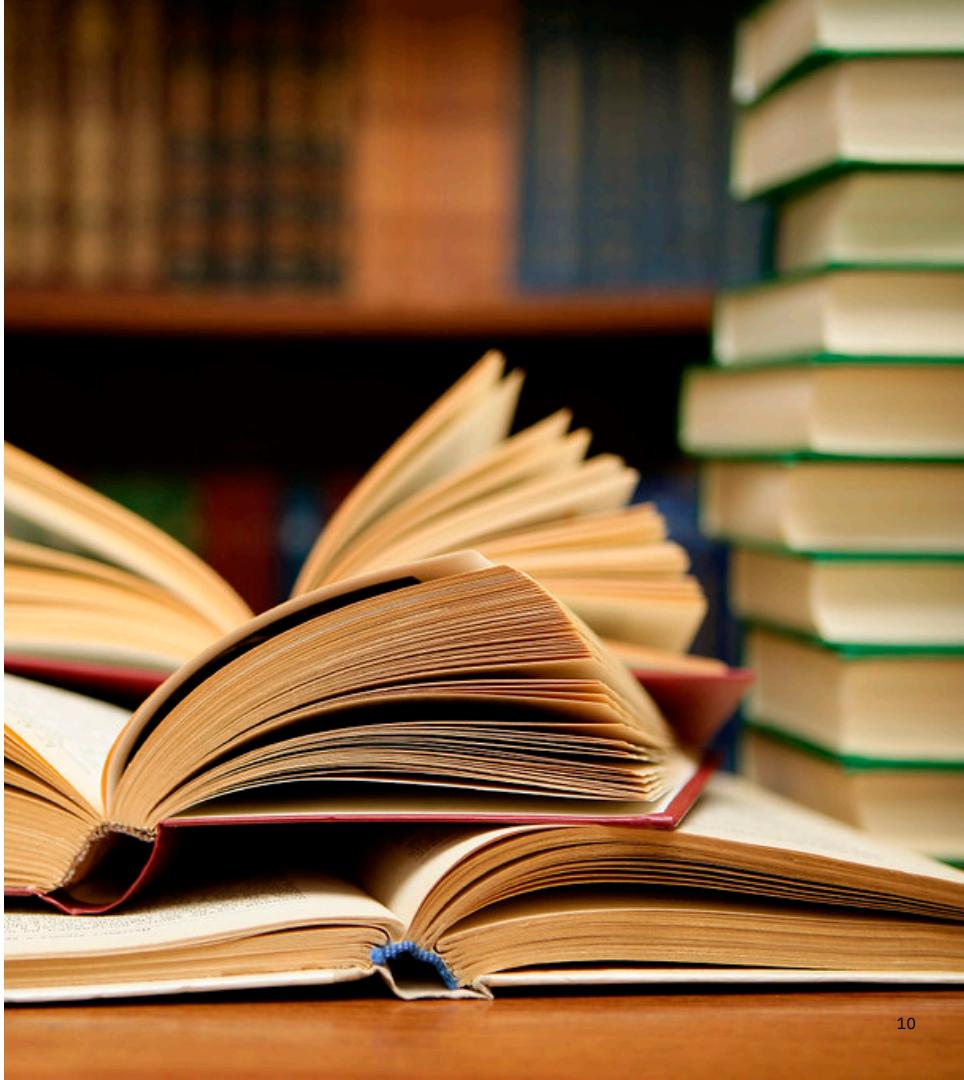
Source: [Forbes](#)

## ↳ What Is Machine Learning?



# Machine Learning Defined

“Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. Machine learning algorithms build a mathematical model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to perform the task.”



# Examples of Machine Learning

- Virtual Personal Assistants
- Email/Spam Filtering
- Chatbots/Online Support
- Video Surveillance
- Maps/Traffic/Time to Arrival
- Speech Recognition
- Recommendation Engines

“Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead.”

# Deep Learning Defined

“Deep learning architectures such as deep neural networks, deep belief networks, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, bioinformatics, drug design, medical image analysis, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance.”



# Artificial Intelligence Defined

“A system’s ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation.”



# Let's Recap: Definitions

**Artificial Intelligence (AI)** - The broad discipline of creating intelligent machines

**Machine Learning (ML)** - Systems that can learn from experience

**Deep Learning (DL)** - Systems that learn from experience on large data sets

**Artificial Neural Networks (ANN)** - Models of human neural networks that are designed to help computers learn

Source: Sonix

# ↳ Let's Dive in: Artificial Neural Networks



# Types of Neural Networks

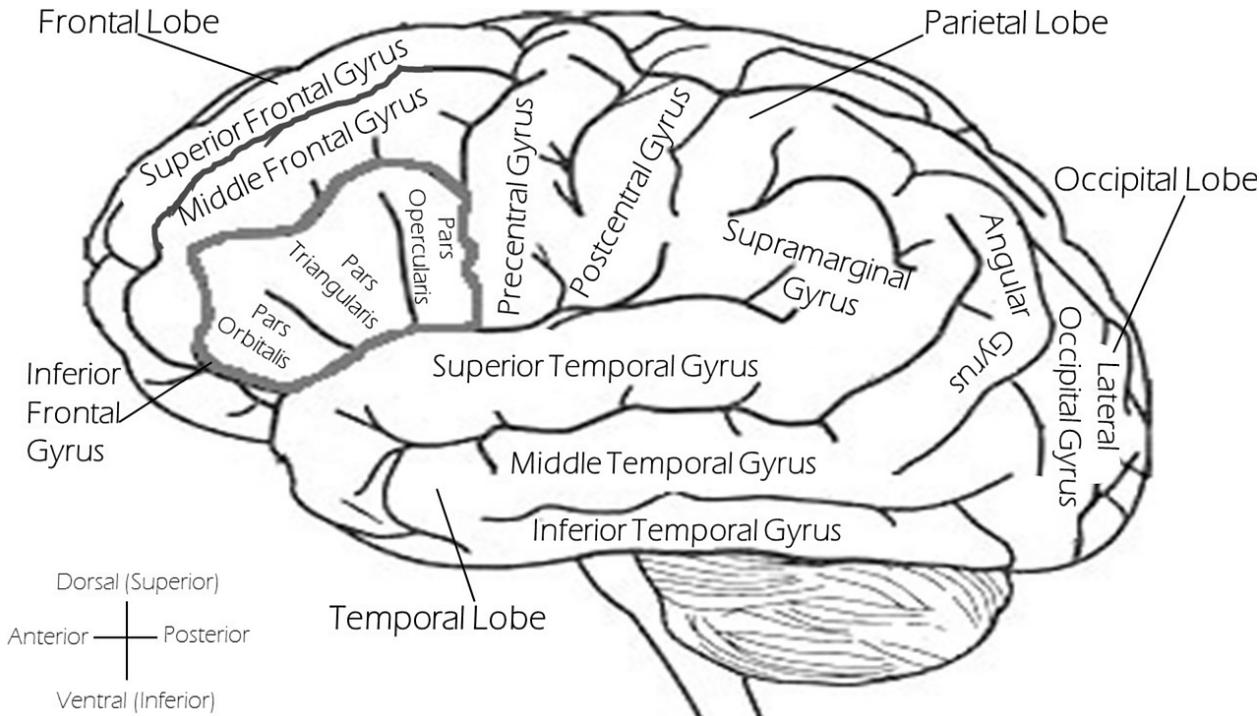
Convolutional neural networks

Long short-term memory network

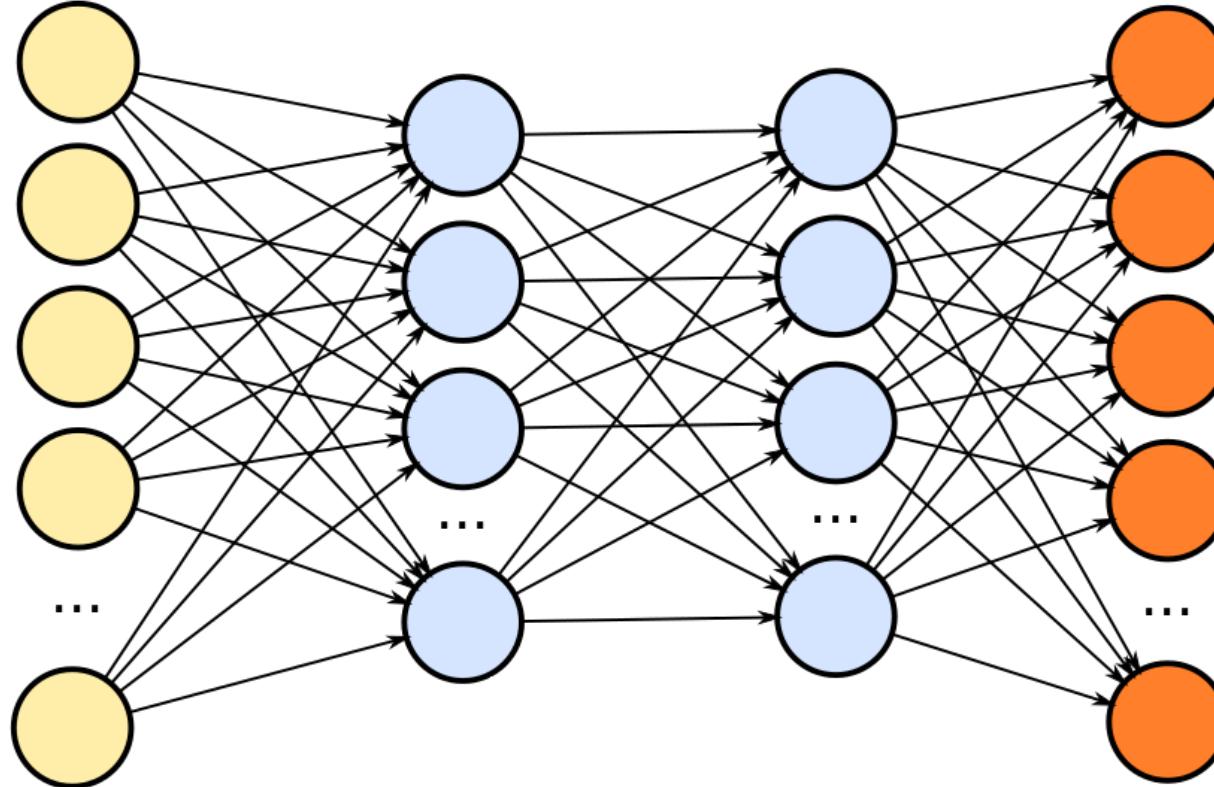
Simple/multilayer



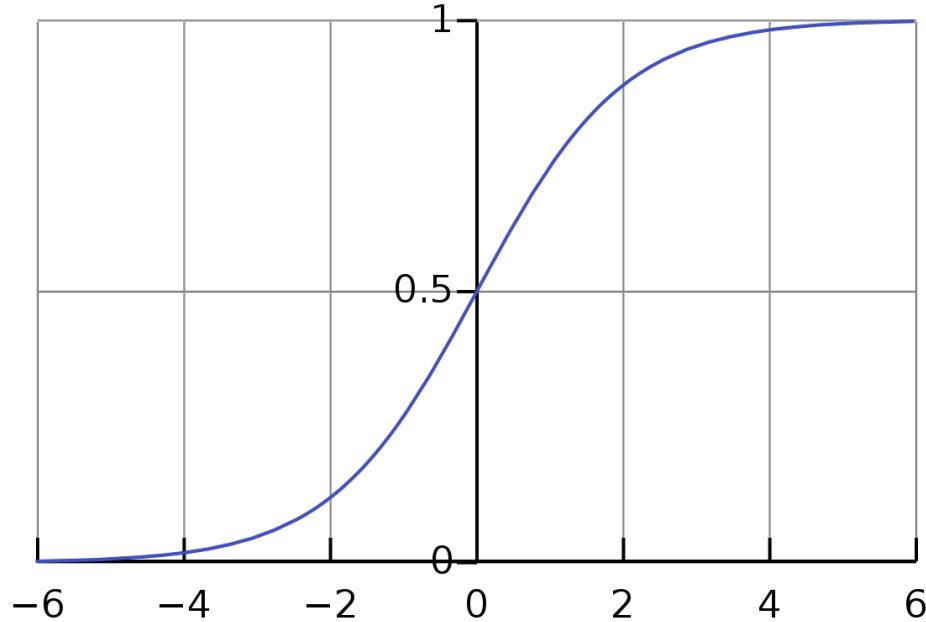
# Artificial Neural Network Inspiration



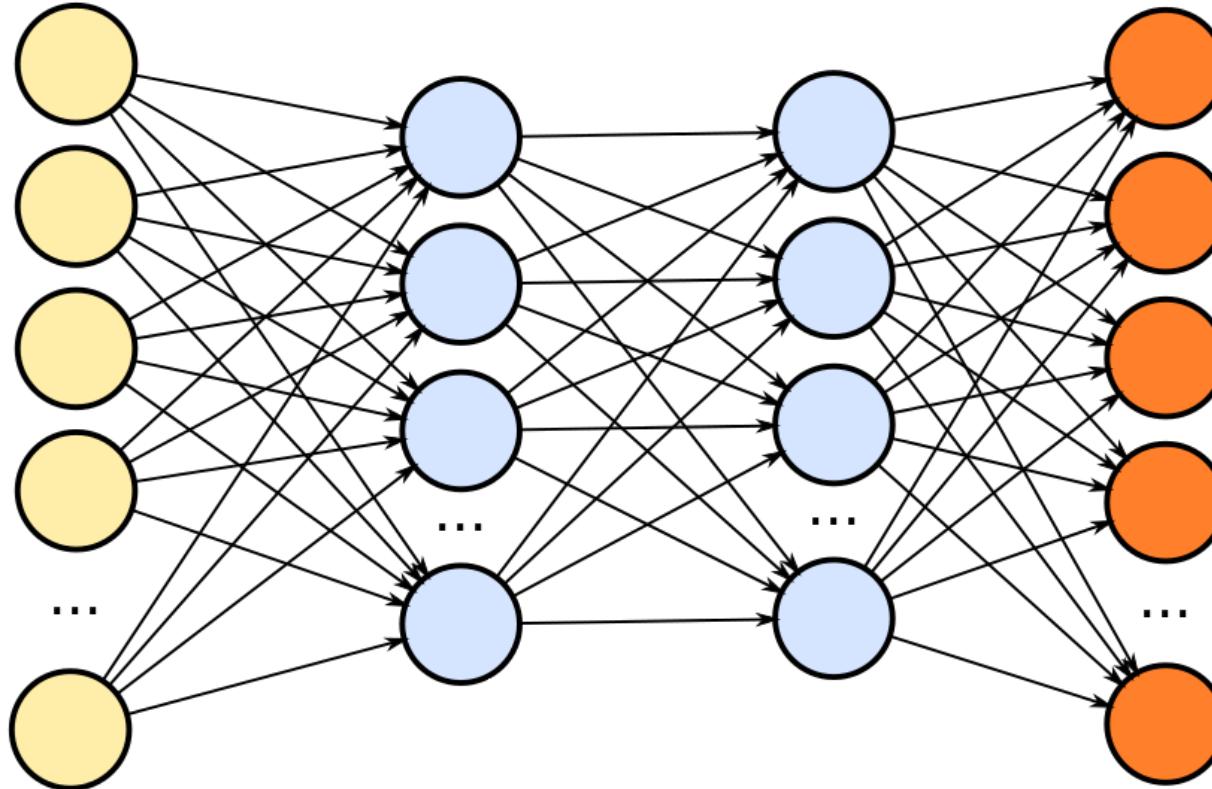
# Artificial Neural Networks: Layers



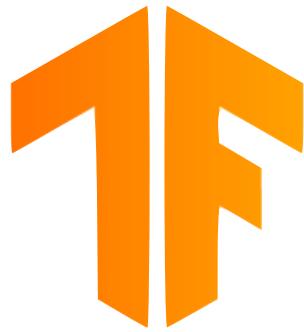
# Sigmoid Function



# Artificial Neural Networks: Weights & Costs



## ↳ What is TensorFlow?



# TensorFlow

Commits made to the [TensorFlow repository](#) on GitHub

77,748

# Why Chatbots?



# Projected market for chatbot technologies, 2024

\$9 . 4B

Source: [Business Insider](#)

# Chatbot Compound Annual Growth Rate in North America

Source: [Business Insider](#)

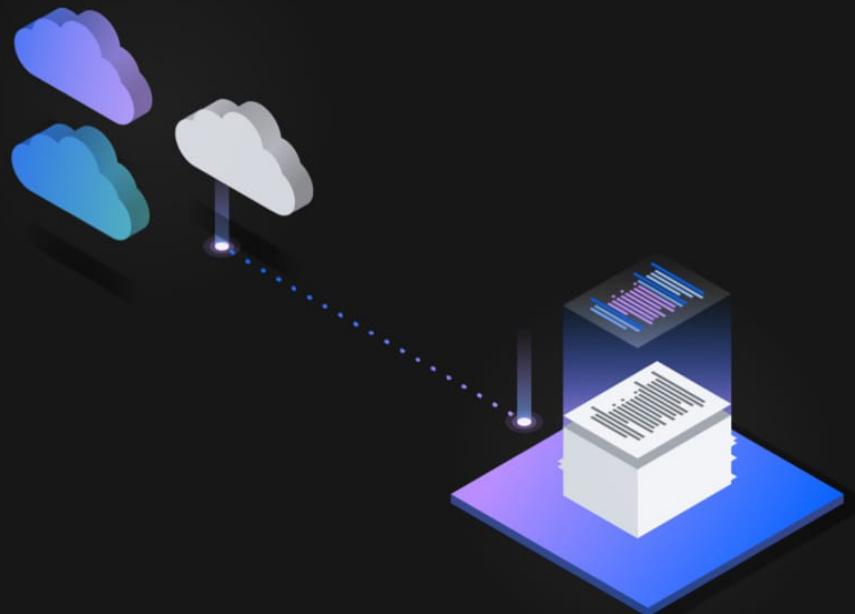
31.2%

# Why Chatbots?

“Technologies such as artificial intelligence, IoT, and APIs, among others, are evolving at a rapid speed. Chatbots are integrated with these technologies to offer enhanced operations, thereby driving market demand. Artificial intelligence and audio speech-based chatbots are expected to account for the largest market share in future.” -Grand View Research



# Introduction to NLP

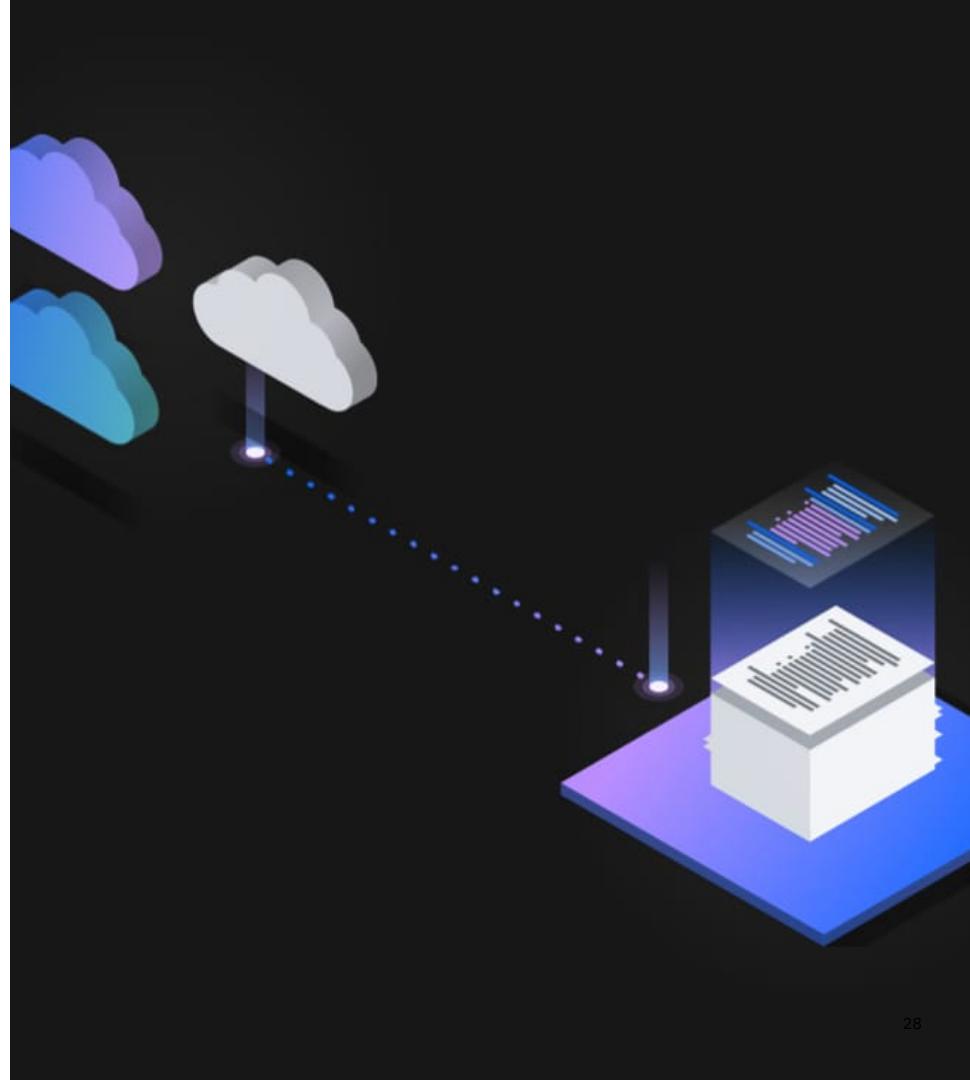


# What is NLP?

Natural Language Processing, usually shortened as NLP, is a branch of artificial intelligence that deals with the interaction between computers and humans using the natural language.

The ultimate objective of NLP is to read, decipher, understand, and make sense of the human languages in a manner that is valuable.

Most NLP techniques rely on machine learning to derive meaning from human languages. [[source](#)]



# Introduction to Naïve Bayesian Classifiers

In statistics, Naïve Bayes classifiers are a family of simple "probabilistic classifiers" based on applying Bayes' theorem with strong (naïve) independence assumptions between the features. They are among the simplest Bayesian network models. But they could be coupled with Kernel density estimation and achieve higher accuracy levels.

Naïve Bayes classifiers are highly scalable, requiring a number of parameters linear in the number of variables (features/predictors) in a learning problem. Maximum-likelihood training can be done by evaluating a closed-form expression, which takes linear time, rather than by expensive iterative approximation as used for many other types of classifiers.

# Three Smart Concepts

Watson  
NLP

Twilio  
Autopilot

Naive  
Bayesian  
Classifier

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# Build Smart



Tuesday August 11

**Build a location-aware IoT Ecosystem with HERE and IBM Cloud**

Wednesday, August 12

**Processing Big Data using Serverless and Java**

Thursday, August 13

**Serv(er)s-Up! Develop Serverless Applications w IBM Cloud Functions & IBM App ID**

[www.crowdcast.io/ibmdeveloper](http://www.crowdcast.io/ibmdeveloper)

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San Francisco, CA

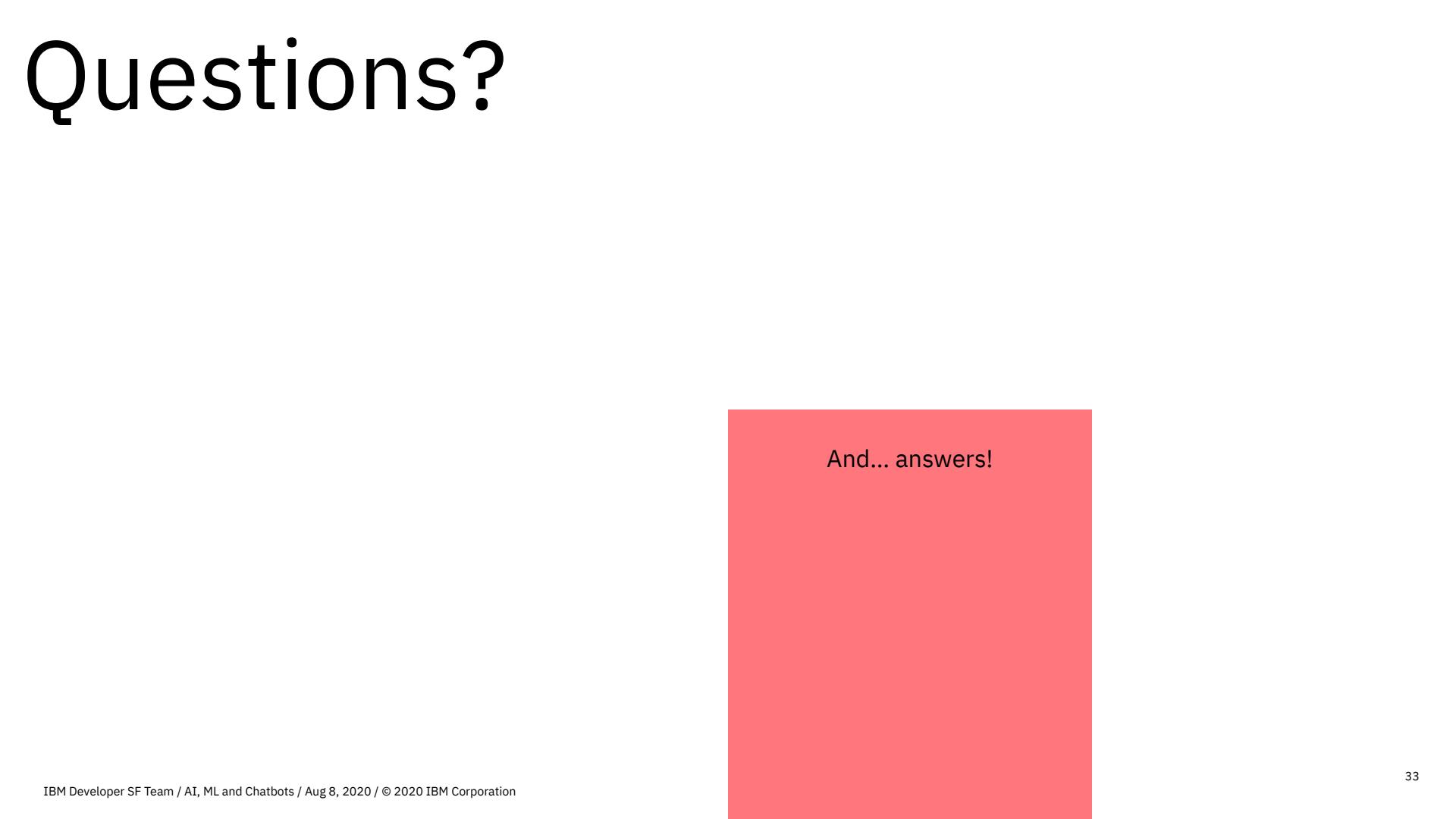


7,619 members · Public group [?](#)



Organized by Angie K and 6 others

# Questions?



And... answers!

