



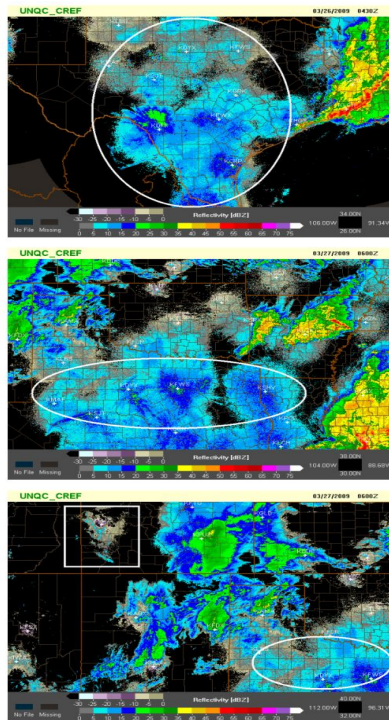
Leveraging AI on the Cloud to transform your business

Florida Business Analytics Forum 2018
at University of South Florida

Google Cloud

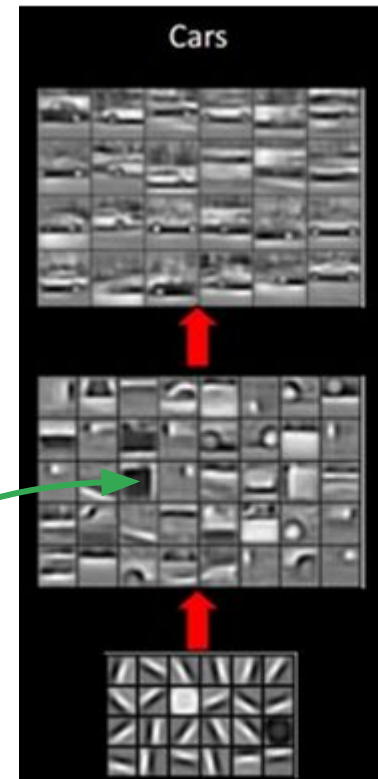
My (unusual) path to Google

Neural networks at NOAA



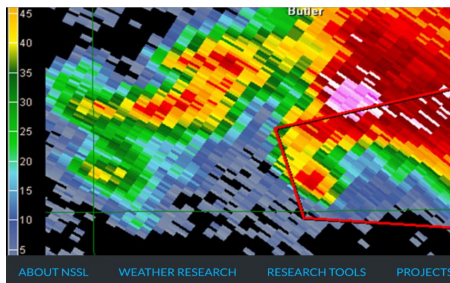
DNNs solved image analysis

*My PhD thesis can now be
learned by a neural network ...*



After 4 years managing infra ...

4 years



[Home](#) > [Research Tools](#) > [Warning](#)

RESEARCH TOOLS: WARNING

FACETs

Forecasting a Continuum of Environmental Threats (FACETs) serves as a framework and strategy to help focus and direct efforts related to next-generation technology and tools for forecasting environmental hazards. FACETs will be based on probabilistic threats, storm-scale observations and guidance, the grid tools, useful output, effective response, and verification.

[FACETs: A New Warning Paradigm & Framework for Progress \(.pptx, 28 MB\)](#)

MYRORSS

The **Multi-Year Reanalysis Of Remotely-Sensed Storms (MYRORSS)** is a project that "mirrors" NSSL and the National Climatic Data Center (NCDC) to recompute numerical model output and radar products derived from 15 years of Weather and Climate Research and Advanced Modeling (WCRAM) data over the conterminous U.S. (CONUS). The end result of this research will be a diverse range of applications, including severe weather diagnosis and climate information.

I discovered the power of cloud.

Every two weeks!



Meteorology (

Our Mission is to develop methods and curate

Our Team

Inspire one another
Be direct and transparent



Scientists, engineers, statisticians, and data specialists work together to curate comprehensive data sets and develop scalable, production-ready algorithms.

Our Impact

Leave a mark on the world

We provide the best available estimates of precipitation to people who need weather information the most. Our products reported field-specific weather information for 75 million acres in 2015.



Crop health/damage



Field workability



If and when to fertilize

Our Work: Project Example

Find the possible in the impossible

Motivation

Drop Size Distribution (DSD) vs substantial uncertainty when p_r from radar reflectivity (Z).



Imag
Prog

Same Z, different R



Use the DSD as a latent model radar data and generate a prob Quantitative Precipitation Estim

Test/calibrate/validate model on dataset. The MCSE experiment disdrometer, MRR, and NPOL



Fall speed vs drop size

Bayesian sampling of DSD and rain rate for radar observations.

Extend the initial model as new temporal correlations? coalescence/evaporation of d better error models?

File a patent application



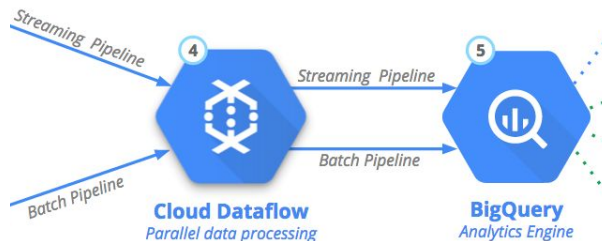
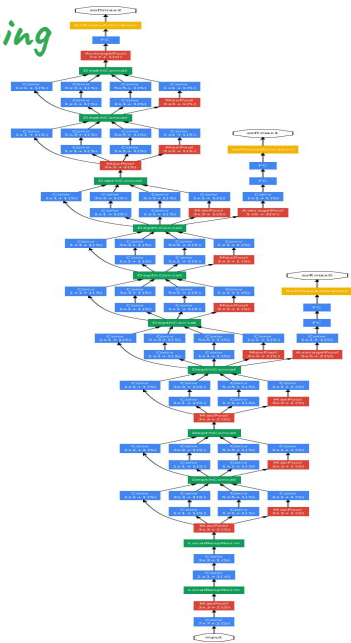
Consider model for use in precipitation



Where do you go if you want to be part of two revolutions?

Google Cloud

Machine Learning



Cloud Computing



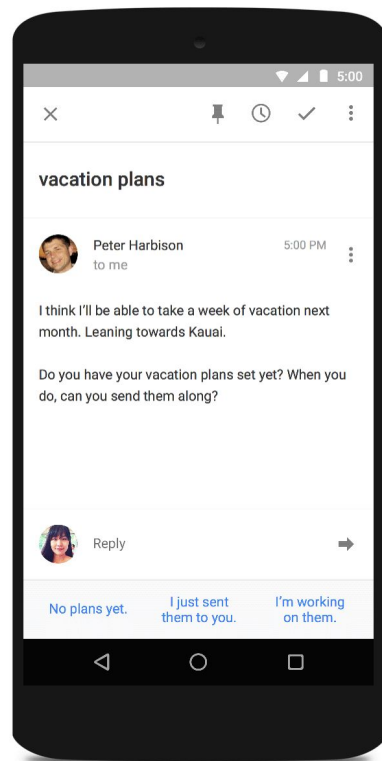
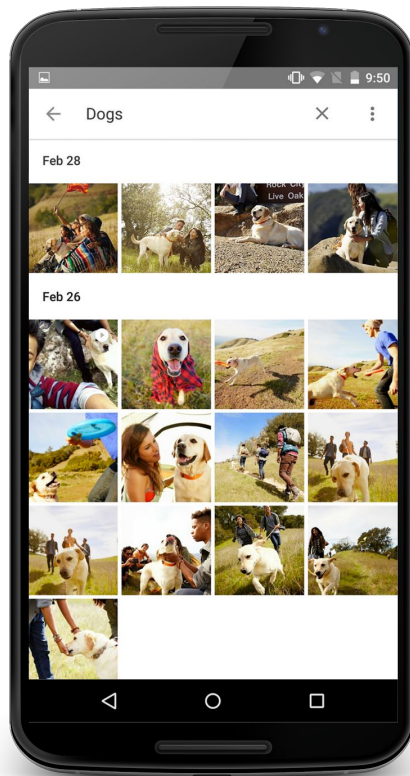
Google Cloud



Leveraging AI on the Cloud to transform your business

Google Cloud

When
you hear
*machine
learning*, you
probably think
of...



The most common ML models at Google operate on structured data

Type of network	# of network layers	# of weights	% of deployed models
MLP0	5	20M	61%
MLP1	4	5M	
LSTM0	58	52M	29%
LSTM1	56	34M	
CNN0	16	8M	5%
CNN1	89	100M	

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



data



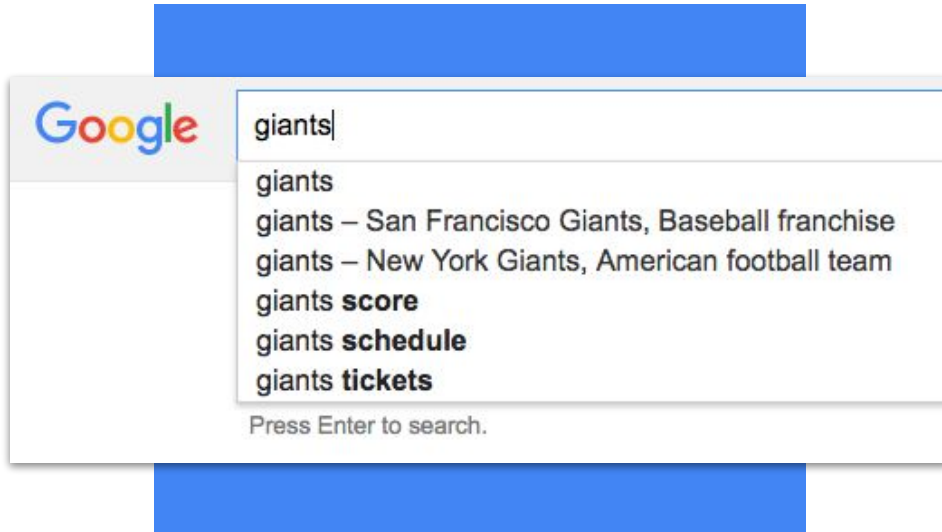
algorithm



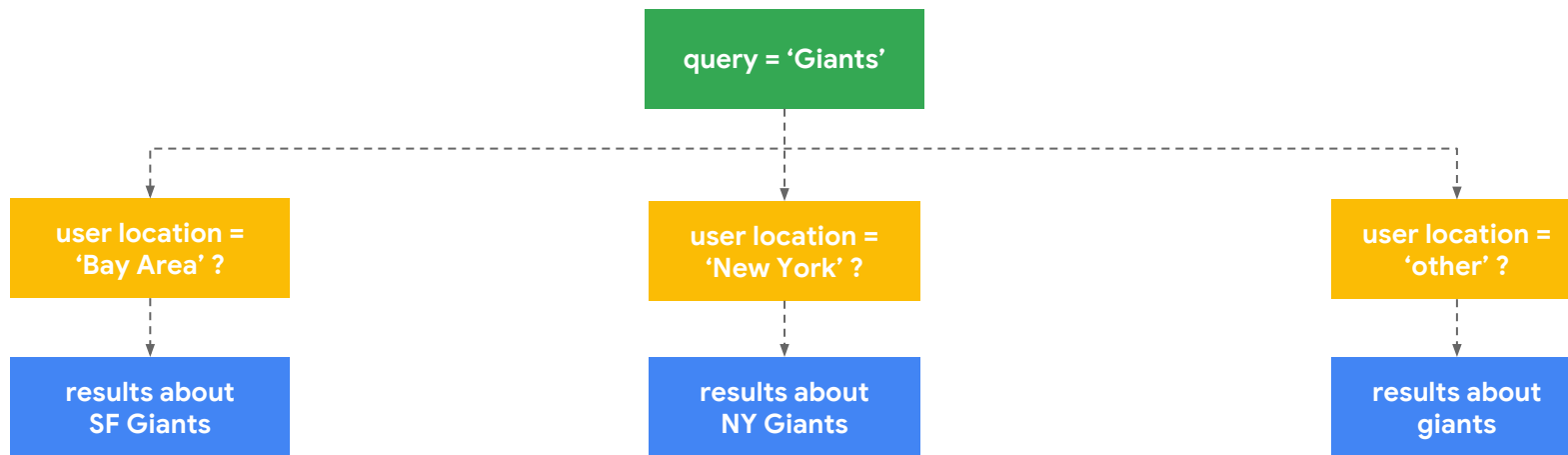
Predictive insight



decision

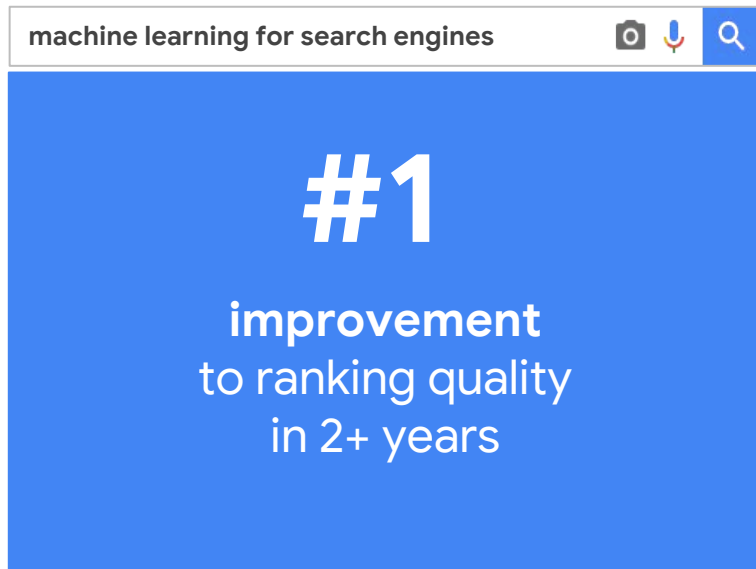


Machine learning **scales** better than hand-coded rules





RankBrain
(a deep neural
network for search
ranking) improved
performance
significantly

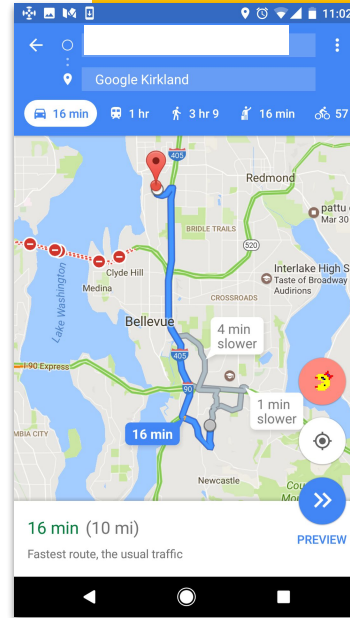


#1

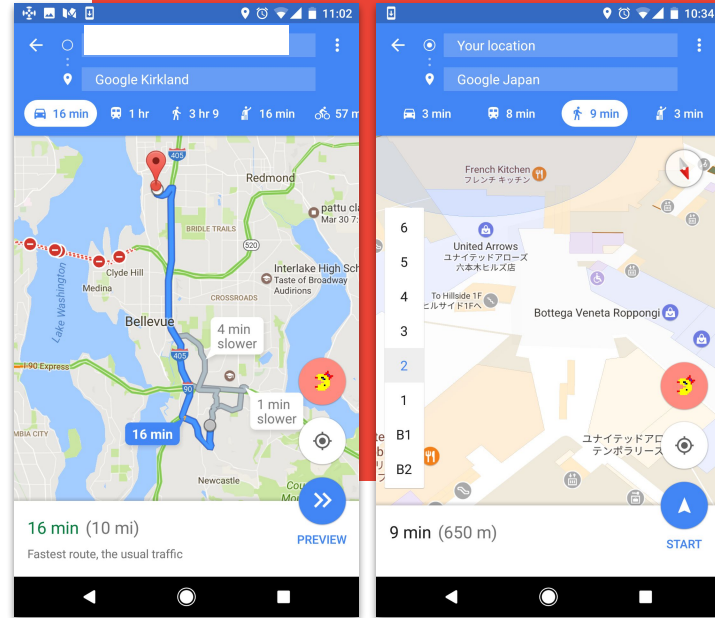
**ML can be used to
solve many problems
for which you are
writing rules today**



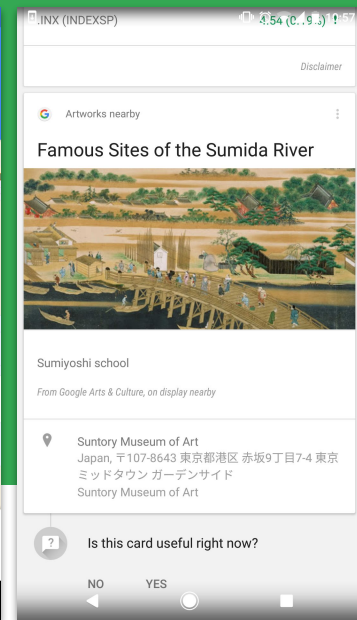
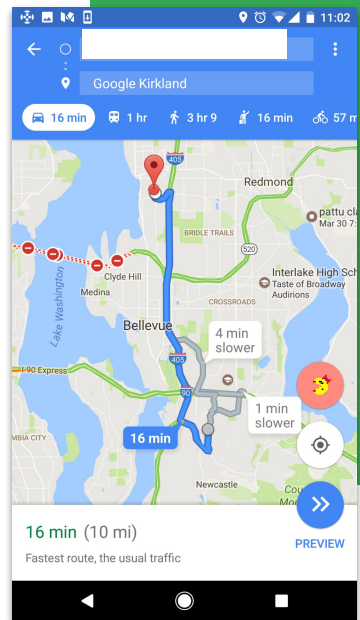
Is this machine learning? What's needed for ML?



Is this machine learning? What's needed for ML?



Is this machine learning? What's needed for ML?



#2

**Machine Learning is
how you personalize
applications and reach
the long tail**



**“It's not who has the
best algorithm who
wins, it's who has the
most data”**

Andrew Ng



Conventional
methods are about
filtering down the
data you happen
to have

Stage 1:
Leads
(1000s)

Stage 2:
Products
(100s)

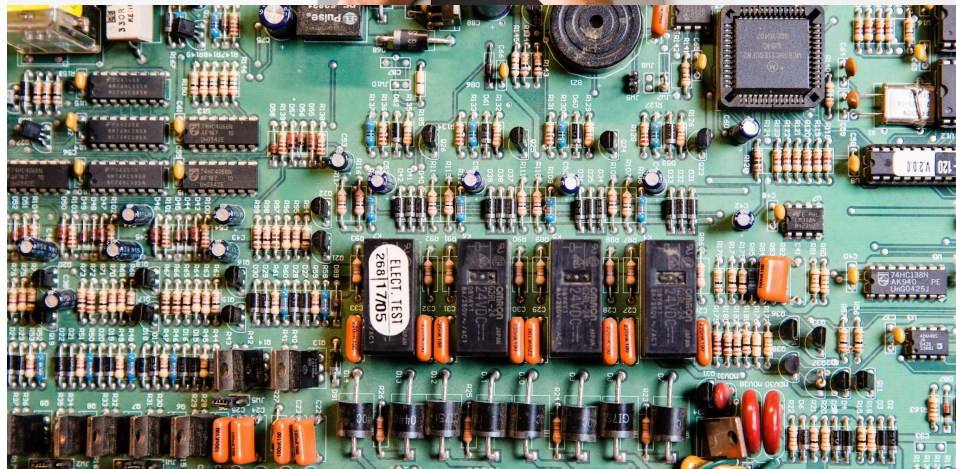
Stage 3: Customers
(10s)

Machine Learning is
about accounting
for more **diverse**
factors





Can now
capture data
from many sources



Big data is changing many industries



Games and social media analytics



Advertising campaign optimization



Sensor data analysis



Transportation and logistics



POS-Retail Analytics



Web Logs, Machine Logs, Infrastructure monitoring



Mobile application analytics

8.4 Billion

The number of connected things in use in 2017, up 31% from 2016*

We're generating more data than ever before



#3

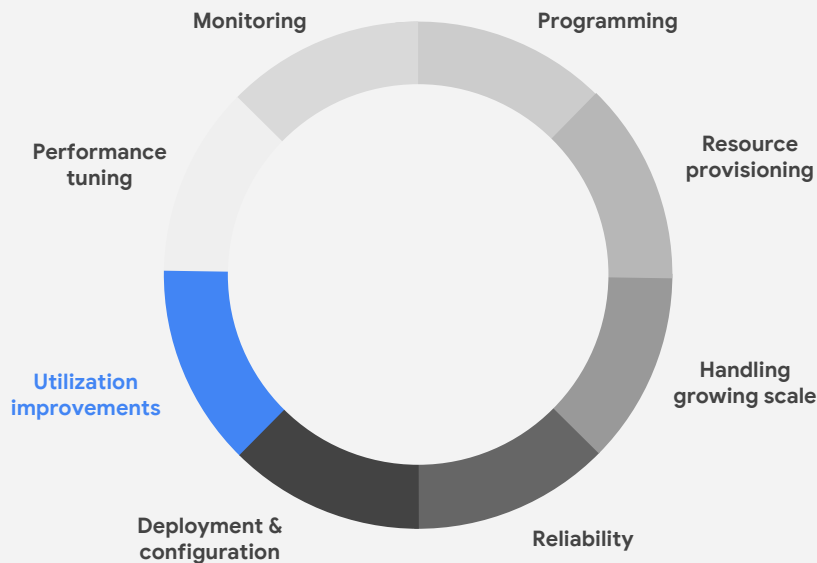
**Design systems with
the expectation that
you will have more
data next year**



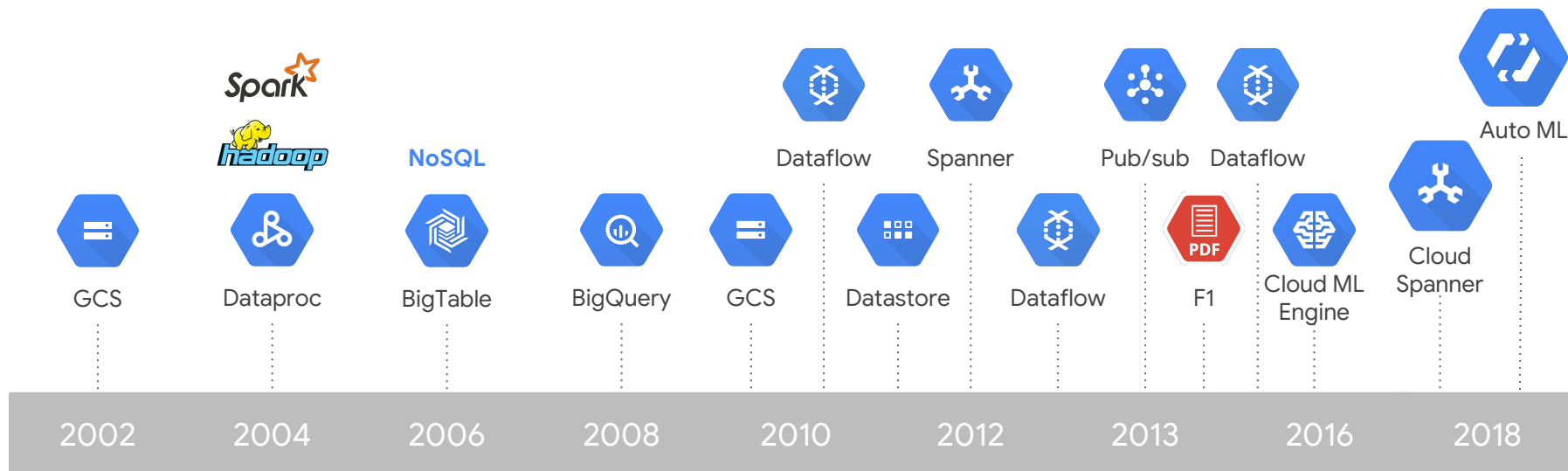
What happens when you collect petabytes and exabytes of data?

Businesses **can not derive value from data** if they are focused on building infrastructure

Typical Big Data Processing Time to Understanding



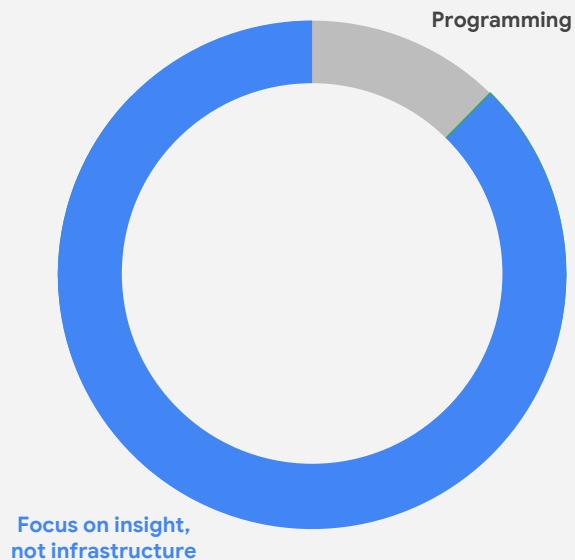
Towards serverless data analysis and processing



Spend Time on 'What' not 'How'



Big Data Processing with Google Cloud Platform Time to Understanding



#4a

**Use a platform that
lets you forget about
infrastructure**



The ML marketplace is moving towards increasing levels of ML abstraction

Custom image model
to price cars



Build off NLP API to
route customer emails



Use Vision API as-is to
find text in memes



Use Dialogflow to
create a new shopping
experience



#4b

**ML is software -- learn
to make buy-vs-build
decisions**



#1

ML can be used to solve many problems for which you are writing rules today

#2

ML is how you personalize applications and reach the long tail

#3

Design systems with the expectation that you will have more data next year

#4

Use a platform that lets you forget about infrastructure and offers great pre-built models

Google Cloud* can help you transform your business with AI

*In Tampa, Tom Howe: thowe@google.com



Google Cloud

@lak_gcp



Thank you.
cloud.google.com