



# Accelerate ML Deployment with H2O Driverless AI on AWS

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Michelle Tanco – Customer Data Scientist

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# We are the Experts in AI and Machine Learning

<b>Company</b>	Founded in Silicon Valley in 2012 Funded: \$147M Investors: Goldman Sachs, Wells Fargo, NVIDIA, Nexus Ventures, Paxion Ventures
<b>Products</b>	<ul style="list-style-type: none"><li>• H2O Open Source Machine Learning (18,000 organizations)</li><li>• H2O Driverless AI – Automatic Machine Learning</li></ul>
<b>Team</b>	175 AI experts (Expert data scientists, Kaggle Grandmasters, Distributed Computing, Visualization)
<b>Global</b>	Mountain View, NYC, London, Prague, India



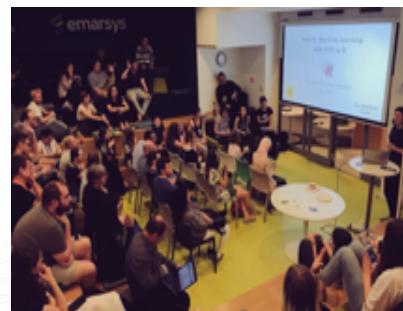
# H2O.ai is Driving AI Momentum

H<sub>2</sub>O.ai

## Open Source Movement Acceleration



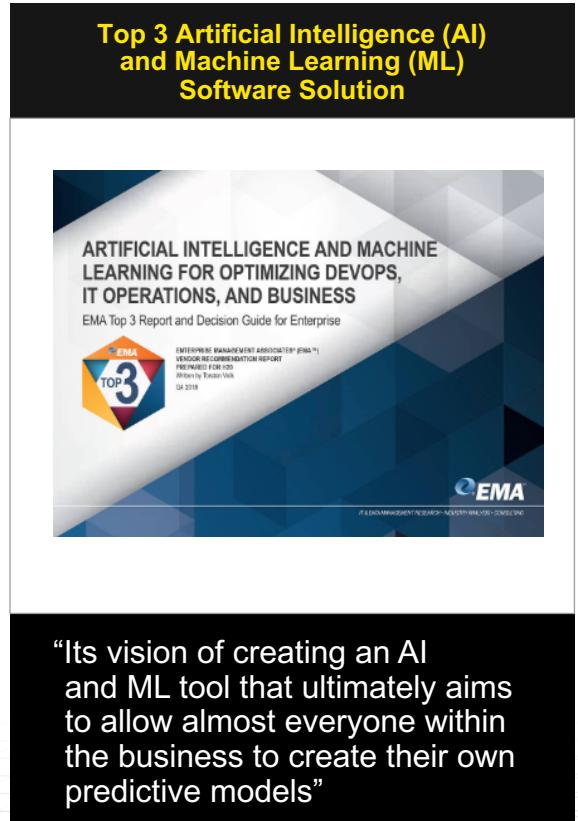
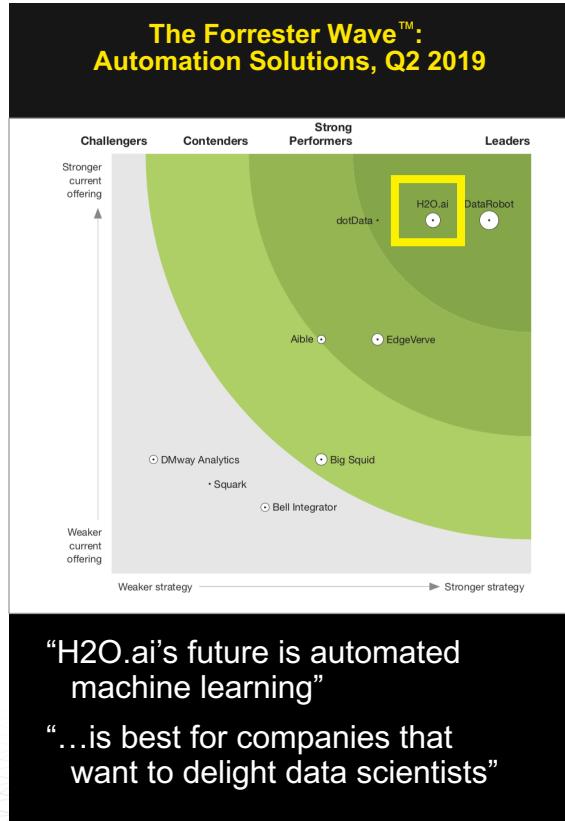
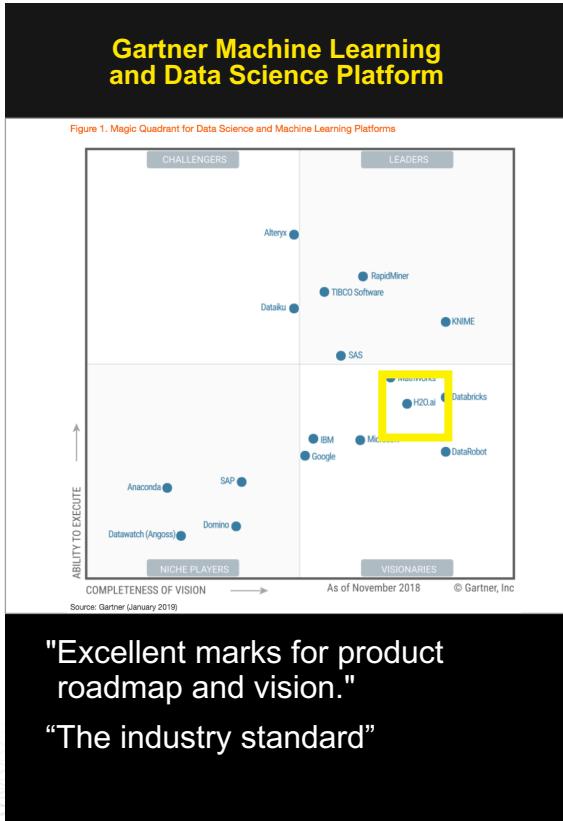
**H2O World – NYC, London, SF**  
Thousands attending live and online



## Growing Customer List



# H2O.ai is a Recognized Leader in AI and ML



# Driverless AI is Across Industries



Insurance



Manufacturing



Financial Services



Healthcare



Retail



Ad Tech / MarTech

# Industry Use Cases

Financial Services	Healthcare	Telecom	Marketing and Retail
<b>Wholesale / Commercial Banking</b> <ul style="list-style-type: none"><li>• Know Your Customers (KYC)</li><li>• Anti-Money Laundering (AML)</li></ul> <b>Card / Payments Business</b> <ul style="list-style-type: none"><li>• Transaction frauds</li><li>• Collusion fraud</li><li>• Real-time targeting</li><li>• Credit risk scoring</li><li>• In-context promotion</li></ul> <b>Retail Banking</b> <ul style="list-style-type: none"><li>• Deposit fraud</li><li>• Customer churn prediction</li><li>• Auto-loan</li></ul>	<ul style="list-style-type: none"><li>• Early cancer detection</li><li>• Product recommendations</li><li>• Personalized prescription matching</li><li>• Medical claim fraud detection</li><li>• Flu season prediction</li><li>• Drug discovery</li><li>• ER and hospital management</li><li>• Remote patient monitoring</li><li>• Medical test predictions</li></ul>	<ul style="list-style-type: none"><li>• Predictive maintenance</li><li>• Avoidable truck-rolls</li><li>• Customer churn prediction</li><li>• Improved customer viewing experience</li><li>• Master data management</li><li>• In-context promotions</li><li>• Intelligent ad placements</li><li>• Personalized program recommendations</li></ul>	<ul style="list-style-type: none"><li>• Funnel predictions</li><li>• Personalized ads</li><li>• Credit scoring</li><li>• Fraud detection</li><li>• Next best offer</li><li>• Next best customer</li><li>• Smart profiling</li><li>• Prediction</li><li>• Customer recommendations</li><li>• Ad predictions and spend</li></ul>

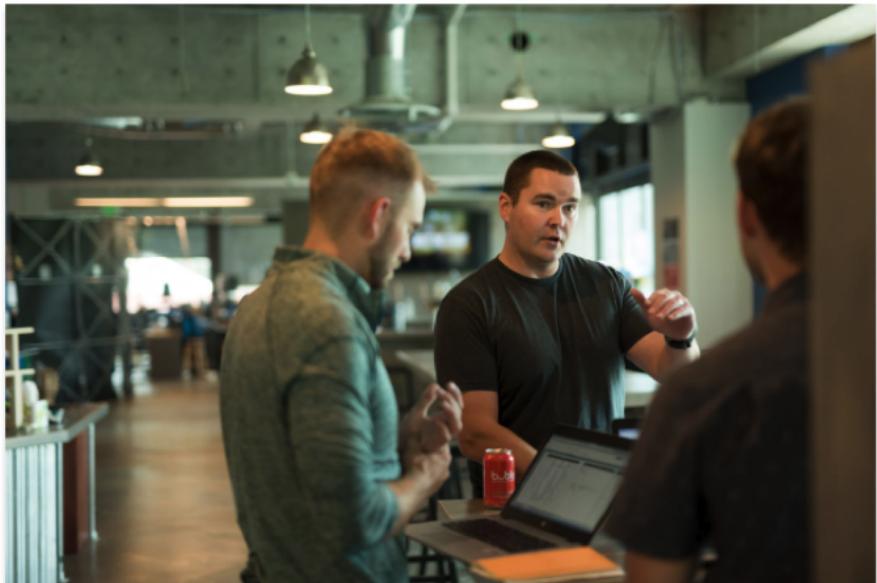
**Save Time. Save Money. Gain a Competitive Advantage.**



# Real Estate Marketing Optimization

## G5 marketing expertise by the numbers.

- **7,000 websites**, servicing 500 portfolios
- **Delivering tens of millions of leads** hundreds of millions of visitors
- **Leaders in Digital Marketing optimization** since 2005





## ...Calls Matter Most

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90% of Interactions are Call based

1 out of 7 Calls has commercial intent

Quick follow up matters

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# Need to Classify Caller Intent

## Benefits For Marketers

- Track Qualified Leads (QL) Including Calls Automatically!
- Measure Marketing Channel Efficiency
- Rank channel sources (including ads) by Leads, Qualified Leads and ratios
- Filter and track individual channels

## Benefits For Operators

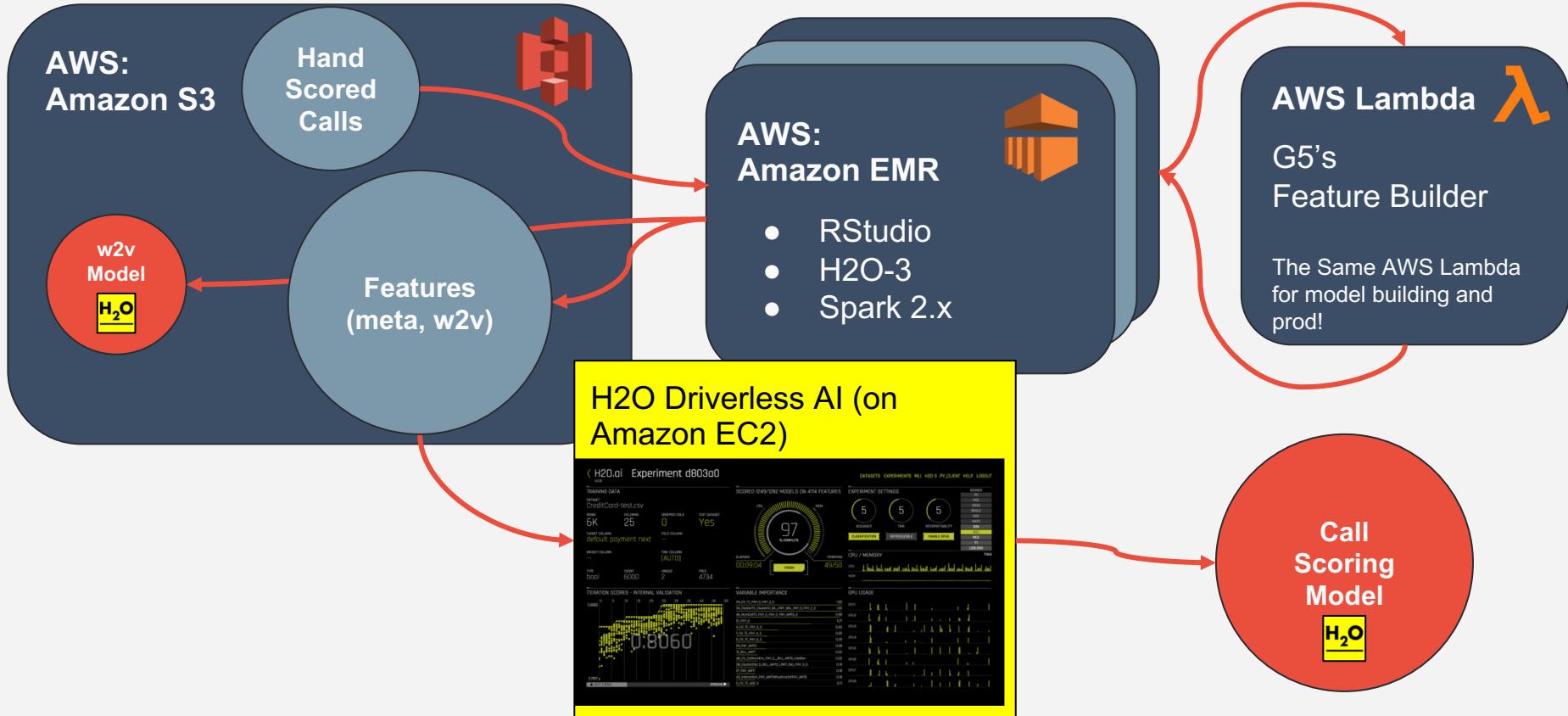
- Separate View for phone agents and operators that shows ranked Leads by propensity to lease and recency for quick and prioritized follow up



Use ML to score and rank calls with the highest revenue potential

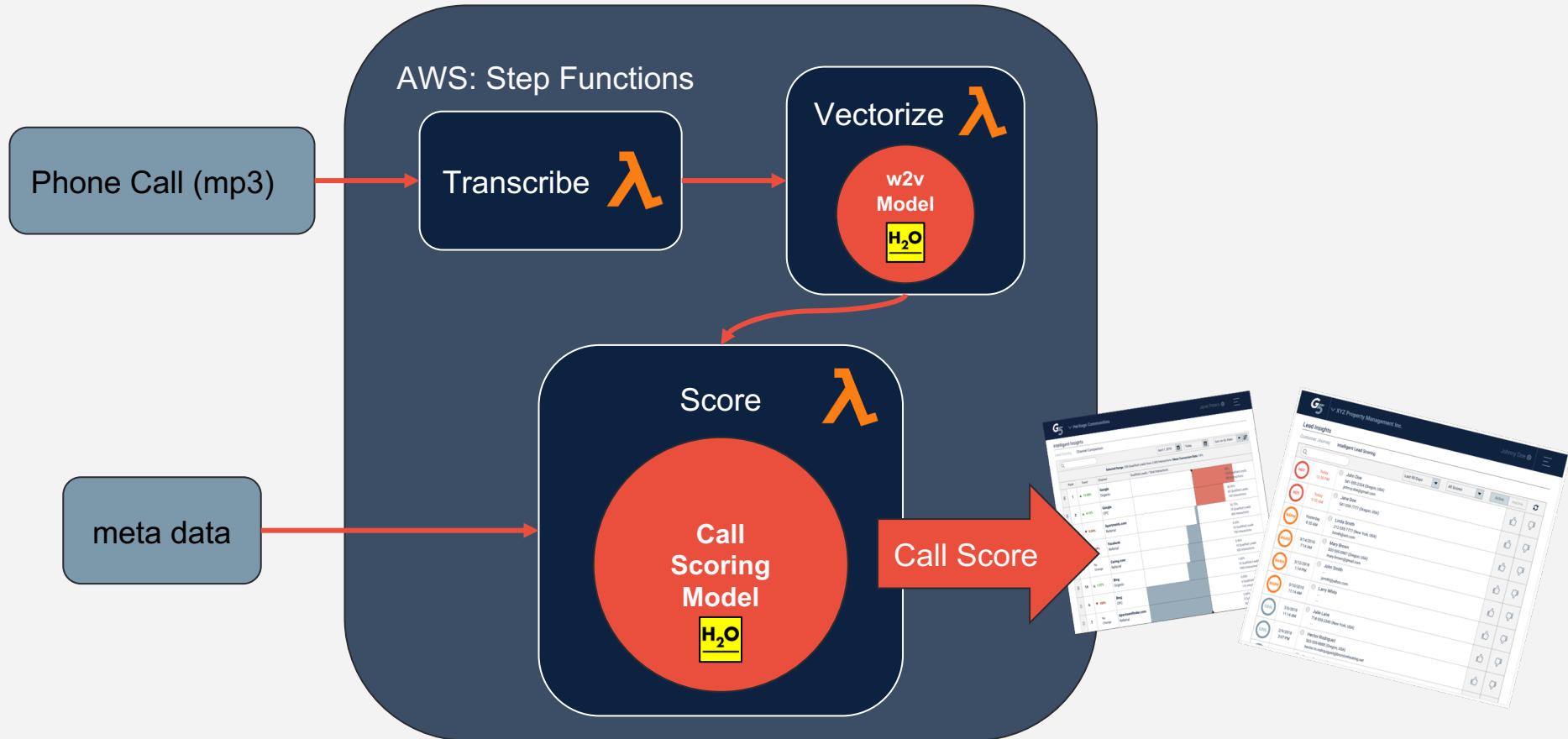


# Getting from Data to Prediction



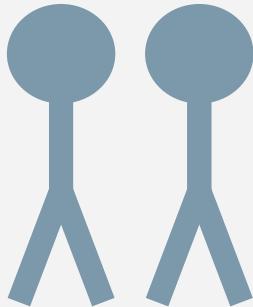


# Getting from Prediction to Product

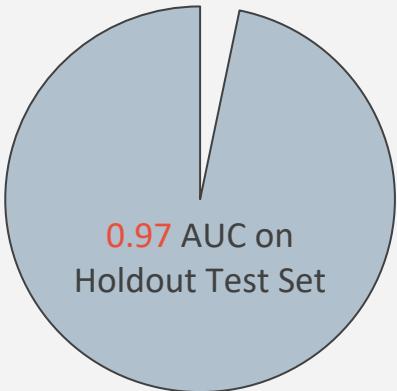




# Business Outcome: Metrics and Results



2 technical staff



0.97 AUC on  
Holdout Test Set



5X faster  
Model Building



95% Real World  
Scoring Accuracy

~3 Minutes Time Savings Per Call vs Human Listening

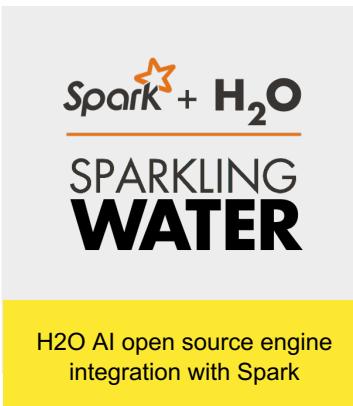
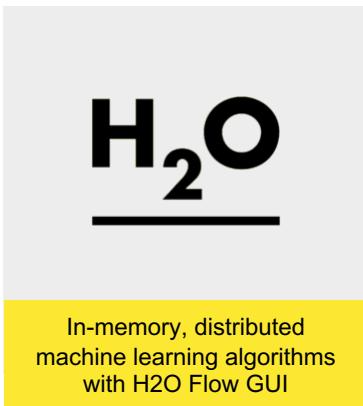
@1 Million Calls Per Month    =    50k Hours

\$1.25 Million Saved Per Month

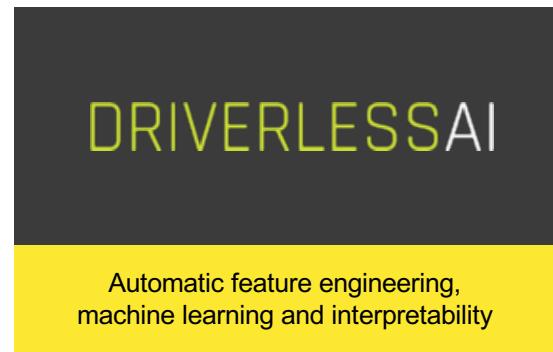
Reduce Scoring Time by  
vs Competitors

99%

## Open Source



- 100% open source – Apache V2 licensed
- Built for data scientists – interface using R, Python on H2O Flow (interactive notebook interface)
- Enterprise support subscriptions



- Enterprise software
- Built for domain users, analysts and data scientists – GUI-based interface for end-to-end data science
- Fully automated machine learning from ingest to deployment
- User licenses on a per seat basis (annual subscription)

# Driverless AI is ideal for Enterprise AI

## Talent

Data is a Team Sport

~100

Data Science Experts  
in the World

Lack of AI Talent

## Time

Months

Time for a Data Scientist  
to Build a Model

Time to Insights Slow

## Trust

?

Explainable AI

Lack of Trust in AI

# Driverless AI Delivers AI for Enterprise

H<sub>2</sub>O.ai

## Talent

Expert Data  
Scientists at H2O.ai

Kaggle Grandmasters

## Time

Months  
to Hours

GPU Accelerated ML  
Automatic Pipelines

Time to Insight

## Trust

Machine Learning  
Interpretability

Auto Doc

Auto Visualization

Explainability  
and Transparency

# Supervised Learning

Age	Income	Last Month Payment	Default
47	\$183,342	Yes	False
29	\$ 84,823	No	True
58	\$ 95,853	Yes	False
63	\$ 43,824	Yes	True

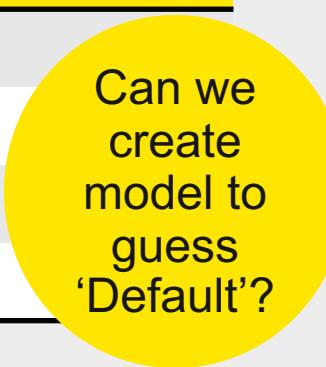
Training Data



What's the pattern?

Age	Income	Last Month Payment	Default
61	\$ 73,679	Yes	
73	\$ 54,428	No	
59	\$ 90,453	Yes	
43	\$ 83,041	Yes	

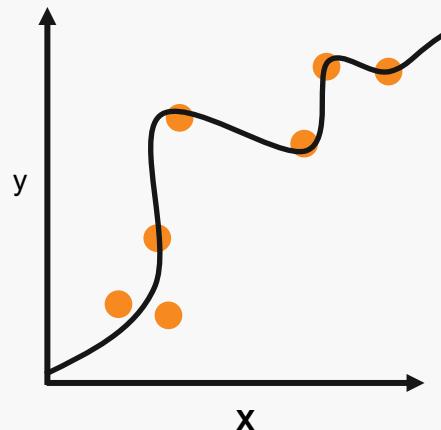
Test Data



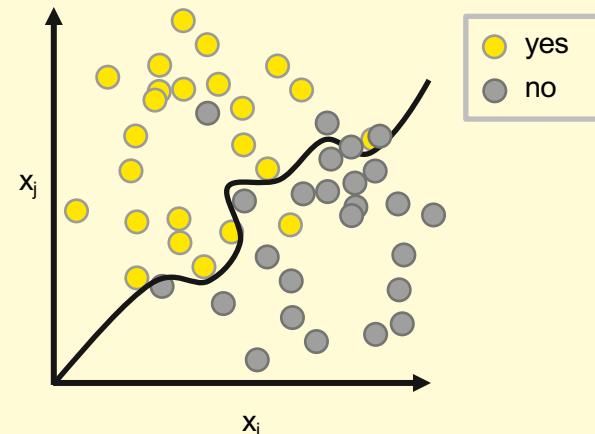
Can we create model to guess 'Default'?

# Supervised Learning Techniques

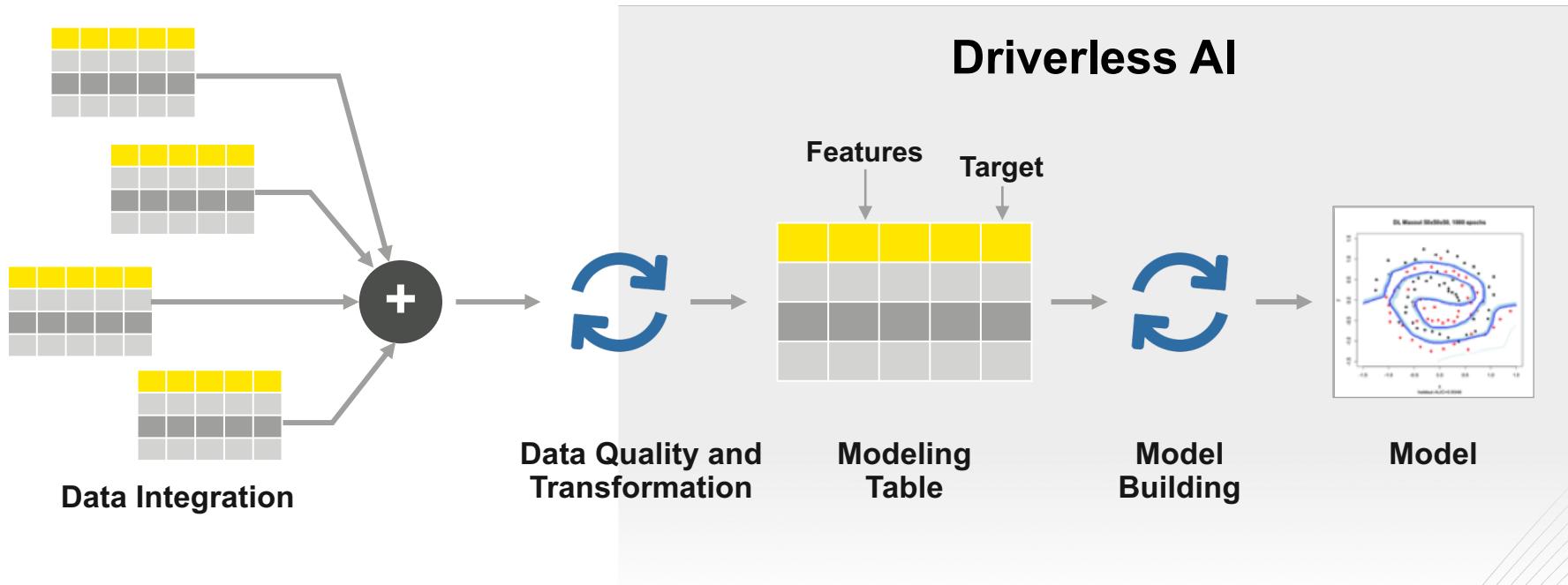
**Regression:**  
How much will a customer spend?



**Classification:**  
Will a customer make a purchase? Yes or No

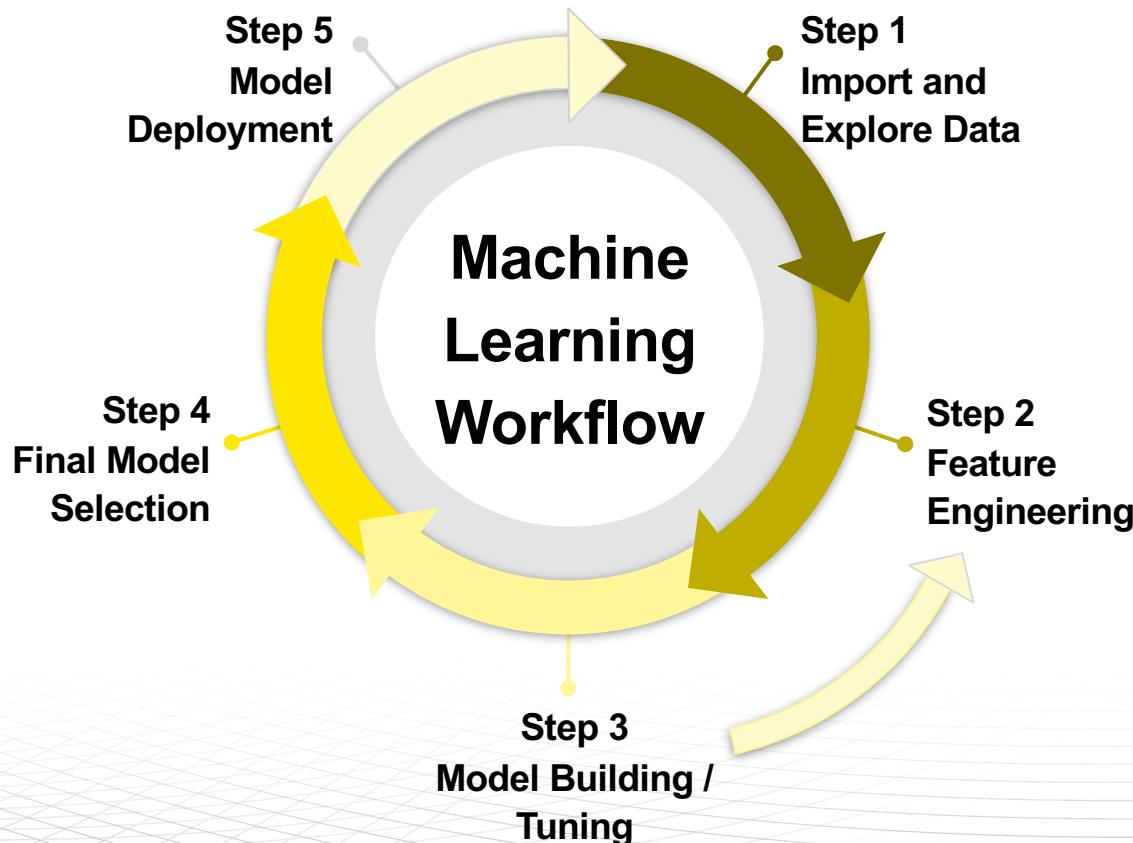


# Driverless AI: Automates Data Science and ML Workflows

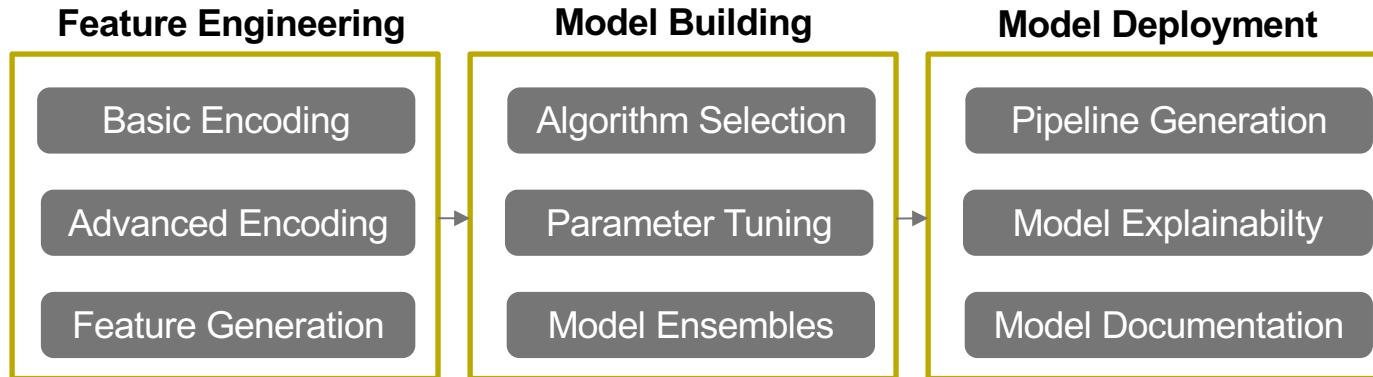


# Machine Learning Iterative Process

From Data to Deployment



# Challenges in AI Model Development



- Time consuming
- Requires advanced skillset
- Creating new feature combinations requires advanced skill

- Time consuming
- Requires advanced knowledge of algorithms and parameters
- Creating ensembles is an advanced skill

- Time consuming
- Requires different set of skills to deploy models
- Explaining how models make decisions is critical to building trust with business stakeholders and regulators

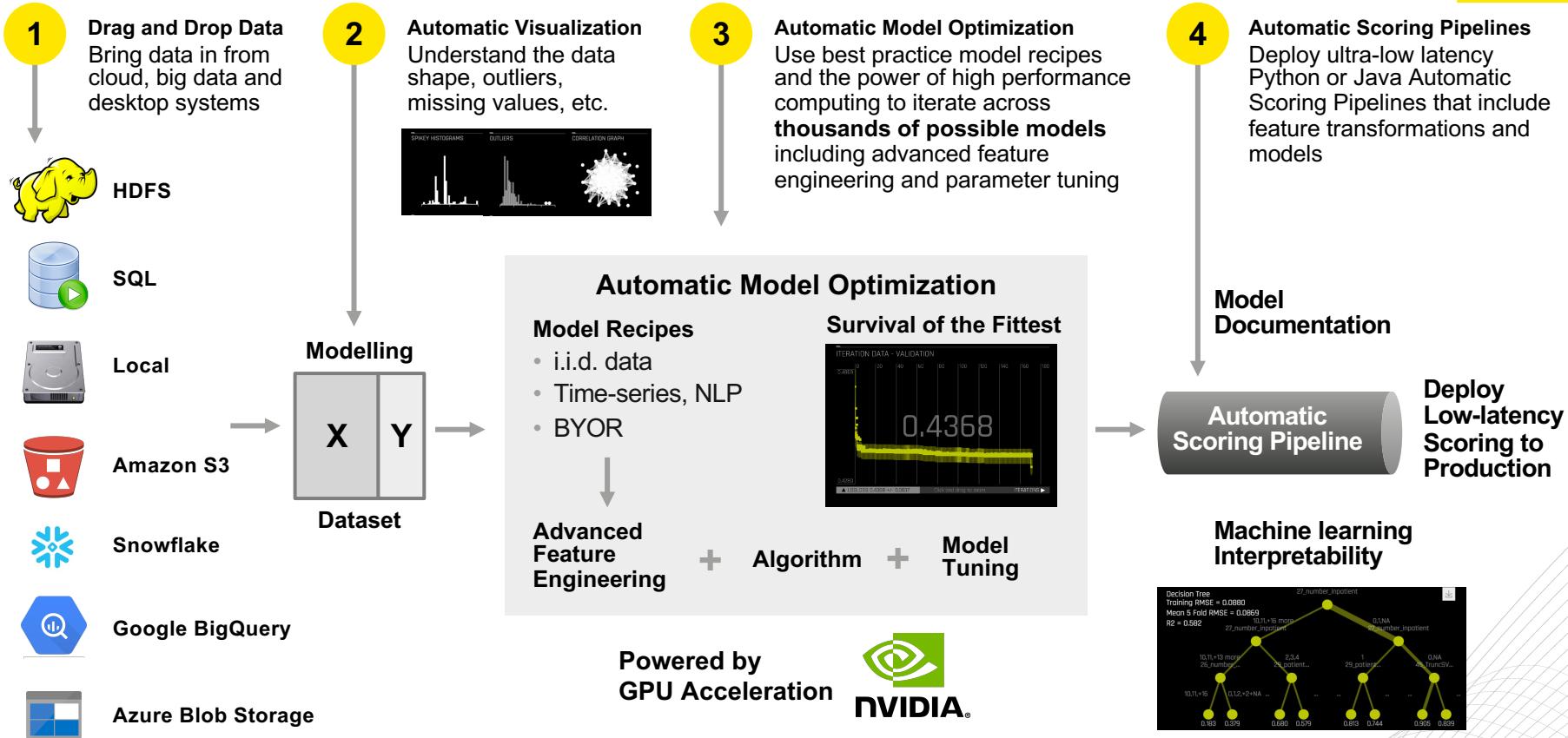
The entire process is highly iterative and can take weeks or months to develop a single production-ready model.

# Driverless AI Platform Capabilities



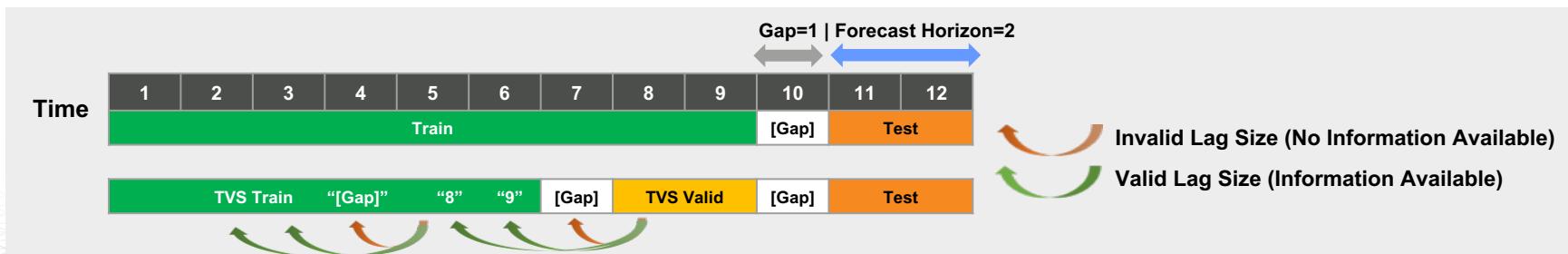
- Automatic Visualization
- Automatic Feature Engineering
- Automatic Model and Ensemble Selection
- Machine Learning Recipes
  - Time Series
  - NLP
- GPU Acceleration
- Machine Learning Interpretability (MLI)
- Scoring Pipeline and Deployment
- Trouble Shooting and Docs

# H2O Driverless AI – How it Works



# Time Series Recipe in Driverless AI

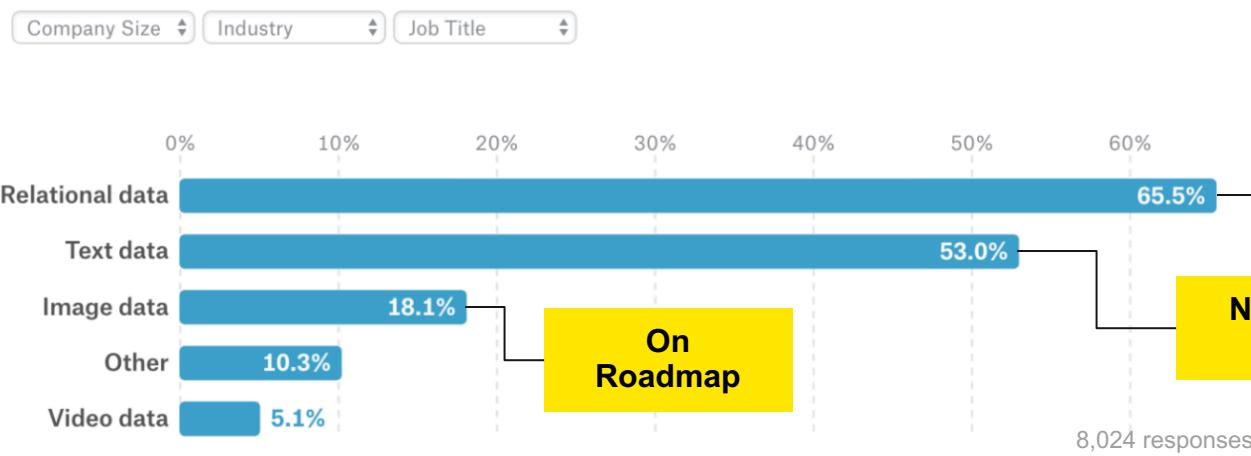
- Automatic handling of time groups (e.g., [time, store\_id, department\_id])
- Robust validation framework
  - Accounting for time gaps between train and test
  - Accounting for length of forecast horizon the user is interested in
- Comprehensive set of recipes for time series specific feature engineering
  - Date features like day of week, day of month, etc.
  - Optimal (target)-lags taking account of detected time groups
  - Interactions of lagged-features
  - Exponentially Weighted Moving Averages of n-th order differentiated past information
  - Aggregation of past information (mean, std, sums, etc.) across time groups and for different time intervals (e.g., every week, every two weeks, etc.)
- Fully integrated into **Driverless AI's** optimization pipeline



# Text / Natural Language Processing in Driverless AI

## What type of data is used at work?

Relational data is the most commonly reported type of data used at work for all industries except for **Academia** and the **Military and Security** industry where text data's used more.



Recipes Can Mix and Match

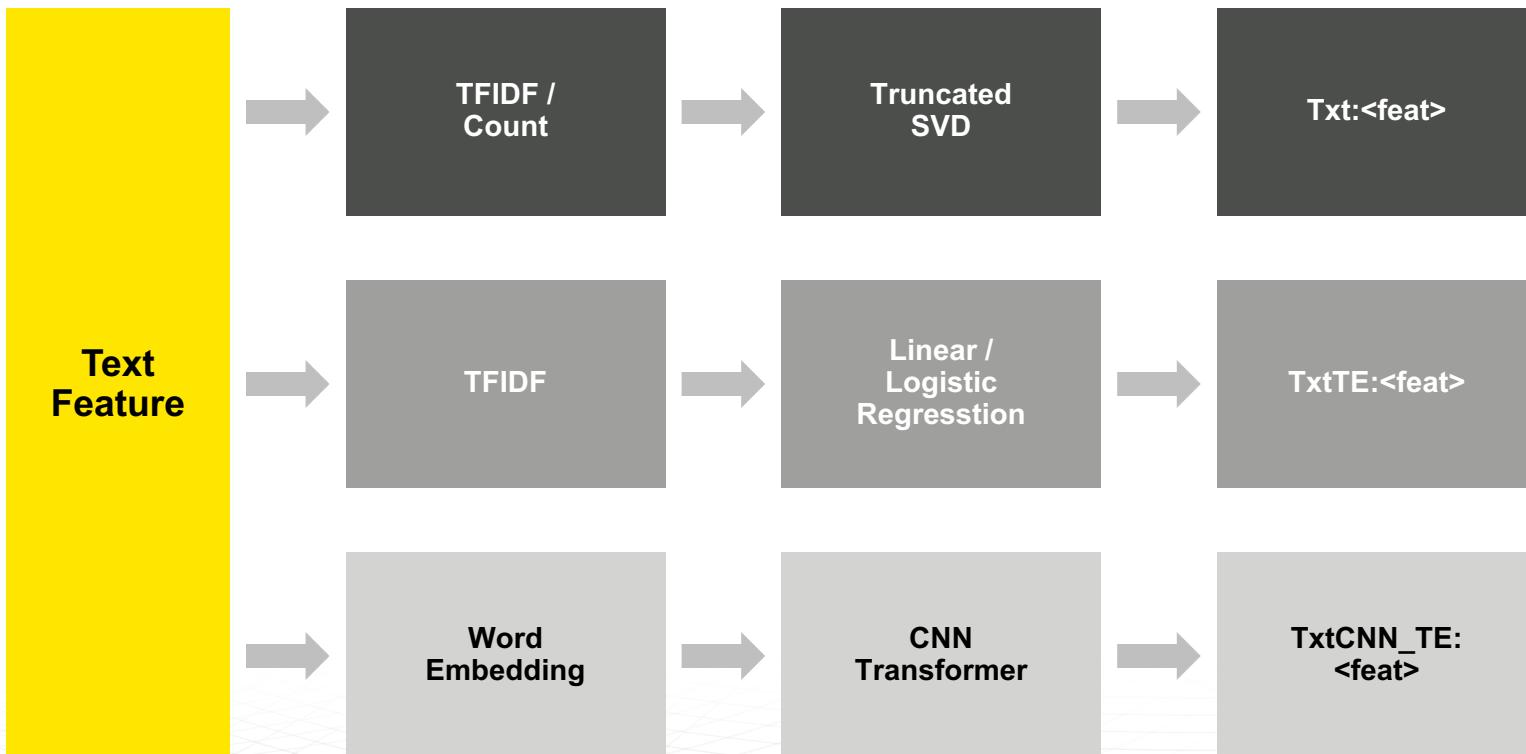
i.i.d and Time-Series Recipes

NLP Recipes: Statistical and Deep Learning

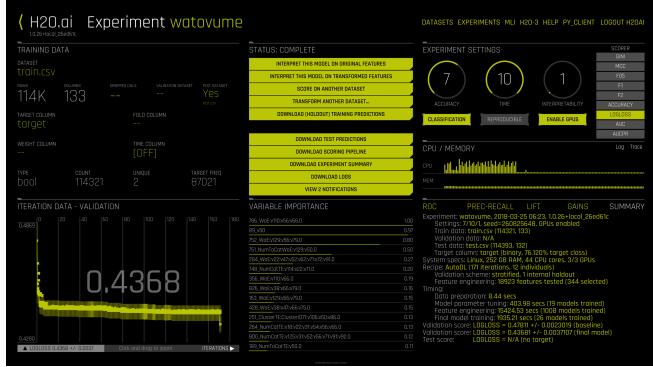
More information:

<https://blog.h2o.ai/2018/09/automatic-feature-engineering-text-analytics-latest-addition-kaggle-grandmasters-recipes/>

# Text / Natural Language Processing in Driverless AI



# Driverless AI: Top 10 in BNP Paribas Kaggle Competition



Single Run,  
Fully Automated:  
2h on DGX  
Station!  
6h on PC

## BNP Paribas Cardif Claims Management

Can you accelerate BNP Paribas Cardif's claims management process?

\$30,000 • 2,926 teams • 2 years ago

Submission and Description

[sub.csv](#)

3 months ago by Arno Candel

940b9f 7/10/1 cv 0.4354 finished after 172 iters

Private Score

Public Score

Use for Final Score

0.42945

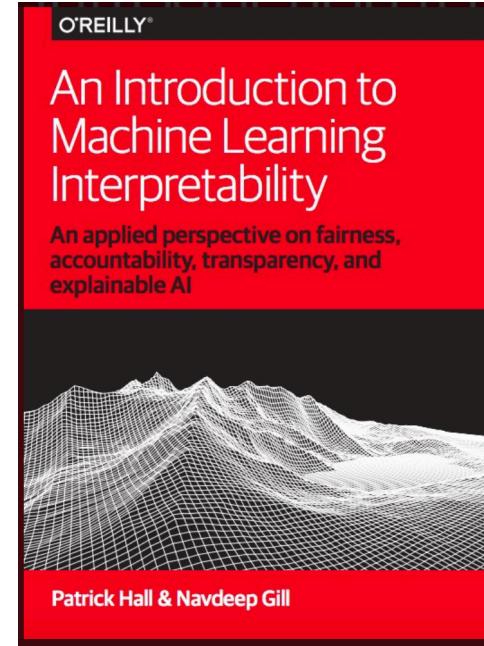
0.43156

#	△pub	Team Name	Kernel	Team Members	Score @	Entries	Last
1	—	Dexter's Lab			0.42037	198	2y
2	—	escalated chi			0.42079	162	2y
3	—	Exploding Kittens			0.42182	124	2y
4	—	Branden   Nickel   utility			0.42259	251	2y
5	—	the flying burrito brothers			0.42450	264	2y
6	—	n_m			0.42535	4	2y
7	—	PAFY			0.42557	310	2y
8	—	KAME			0.42688	121	2y
9	—	Jack (Japan)			0.42744	22	2y
10	▲ 1	Dmitry & Bohdan			0.43000	192	2y
11	▲ 1	Li-Der			0.43006	56	2y
12	▼ 2	BK3M2PRS			0.43089	338	2y
13	—	x2x4x8			0.43107	55	2y
14	—	Frenchies			0.43146	134	2y
15	▲ 1	Alns			0.43168	55	2y
16	▼ 1	maze runners			0.43262	164	2y
17	—	BLR-2			0.43313	129	2y
18	▲ 3	no one			0.43317	88	2y

Driverless AI: 10th Place in Private LB at Kaggle (Out of 2,926)

2 Months for Grandmasters – 2 Hours for Driverless AI

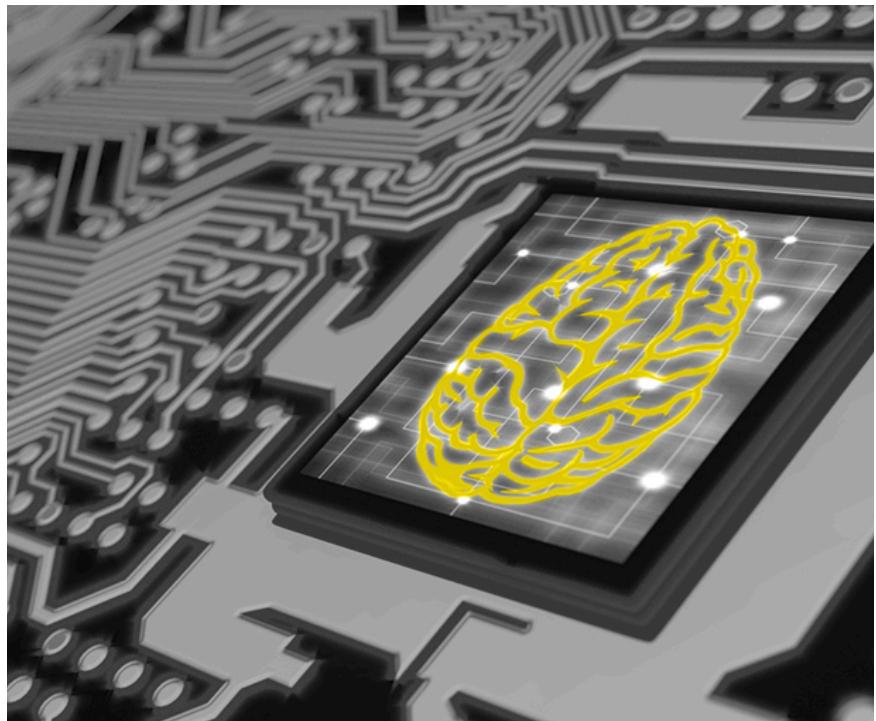
# MLI – Machine Learning Interpretation



**Gain Confidence in Models before Deploying them!**

# Easy Deployment for Low-latency Models

- Stand-alone scoring pipeline that is easy for IT to deploy and manage including all feature transformations
- Easy to update when a new model version is available
- Optimized the scoring code for complex (big data) models
- Streamlined scoring code to deploy on any device on the edge, mobile, etc.
- Really fast (millisecond) to satisfy today's real-time apps





# Driverless AI Integrates with

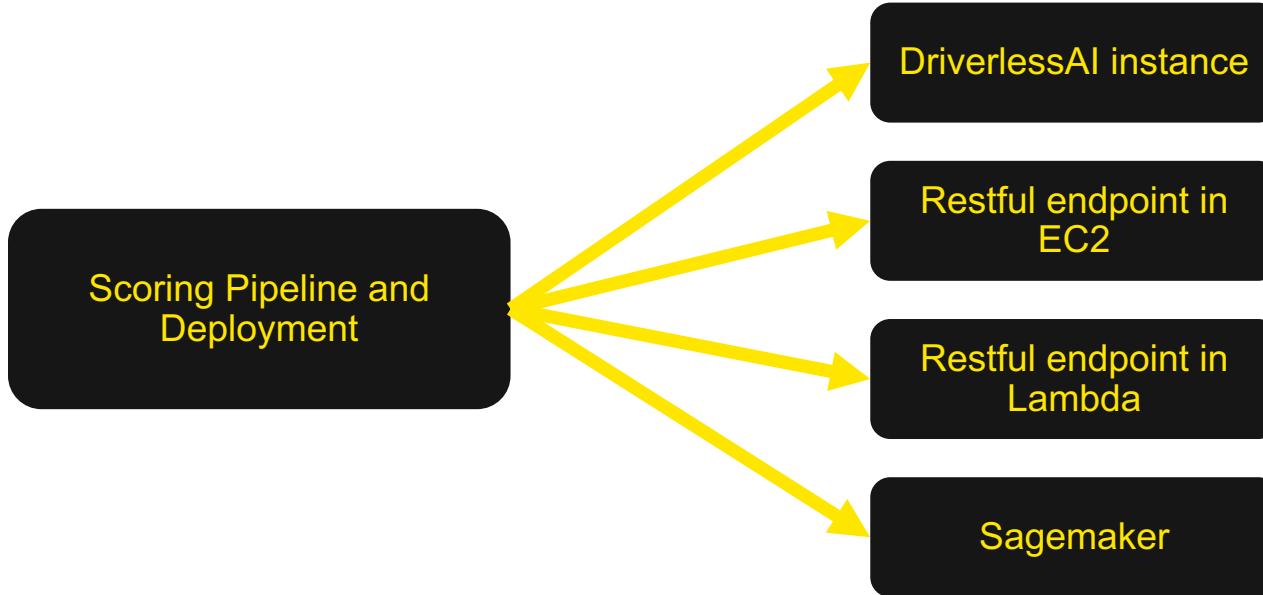
- Driverless AI has a built in connector to AWS S3
- Driverless AI can be easily deployed to EC2 using an AMI
- Driverless AI Mojo2 can easily be deployed for inference using AWS services like AWS Lambda (single-click) and AWS Sagemaker
- Manage all cloud configurations with Enterprise Puddle for AWS
- JDBC connector to Redshift

Explore Amazon S3:  
DRIVERLESS AI 1.4.1 – AI TO DO AI  
Licensed to H2O.ai (SM29)  
s3://h2o-public-test-data/smalldata/

DATASETS OVERVIEW

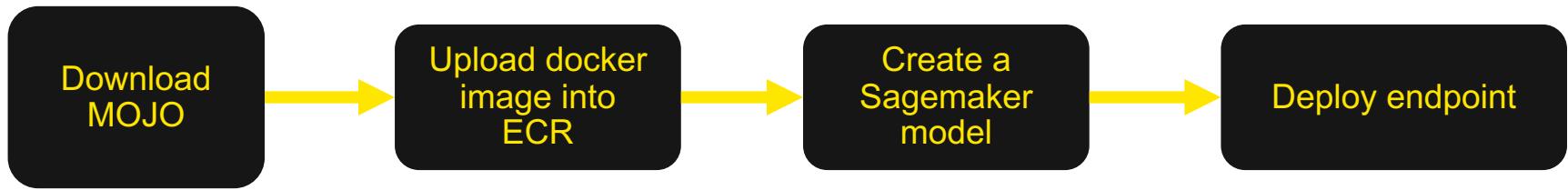
NAME	SOURCE	SIZE
[...]	s3://h2o-public-test-data/smalldata/bcwd.csv [14.3KB]	107MB
BHPBathubs-test.csv	s3://h2o-public-test-data/smalldata/craigslistJobTitles.csv [699.8KB]	107MB
/data/	s3://h2o-public-test-data/smalldata/smsData.txt [111.0KB]	107MB
BHPBathubs-train.csv	s3://h2o-public-test-data/smalldata/weather.csv [38.7KB]	107MB
/data/	s3://h2o-public-test-data/smalldata/airlines/	
	s3://h2o-public-test-data/smalldata/anomaly/	
	s3://h2o-public-test-data/smalldata/arcene/	
	s3://h2o-public-test-data/smalldata/arff-examples/	
	s3://h2o-public-test-data/smalldata/binarymodels/	
	s3://h2o-public-test-data/smalldata/census_income/	
	s3://h2o-public-test-data/smalldata/challenge/	
	s3://h2o-public-test-data/smalldata/chess/	

# Scoring pipeline of Driverless AI models



# Scoring pipeline in Amazon Sagemaker

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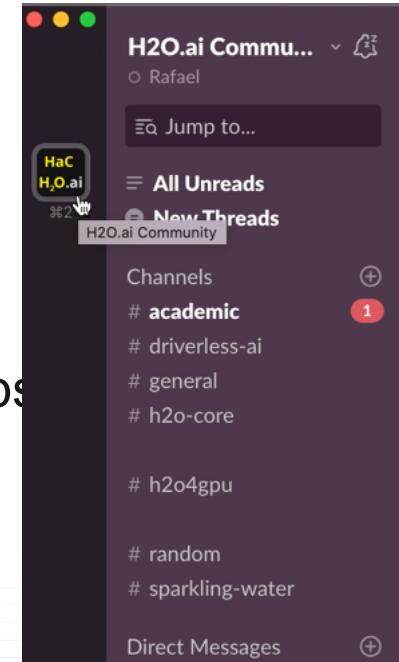


# H2O.ai Community Slack Workspace

H<sub>2</sub>O.ai

Online Chat to ask questions, discuss use cases, give feedback and more

- Join the H2O.ai Community Slack Workspace today!
  - <https://www.h2o.ai/community/driverless-ai-community/#chat>
- Click:  
[Sign up for Community Slack Channel](#)
- You will receive an email with login details and next steps
- Check out Community Guide for more info:
  - <https://tinyurl.com/hac-community-guide>



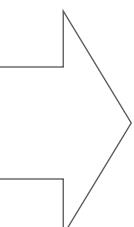
# Interactive Demo

# Register for a Test Drive of DAI on Aquarium

H<sub>2</sub>O.ai

<http://aquarium.h2o.ai/login>

# Create Your Account and Launch DAI



**H<sub>2</sub>O.ai**

## Login

Email \*

Password \*

**Login**

**Create a new account**

I forgot my password

**H<sub>2</sub>O.ai**

Yves Laurent (student)

[Dashboard](#) [Browse Labs](#)

### Driverless AI Test Drive

Lab ID: 6  
Lab cloud: aws (us-west-2)  
Lab cloud image ID: ami-023b8dfc573db90  
Lab cloud instance type: p2.xlarge  
Lab duration: 120 minutes

### Welcome!

You are one click away to kickoff your Driverless AI test drive. You can hit the "Start Lab" button below and we'll get an instance ready. This might take 5 to 10 minutes. While we get this set up, please review the step-by-step tutorial that will guide you through the test drive. You'll explore how to:

- Auto visualize a dataset
- Launch an experiment
- Perform feature engineering
- Create ML Interpretability report

To access the tutorial, [click here](#).

When the instance is ready you can click on the Driverless AI URL provided at the bottom of the page. You can navigate to the test drive dataset in the UI as follows:

- "ADD DATASET" -> "FILE SYSTEM" -> /data/TestDrive/titanic.csv

This instance will be available to you for two hours, after which it will terminate. If you need more time to further explore Driverless AI you can always launch another test drive instance.

Enjoy the drive!

**Start Lab** **End Lab**

# Thank You