

AI & Machine Learning

Spin up Jupyter Notebooks at scale and increase your productivity

Aaron Sengstacken

Senior Machine Learning Specialist SA

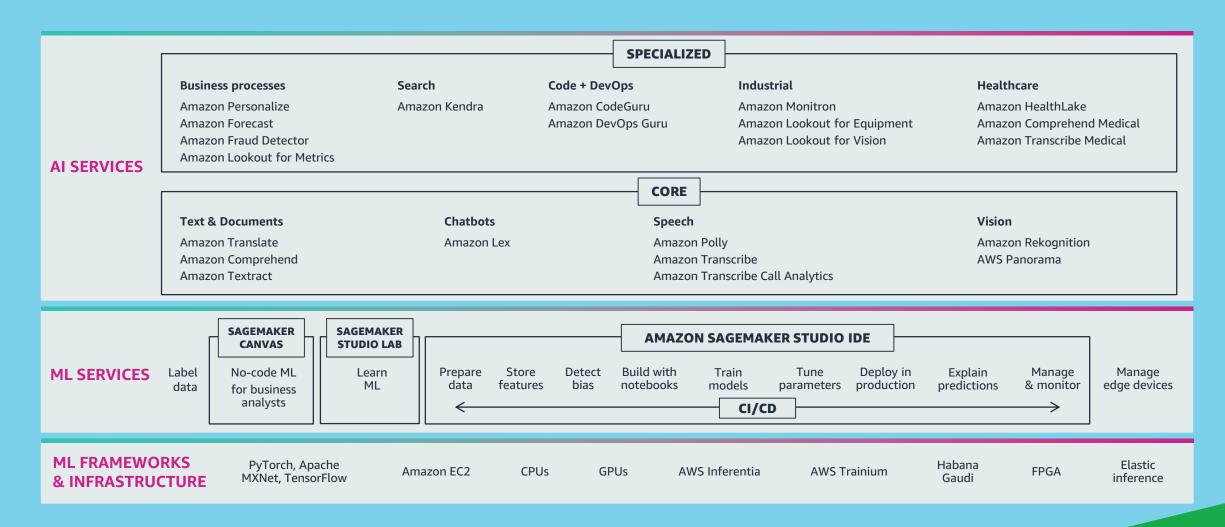
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Outline

- Machine Learning on AWS
- Amazon SageMaker Overview
- Amazon SageMaker Studio Onboarding
- Demonstration
- Getting Started

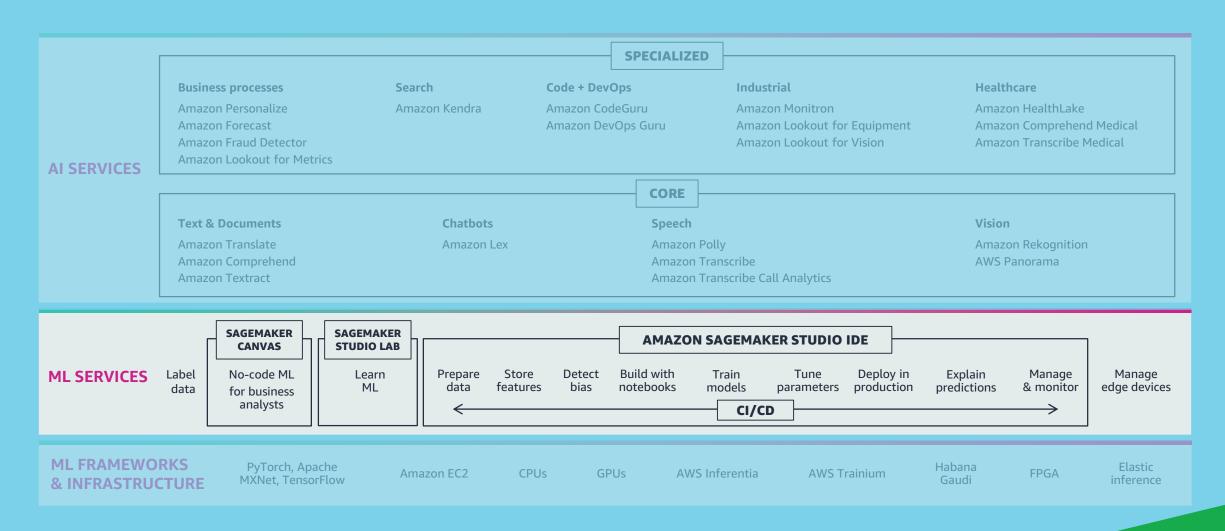
The AWS ML stack

Broadest and most complete set of machine learning capabilities



The AWS ML stack

Broadest and most complete set of machine learning capabilities



INTEGRATED WORKBENCH

IDE designed specifically for ML, data preparation, experiment management, and pipelines

MANAGED INFRASTRUCTURE

Designed for ultralow latency and high throughput, automatic scaling, and distributed training

MANAGED TOOLING

Purpose-built from the ground up to work together: SageMaker Autopilot, collaboration, Jupyter notebooks, Experiments, Debugger, Model Monitor, and more

https://aws.amazon.com/sagemaker

Amazon SageMaker

Most complete end-to-end ML service

random_cut_forest.ipynb ×	A Trial Corr	ponent Chart						
B + % 1 D → ■ C Code → O git conda_python3 O								CHART PROPERT
	TRIAL COMPONENTS 9 rows selected. Select rows to toggle chart visibility.							Data type
Computing Anomaly Scores		xperiment						 Time series Summary state
Now, let's compute and plot the anomaly scores from the entire taxi dataset.		ruits111	Apple111		MO-minerva-byo-2019-11-14-04-;	6.00.aus.training.ich	arn:aws:sager	Junning su
non, let a compare and piet the anomaly acrea from the entire taxi dataset.		ruits111	Apple111				amawssage	Chart type
<pre>[]: results = rcf_inference.predict(taxi_data_numpy)</pre>		ruits111	Apple111				amawssage	Bar
<pre>scores = [datum['score'] for datum in results['scores]]</pre>		ruits111	Apple111				arn:aws:sager	 Line
	@ F	ruits111	Apple111				arn:aws:sager	Scatter plot
<pre>taxi_data['score'] = pd.Series(scores, index=taxi_data.index) taxi_data.head()</pre>	O F	ruits111	Apple111				arn:aws:sager	
	@ F	ruits111	Apple111				amawssager	X-axis dimension
<pre>[]: fig, ax1 = plt.subplots() ax2 = ax1.twinx()</pre>	© F	ruits111	Apple111				arn:aws:sager	 Epoch Time
	© F	ruits111	Apple111				arn:aws:sager	Periods from
# # *Try this out* - change 'start' and 'end' to zoom in on the								
# anomaly found earlier in this notebook	CHARTS							X-axis aggregatio
start, end = 0, len(taxi_data)	test mate	c with 1-minute a	conception					1-minute
#start, end = 5500, 6500	uest-metri	c with 1-minute a	gyregation					5-minute
<pre>taxi_data_subset = taxi_data[start:end]</pre>	1.2-							60-minute
<pre>ax1.plot(taxi_data_subset['valum'], color='(0', alpha=0.8) ax2.plot(taxi_data_subset['scorg'], color='(1'))</pre>	1.0							Y-axis
ax1.grid(which='me)or', axis='both')	100 -							test-metric - qua
<pre>ax1.set_ylabel('fax: Ridership', color='(0') ax2.set_ylabel('Anomaly Score', color='()')</pre>	B 0.6-							
<pre>ax1.tick_params(y', colors='00') ax2.tick_params(y', colors='00')</pre>	0.4-							
	0.2 12 PM Thu 14 12 PM Fri15 12 PM Sat16 12 PM Nov17 12 PM Mon18 12 PM Tue 19 12 PM Wed 20 12 PM Thu 21 12 PM Fri22 12 PM							
<pre>ax1.set_ylim(0, 40000) ax2.set_ylim(min(scores), 1.4*max(scores)) fig.set_finaidth(10)</pre>	-				timestamp			
	🔿 arnawssagemakerus-west-233 🍈 arnawssagemakerus-west-233 🌔 arnawssagemakerus-west-233 🔿 arnawssagemakerus-west-233 🔿 arn							
Note that the anomaly score spikes where our eyeball-norm method suggests there is an								
anomalous data point as well as in some places where our eyeballs are not as accurate.	A Trial Corr	ponent List						
Below we print and plot any data points with scores greater than 3 standard deviations	TRIAL COMP	ONENTS						
(approx 99.9th percentile) from the mean score.	1 rows selec							
[]: score_mean = taxi_data['score'].mean()						Add chart A	ctions 🔻 🌣	
<pre>score_std = taxi_data['score'].std()</pre>								
<pre>score_cutoff = score_mean + 3*score_std</pre>			ruits111	Training job	Apple111	DEMO-minerva-byo-2		
anomalies = taxi_data_subset[taxi_data_subset["score'] > score_cutoff]				Training job	Apple111	DEMO-minerva-byo-2		
anomalies			ruits111	Training job	Apple111	DEMO-minerva-byo-2		
The following is a list of known anomalous events which occurred in New York City within this			ruits111	Training job	Apple111	DEMO-minerva-byo-2		
timeframe:	 Comple 		ruits111	Training job	Apple111	DEMO-minerva-byo-2		

Amazon SageMaker Notebooks Fast-start sharable notebooks





Fully

Administrators

manage access and

permissions



Easy access with Single Sign-On (SSO)

Access your notebooks in seconds

managed and secure

Start your notebooks without spinning up compute resources

Fast

setup

Easy

, da j

Share notebooks with a single click

collaboration



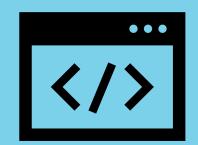
Flexible

Dial up or down compute resources

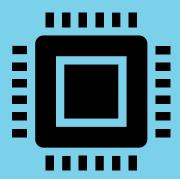
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User

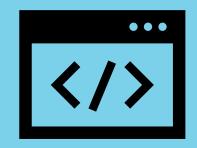


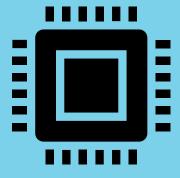
Domain



Compute







User

Domain

Compute

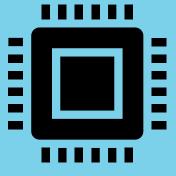
- Authentication via IAM or SSO
- AWS console access not required
- Fast notebook start-up



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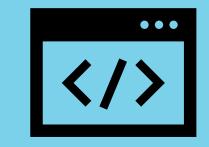
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Compute
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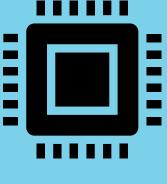
- Familiar IDE based on Jupyter Lab
- Backed by Elastic File System (EFS) •
- One domain per account per region



User



Domain

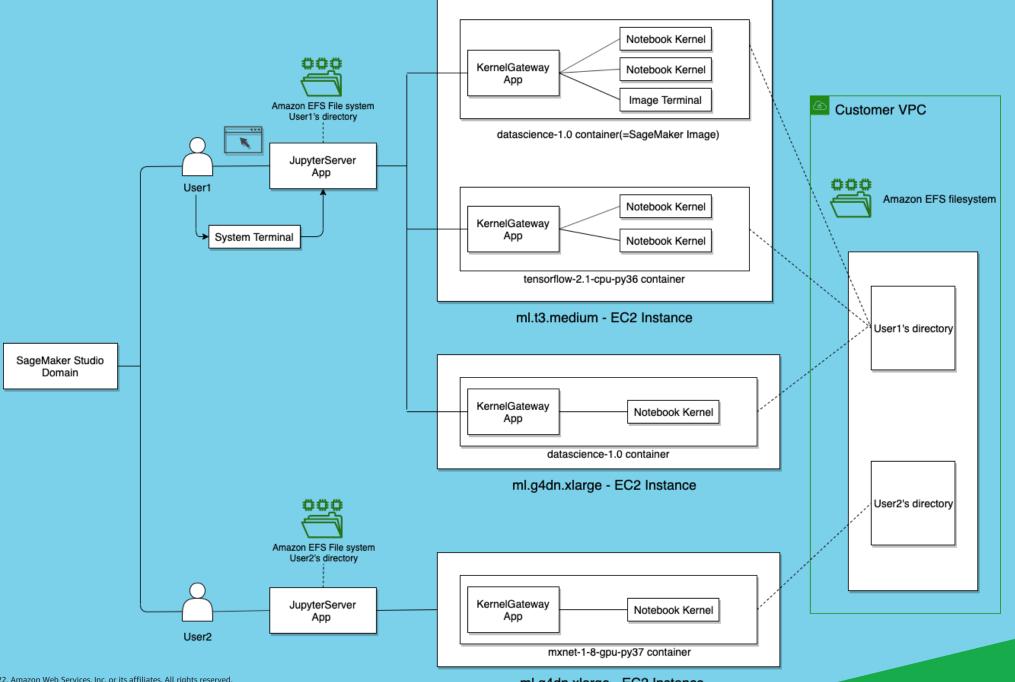


Compute

- Authentication via IAM or SSO
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- Familiar IDE based on Jupyter Lab
- Backed by Elastic File System (EFS)
- One domain per account per region

- Flexible Dial up or down compute resources
- Fully managed and secure
- Consumption based billing



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ml.g4dn.xlarge - EC2 Instance

Demo

Where to start?

Starting your ML journey







Training

Proof of concept

Production

Building your team's skills





Thank you!

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