Cloud Based Practices for Effective Data Science at Scale

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Data Council | Barcelona | Oct 3 2019



Questions / Feedback / Contact? Reach me: tiagoh@microsoft.com

Bio / Short Intro

Currently:

• AI/ML Tech Specialist @ Microsoft

Past:

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- Cloud Solutions Architect AI/AA @ Microsoft
- CTO @ Opscaling
- Solutions Architect @ AWS
- Cloud Architect @ Bestiario
- (... more)

Likes:

- Being a Dad :)
- Endurance Sports (specially Sky Running)
- Open Source
- Digital Fabrication



No Longer an Individual Sport...



Tip #1

Track your ML Experiments



Building blocks for a Data Science Project



Building your own AI models

Build and train



Demo

Experimentation



Leverage service-side capture of run metrics, output logs and models



Use leaderboards, side by side run comparison and model selection



Manage training jobs locally, scaled-up or scaledout



Conduct a hyperparameter search on traditional ML or DNN

Tip #2

Leverage Cognitive Computing



Azure Cognitive Services

Comprehensive list of cognitive capabilities



Uncover insights from all your forms



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	APPLICANT INFORMATION		
Name:			
Date of birth:	SSN:	Phone:	
Current Address:			
City:	State:	ZIP Code:	
Own Rent (Please circle)	Monthly payment or rent:	How long?	
Previous Address:			
City:	State:	ZIP Code:	
Owned Rented (Please circle)	Monthly payment or rent:	How long?	
	EMPLOYMENT INFORMATION		
Current Employer:			
Employer Address:		How long?	
Phone:	E-mail:	Fax:	
City:	State:	ZIP Code:	
Position:	Hourly Salary (Please circle)	Annual income:	
Previous employer:			
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Trainers had good knowledge and experience of the industry.				Ē
Trainers were able to relate material to the workplace.				E
Overall, we are satisfied with the training.				C
We would recommend the training to others.				C
Assessments were based on realistic activities.				E
The training organisation gave appropriate recognition of existing knowledge and skills.				E
Assessment was at an appropriate standard.				E
The training focused on relevant skills.				E
The training prepared employees well for work.				E
The training had a good mix of theory and practice.				E
We would recommend the training organisation to others.				E
The training was an effective investment.				E
The training reflected current practice.				C
The training was effectively integrated into our organisation.				E
Our employees gained the skills they needed from this training.				C

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STANDARD FORM 2 FEBRUARY 1965 EDITION GENERAL SERVICES ADMINISTRATION FPR (41 CFR) 1-16.601	US GOVERNMENT LEASE FOR REAL PROPERTY
DATE OF LEASE	leASE NO. GS-10B-07170

THIS LEASE, made and entered into this date by and between YESLER INVESTMENT COMPANY, LLC

Whose address is 1000 SECOND AVENUE, SUITE 1800 SEATTLE, WA 98104-1046

and whose interest in the property hereinafter described is that of OWNER

ereinafter called the Lessor, and the UNITED STATES OF AMERICA, hereinafter called the Government:

WITNESSETH: The parties hereto for the considerations hereinafter mentioned, covenant and agree as follows:

- The Lessor hereby leases to the Government the following described premises: A total of 172.322 rentable square feet (RES) of office and related space, which yields 152,288 ANSIBCUAN Office Area square feet (RES) of space of Phih and Yetse Building, 300 Fith Avenue, settle WA 86104, to be used for such purposes as determined by the General Services Administration. The space is broaded on the main force and on floors 44 hourph 12. Included the rent at no additional cost to the Government are 27 inside secure parking spaces and 40 bicycle spaces for exclusive use of Government employees and pations.
- 2. TO HAVE AND TO HOLD the said premises with their apputenances beginning approximately September 1, 2010 for the term of 10 years firm. The lease will take effect upon acceptance of space of the first agency installed by the povernment and containing for 10 years, subject to termination and network rights as may be hereirather set forth. The rent start date will be recognized via Supplemental Lease Agreement (SLA).

 The Government shall pay the Lessor annual rent of \$ 6,031,270.00 at the rate of \$502,605.83 per month in arrears. The first six (8) months are rent free. Rent consists of the following:

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Operating rent	\$1,252,780.94	
Tenant improvement	\$1,071,842,84	
Total	\$6,031,270.00	

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WELLS

Form Recognizer



Start with any type of form



Quickly extract test, tables and key value pairs with simple REST API calls



Demo

Tip #3

Prototype quickly



Demo



Automated machine learning UI

Visual interface

Machine learning notebooks

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Select compute		
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Create a new automated machine learning experiment		

machine learning UI

New capabilities in Azure Machine Learning service



Automated machine learning UI

Visual interface

Machine learning notebooks

New capabilities in Azure Machine Learning service

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Diagnostics

Visual interface

Machine learning notebooks

Automated machine learning UI Tip #4

Automated Machine Learning



Machine Learning is Complex



Azure Machine Learning

Automated machine learning



How much is this car worth?

Model creation is typically a time consuming process

Which features?

Mileage

Condition

Car brand

Year of make

Regulations

...

Which algorithm?

Paitæmieter 1

Pasameter 2

Gradient Boosted Nearest Neighbors

Bayesian Regression

LGBM

...

SVM

Ratina Graenteerles Split Raina Grænten leds Leaf

Ωthers

Which parameters?



🔺 I I I I I I I I I

30%

Model

Model creation is typically a time consuming process



Iterate

Model creation is typically a time consuming process



Automated Machine Learning accelerates model development



Understand the inner workings of ML by analyzing feature importance



Feature Imp	ortance	70%	model
Condition			
Year of make			
Mileage			
Regulations			
Car brand			
ŀ			

Enable model explain-ability for every automated ML iteration, not just the optimal model

Demo

Azure Automated ML – Sample Output

AutoML_ab755820-4bfd-4e8a-8b4b-9e0a2446b1c2:

Status: Completed



Iteration	Pipeline	Iteration metric	Best metric	Status	Duration	Started	Run Id	$\hat{}$
99	Ensemble	0.93702349	0.93702349	Completed	0:02:18	Dec 4, 2018 12:18 AM	•	^
10	MaxAbsScaler, LightGBM	0.93289307	0.93289307	Completed	0:01:22	Dec 3, 2018 7:49 PM	•	
67	SparseNormalizer, LightGBM	0.9154763	0.93289307	Completed	0:01:31	Dec 3, 2018 10:19 PM	6	
64	MaxAbsScaler, LightGBM	0.90148724	0.93289307	Completed	0:01:24	Dec 3, 2018 10:09 PM	6	
69	MaxAbsScaler, LightGBM	0.88975241	0.93289307	Completed	0:00:55	Dec 3, 2018 10:22 PM	•	~

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r2_score





Automated ML

Where can I use it?





Automated machine learning UI



Power Bl

Tip #5

MLOps – DevOps for Data Science



DevOps







Code testing



App deployment

MLOps

Model reproducibility

 \checkmark

Model validation

7

Model deployment

Model retraining



Model Lifecycle (Data Science PoV)













































Model deployment























Demo

Recommended architecture to build e2e ML solutions



Wrap-up



Microsoft AI platform

AI for every developer





90%

Reduced time from documents to insights



More insurance cases reviewed

200K

Customers interacting with chatbots

What's next? Some closing thoughts...

- Read more about Team Data Science Process
- <u>Try</u> Azure Machine Learning!

Too basic ? Check further topics:

- Deep Learning
- Data drift
- Model Interpretability
- GPUs and FPGA
- Transfer Learning

Thank You!

ευχαριστώ Salamat Po شكراً متشكرم Grazie благодаря ありがとうございます Kiitos Teşekkürler 谢谢 ขอบคุณครับ Obrigado شكريہ Terima Kasih Dziękuję Hvala Köszönöm Tak Dank u Wel Аякую Tack Mulţumesc спасибо Danke Cám on Gracias 多謝晒 Ďakujem תודה நன்றி Děkuji 감사합니다