

Machine Learning

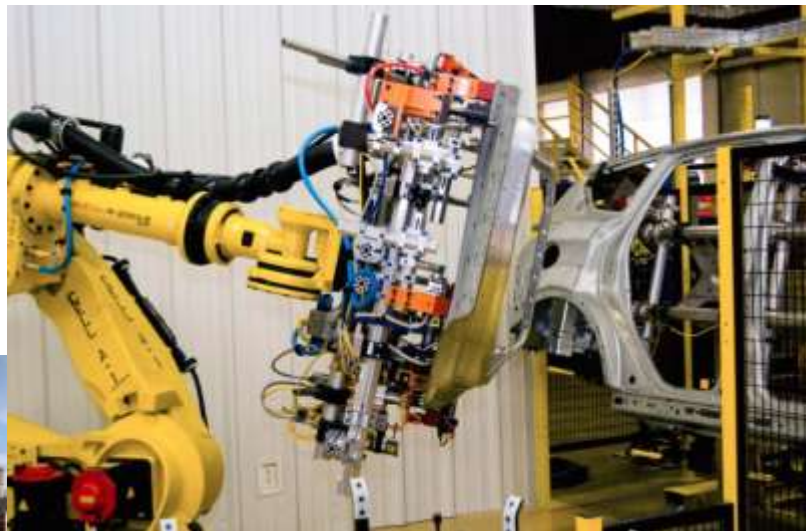


Rekstur tölvukerfa með gervigreind (machine learning)



Hvernig er dagurinn í dag

- Tölvuleikir
- Iðntæki eins og róbótar
- Sjálfstýring bíla
- Margt fleira...



Rekstur og sjálfvirknivæðing

- Sjálfvirknivæðing á eftirliti tölvuumhverfa
 - Dæmi um hugbúnað sem er hægt að nota fyrir Machine Learning
 - Azure Umhverfið (Azure Stream Analytics, Azure Cognitive Services og Azure Hub fyrir IoT)
 - Keras fyrir Python omflr.

Dæmi um hvernig Machine Learning umhverfi er notað ?

Þetta tiltekna dæmi

- Nota Azure
- Bý til viðeigandi þjónustur inn í Azure
- Nota mitt eigið forrit til að búa til gögn
 - Hitastig í netþjónaherbergi
- Nota PowerBI til að birta gögnin

+ Create a resource

Home

Dashboard

All services

★ FAVORITES

All resources

Resource groups

App Services

Function Apps

SQL databases

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Cost Management + Billing

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Virtual machines



Storage accounts



App Services



SQL databases



Azure Database for PostgreSQL



Azure Cosmos DB



Kubernetes services



Function App



Azure Databricks



Cognitive Services

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NAME	TYPE	LAST VIEWED
skyhub	Event Hubs Instance	19 min ago
skydemo	Stream Analytics job	18 h ago
skydemo	Event Hubs Namespace	18 h ago
AnomalyDetector	Cognitive Services	18 h ago
skyhub	SQL server	20 h ago
[REDACTED]	[REDACTED]	20 h ago
archive	SQL database	4 d ago

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[News from the Azure team](#)

- Búa til tengingu, þannig að það er hægt að skrifa inn gögn.

SOURCE
Event Hub

Input details

input

 Test  Delete

* Input alias

Provide Event Hub settings manually
 Select Event Hub from your subscriptions

Subscription

* Service Bus namespace ⓘ

* Event Hub name ⓘ
 Create new Use existing

* Event Hub policy name ⓘ

Event Hub policy key

Event Hub consumer group ⓘ

* Event serialization format ⓘ

Encoding ⓘ

Event compression type ⓘ

+ Add

NAME	SINK
AnomalyDetectionStream	Power BI
archive	SQL Database

- Búa til tengingu þannig að gögn fari inn á viðeigandi kerfi, það er hægt að velja mismunandi kerfi, í þessu tilfalli notum við PowerBI

⚙️ Test 🗑️ Delete

* Output alias
AnomalyDetectionStream

Group workspace
My workspace

⚠️ If the dataset or table already exists in your Microsoft Power BI subscription, it will be overwritten.

* Dataset name
AnomalyDetectionStream

* Table name
skjanomaly

Currently authorized as [Gísli Guðmundsson](#)

Authorization
Click the button below if you want to renew authorization, authorize with a different account, or modify the workspace.

[Renew authorization](#)

Note: This output has permanent access to your Power BI dashboard. Access to Power BI, once granted, does not expire unless you do one of the following:

1. Change the user account password.
2. Delete this output.
3. Delete this job.

▶ Start ■ Stop 🗑️ Delete

Resource group (change) : [iteggsAuthentication](#)

Status : Stopped

Location : West Europe

Subscription (change) : [Microsoft Azure](#)

Subscription ID : 2e2ea35d-a292-4e18-9a56-3ee6e202cff7

Send feedback : [UserVoice](#)

Created : Thursday, March 28, 2019, 3:06:45 PM

Started : Monday, April 1, 2019, 3:29:14 PM

Output watermark : -

Hosting environment : Cloud



Inputs

1



input

Outputs

2



AnomalyDetectionStream

archive

Query

```
1 WITH AnomalyDetectionStep AS
2 (
3     SELECT
4         System.TimeStamp AS [TimeStamp],
5         EVENTENQUEUEDUTCTIME AS time,
6         CAST(temperature AS float) AS temp,
7         AnomalyDetection_SpikeAndDip(CAST(temperature AS float), 98, 480, 'spikesanddips')
8         | OVER(LIMIT DURATION(second, 480)) AS SpikeAndDipScores
9     FROM input
10 )
11 SELECT
12     System.TimeStamp AS [TimeStamp],
13     time,
14     temp,
```

Query

skydemo

Save Discard Test

Inputs (1)

input

Outputs (2)

AnomalyDetectionStream

archive

Need help with your query? Check out some of the most common Stream Analytics query patterns [here](#).

```
1 WITH AnomalyDetectionStep AS
2 (
3     SELECT
4         System.TimeStamp AS [TimeStamp],
5         EVENTENQUEUEDUTCTIME AS time,
6         CAST(temperature AS float) AS temp,
7         AnomalyDetection_SpikeAndDip(CAST(temperature AS float), 98, 480, 'spikesanddips')
8         OVER(LIMIT DURATION(second, 480)) AS SpikeAndDipScores
9     FROM input
10 )
11 SELECT
12     System.TimeStamp AS [TimeStamp],
13     time,
14     temp,
15     CAST(GetRecordPropertyValue(SpikeAndDipScores, 'Score') AS float) AS
16     SpikeAndDipScore,
17     CAST(GetRecordPropertyValue(SpikeAndDipScores, 'IsAnomaly') AS bigint) AS
18     IsSpikeAndDipAnomaly
19 INTO AnomalyDetectionStream
20 FROM AnomalyDetectionStep
```

Spá

- Því lengur sem hún tekur saman "sömpl" er í gangi yfir lengri tíma mun það hafa betri spár á vandamálum.

TIME	TEMP	SPIKEANDDIPSCORE	ISSPIKEANDDIPANOMALY
"2019-04-01T13:45:43.0170000Z"	19.969	0.4999999995	0
"2019-04-01T13:45:43.2360000Z"	19.89	1e-8	1
"2019-04-01T13:45:43.4550000Z"	19.689	1e-8	1
"2019-04-01T13:45:43.6890000Z"	27.687	1e-8	1
"2019-04-01T13:45:43.9100000Z"	19.745	0.2626268113634732	0
"2019-04-01T13:45:44.1290000Z"	19.941	0.4686609987371839	0
"2019-04-01T13:45:44.3480000Z"	19.457	0.07371375067073982	0
"2019-04-01T13:45:44.5660000Z"	19.502	0.094665338818263	0
"2019-04-01T13:45:44.7850000Z"	19.719	0.24286971344077624	0
"2019-04-01T13:45:45.0200000Z"	19.46	0.07788972918746717	0
"2019-04-01T13:45:45.2380000Z"	19.832	0.35405081764383506	0
"2019-04-01T13:45:45.4580000Z"	19.802	0.3237315599610773	0

MachineLearning_Temp.py ▸ sendData

```
1 # Import classes from Event Hubs python package
2 from azure.eventhub import EventHubClient, Receiver, Offset, EventData
3 import random
4 import time
5
6 eventHubName = "hub"
7 ADDRESS = "amqps://skydemo.servicebus.windows.net/skyhub"
8
9 # SAS policy and key are not required if they are encoded in the URL
10 USER = "RootManageSharedAccessKey"
11 KEY = "I5q[REDACTED]BA="
12
```

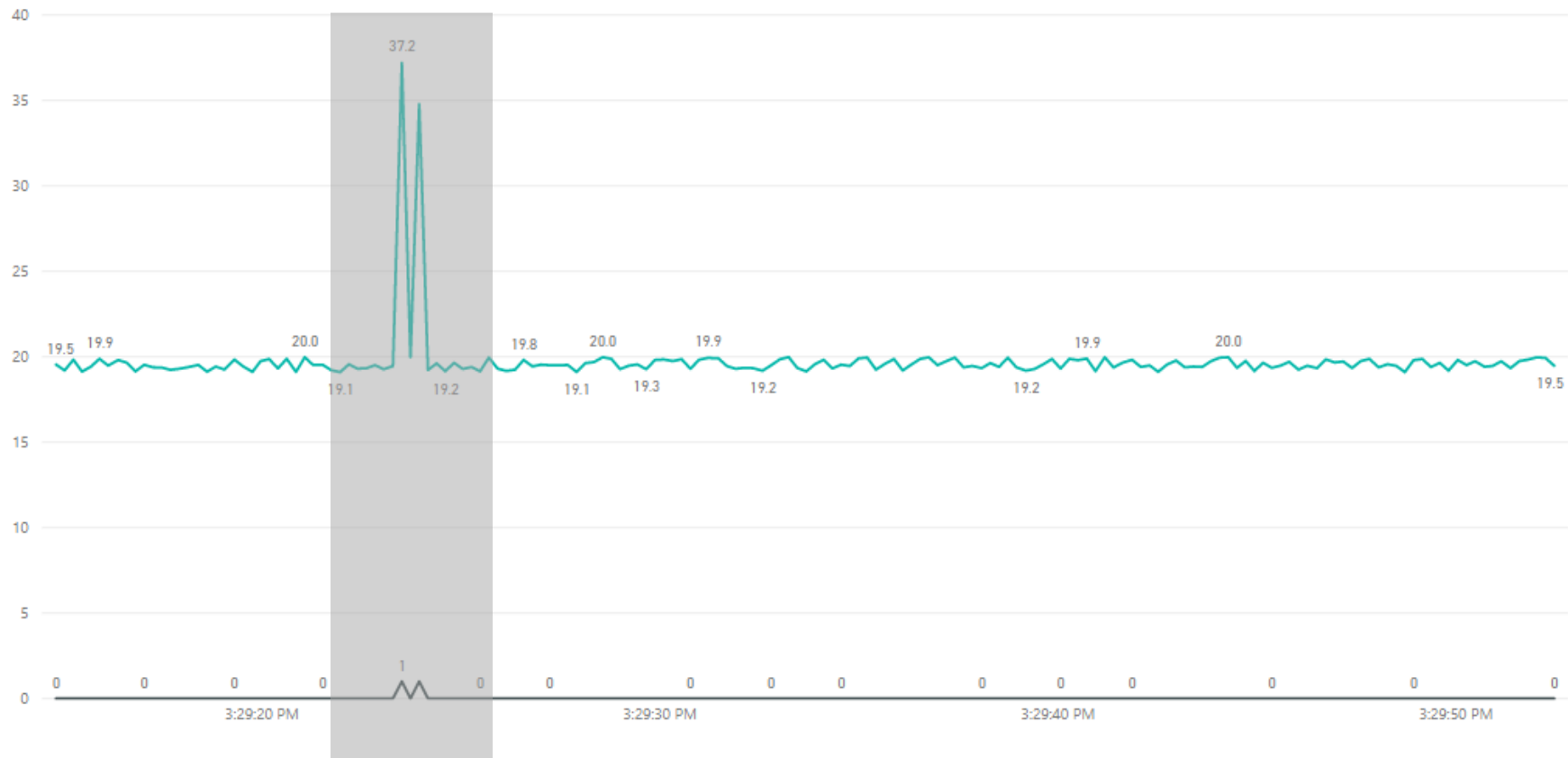
```
16 client.run()
17
18 temp_lower = random.randint(1,99)
19 temp_higer = "19."+str(temp_lower)
20
21 while True:
22     temp_lower = random.randint(1,999)
23     temperature = "19."+str(temp_lower)
24
25
26     if float(temperature) > float("19.980"):
27         temp_lower = random.randint(1,999)
28         temp_next = random.randint(1,59)
29         if temp_lower > 27 and temp_next < 30:
30             upper_temp = random.randint(26,38)
31             temperature = str(upper_temp)+"."+str(temp_lower)
32
33     time.sleep(0.15)
34     data = { "temperature":'+temperature+' }
```

PROBLEMS **1** OUTPUT DEBUG CONSOLE TERMINAL

```
{ "temperature":19.79 }
{ "temperature":19.814 }
{ "temperature":19.918 }
{ "temperature":19.424 }
{ "temperature":19.935 }
{ "temperature":19.543 }
{ "temperature":19.802 }
{ "temperature":19.151 }
{ "temperature":19.49 }
{ "temperature":19.696 }
{ "temperature":19.174 }
{ "temperature":19.168 }
{ "temperature":19.109 }
{ "temperature":19.725 }
{ "temperature":19.174 }
```

temp and isspikeanddipomaly by timestamp

● temp ● isspikeanddipomaly



Baseline eftirlit

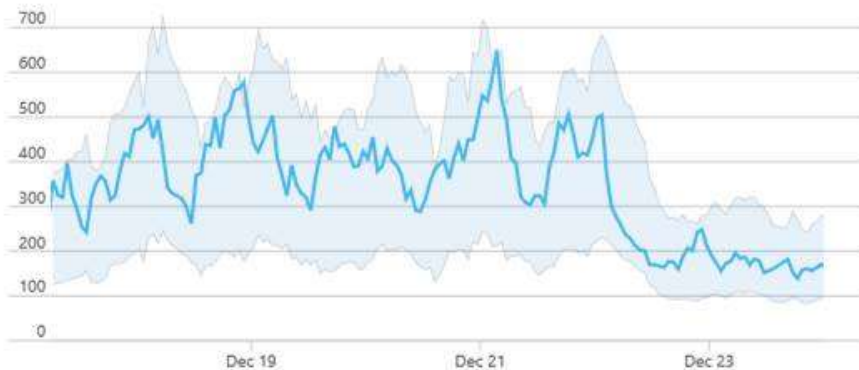
Server requests(Platform)

Show history

Over the last week

Select time series ⓘ

Select time series



Server requests (Avg)
ai-baselingsvc-prod
344.58

IT Operations

Resource usage and availability

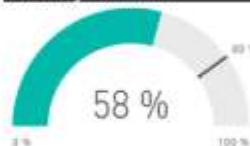
Server

- DBServer-1
- DBServer-2
- DBServer-3
- DBServer-4
- WebApp-1
- WebApp-2
- WebApp-3
- WebApp-4
- WebApp-5

CPU utilization



Memory utilization



Disk utilization



CPU utilization by year



Total DBs

275

Database Backups

271
Backups Run

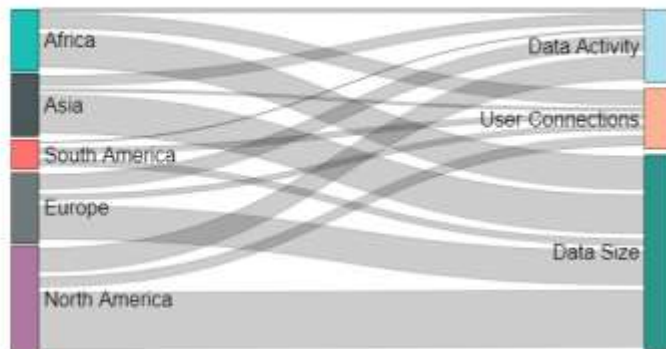
3
Backups Failed

346782
Backup Size (GB)

Usage Type

- Data Activity
- Data Size
- User Conne...

Usage by type and region



Network usage by location



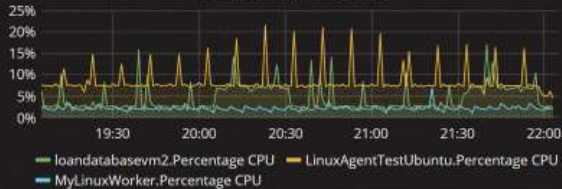


Contoso dev



Zoom Out Last 3 hours Refresh every 10s

Contoso Prod VMs CPU%



Contoso Web Incoming Requests



Contoso Storage Ingress



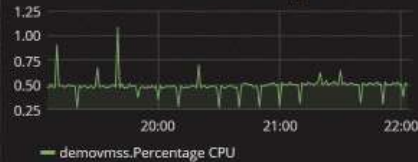
Incoming Queue (messages)

34554

Contoso Blob Storage Latency



Contoso backend VMSS avg. CPU%



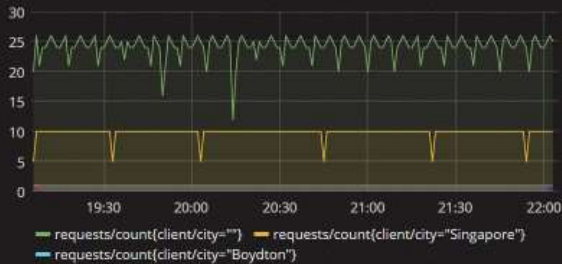
Contoso Workflow requests



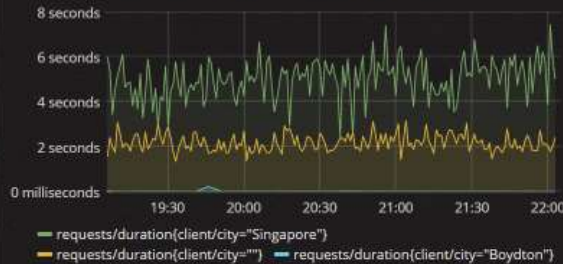
Outgoing Queue (messages)

233367

Contoso Web Incoming Requests by City (AI)



Contoso Web Request Duration by City (AI)



Web Avg. Response Time

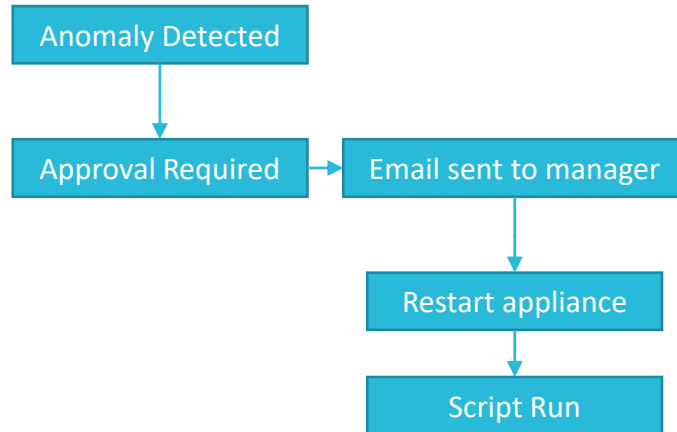


Og hvað svo

- Þegar gögn eru farin að berast, hvað getum við gert ?
 - Notað sjálfvirknivæðingu til að laga það sem þarf að laga
 - Endurræsing á þjónustum
 - Endurræsing á þjónum
 - Hreinsa til á diskum
 - Og margt fleira
 - Notað Flow til að búa til feril í kring um ákveðin atvik eins og að tölvupóstur berist þegar anomaly finnst. Keyra scriptur..., önnur kerfi.

Flow / Ferli

- Hvað á að gerast ef kemur upp „anomaly“



Hugmyndir hvað er hægt að nota þetta í

- Nokkur dæmi hvað er hægt að nota þetta í rekstri
 - Fylgjast með minni á vélum, fylgjast með minnisleka
 - Fylgjast með diskum og hvað er langt í að diskur er líklegur að fyllast.
 - Finna út hvað er sameiginlegt með villum í umhverfi, hverjir eru undanfarar.
 - Innskráningar s.s. hversu oft er verið að skrá sig inn, er verið að skrá sig inn á mismunandi stöðum.
 - Notkun umhverfis, hversu mikið eru þjónar nýttir
 - Niðri tíma eftirlit
 - Kostnaðar eftirlit á umhverfi
- IoT tæki eins og fylgjast með rakastig, hitastig, orkunotkun
- Annað fyrir utan rekstur
 - Hvenær eru mestu sölurnar í mánuðinum, klukkan hvað og á hvaða dögum.

Kostir

- Hjálpar til við að einfalda rekstur á umhverfi
- Hjálpar til við sjálfvirknivæðingu á umhverfi
- Hjálpar til við ferlavæðingu á umhverfi
- IT sérfræðingar hafa ekki endalausán tíma til að horfa á skjáborð með fullt af upplýsingum, geta týnt sér í því.
- Gæti fækkað mannlegum mistökum
- Kerfi verða ódýrari í rekstri
- Rauntíma staða á umhverfi

Gallar

- Mjög erfitt í uppsetningu
- Gæti þurft mikið viðhald en þó sérstaklega eftir hvernig gögn umbreytast.
- Getur verið erfitt fyrir IT sérfræðinga að átta sig á gögnum af hverju þetta er eins og það er.
- Getur komið upp false/positive
- Gögnin geta verið stór og mikið af gögnum

Framtíðin

- Meiri gögn, hraðari tölvur
- Verður partur af öllum þjónustum hvort sem það er í rekstri eða skýjaþjónustum.
- Verður meira um unsupervised greind