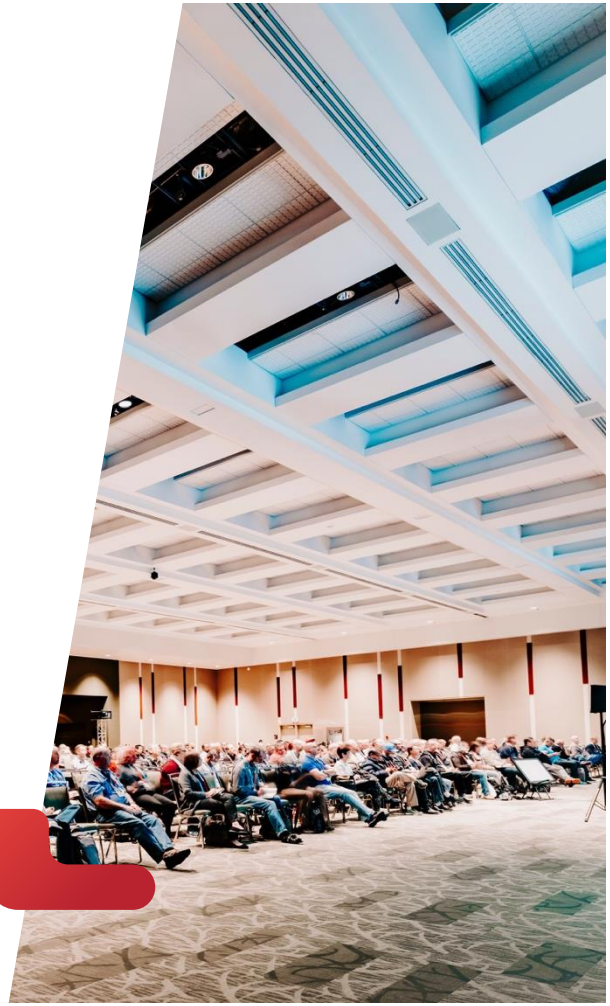
PASS SUMMIT2019

Sentiment Prediction

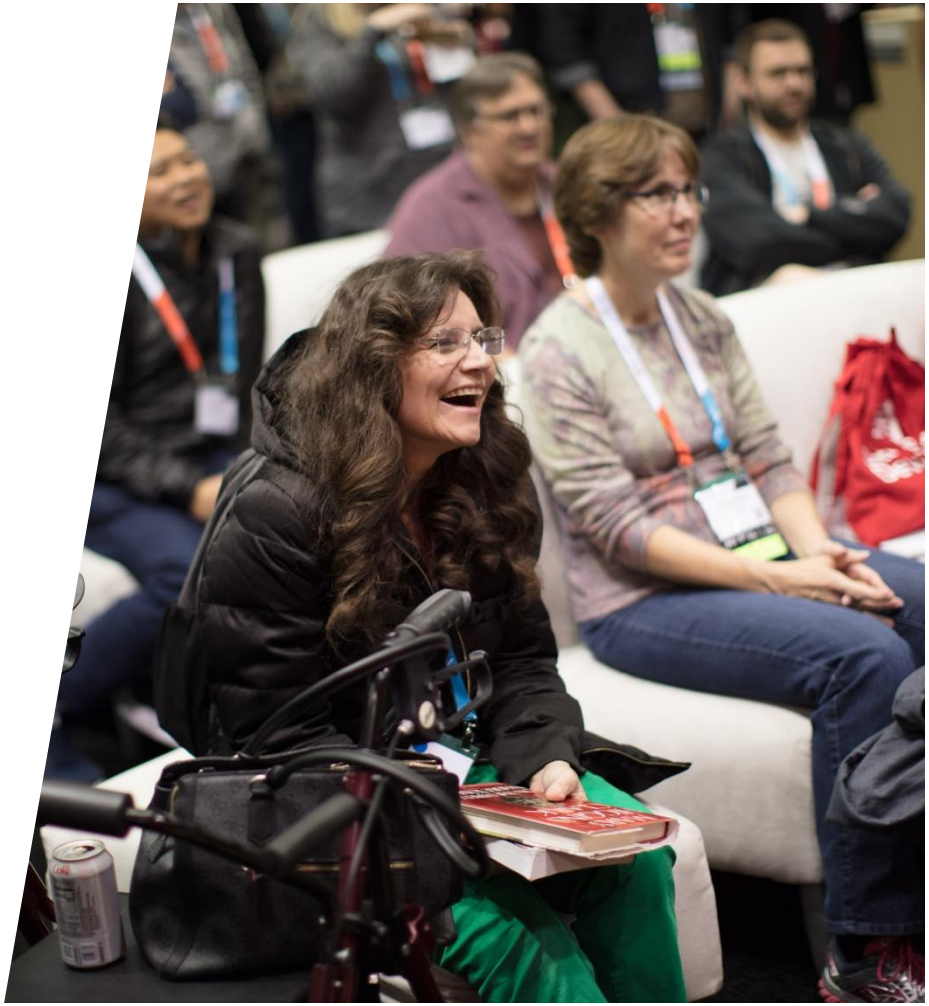
Real-time in SQL Server

Hiram Fleitas

Download: github.com/hfleitas/seattle2019



Please silence cell phones



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Get data fast!

📢 BIG News – PASS Summit 2019!

07/03/2019

Hiram

Leave a comment

Edit

I'm very excited to announce that I've been accepted as a speaker at PASS Summit 2019. I'm extremely grateful for the opportunity and look forward to PASS Summit 2019. Category Session Title Status General Session The Power Platform Game Changer Accepted General Session Real-time Sentiment Prediction in SQL Server Accepted See you in Seattle, WA… *Continue reading →*

Microsoft Data & AI South FL (Nov 2019) Azure Data Factory

10/24/2019

Hiram

Leave a comment

Azure Data Factory From On-Prem to Data Warehouse Agenda: Azure Data Factory Data store Connectors 80x On-Premises DevOps Automation Notifications Resources by: Hiram Fleitas Twitter: @hiramfleitas Blog: http://fleitasarts.com Video Recording https://youtu.be/TXxssUeqsOA Resources fleitasarts.com github.com/hfleitas/rig netflix.com/trollhunters Azure Data Factory: GitHub Integration Azure Data Factory: Documentation Azure Data Factory: Copy Activity Performance Azure Data Factory: Connector Azure SQL Data Warehouse Connector… *Continue reading →*

Customize

Link to Poll:

bit.ly/mssql2019

Your participation is very important.

PASS

Session Evaluations

Submit by 5pm Friday, November 15th to win prizes.

3 WAYS TO ACCESS

SCAN ME

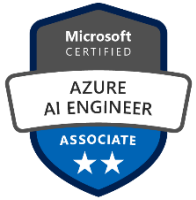
- Go to PASSsummit.com
- Download the GuideBook App and search: PASS Summit 2019
- Follow the QR code link on session signage

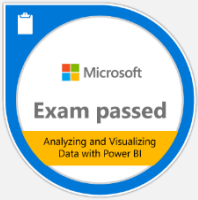
Hiram Fleitas

Principal Database Architect,
Universal Property & Casualty Insurance Company

Bio

Father
Developer since 1995
SQL Server since 1999
Fleitas Arts, LLC since 2008
USCG Auxiliary Flotilla Staff Officer





@hiramfleitas

/hfleitas

hiram@fleitasarts.com

hiramfleitas

fleitasarts.com

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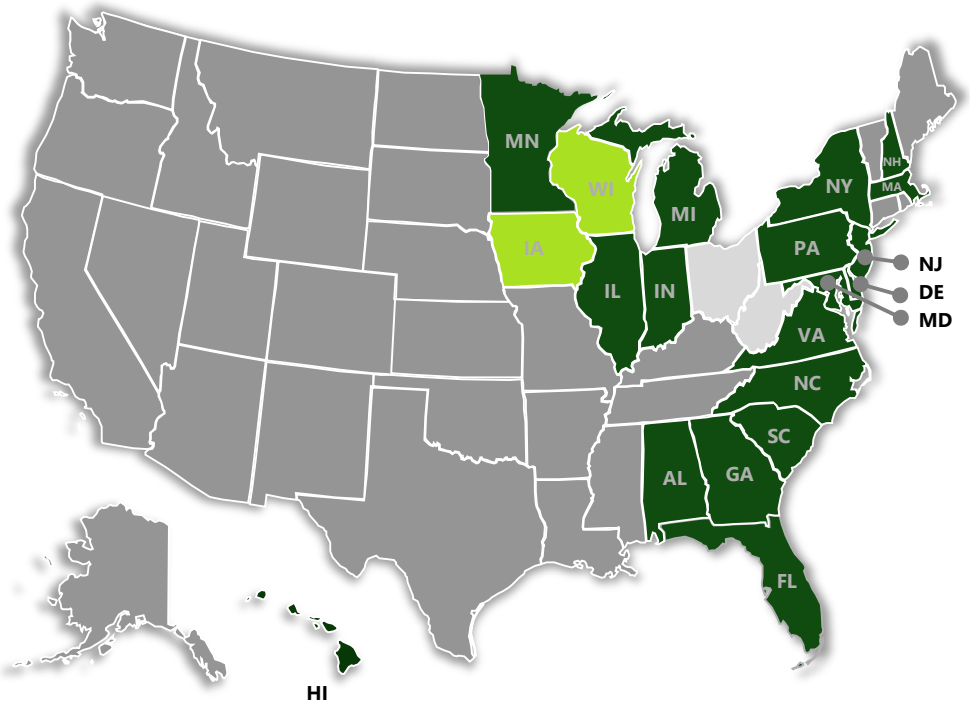
Universal Insurance Holdings (UVE): Growth Story

Doing business | **Licensed**



Leading holding company of personal residential homeowners insurance and services

$1B+ FY18 Direct Premium Written	**#1** Best-in-class Return on Equity (5-yr Average)
18 States actively doing business	**>800K** Customer policies managed
800+ Full time equivalent employees	**9,000+** Independent agents in the distribution channel
Ft. Lauderdale, FL Headquarters	**A** **Exceptional** Demotech financial stability rating

PASS

Agenda

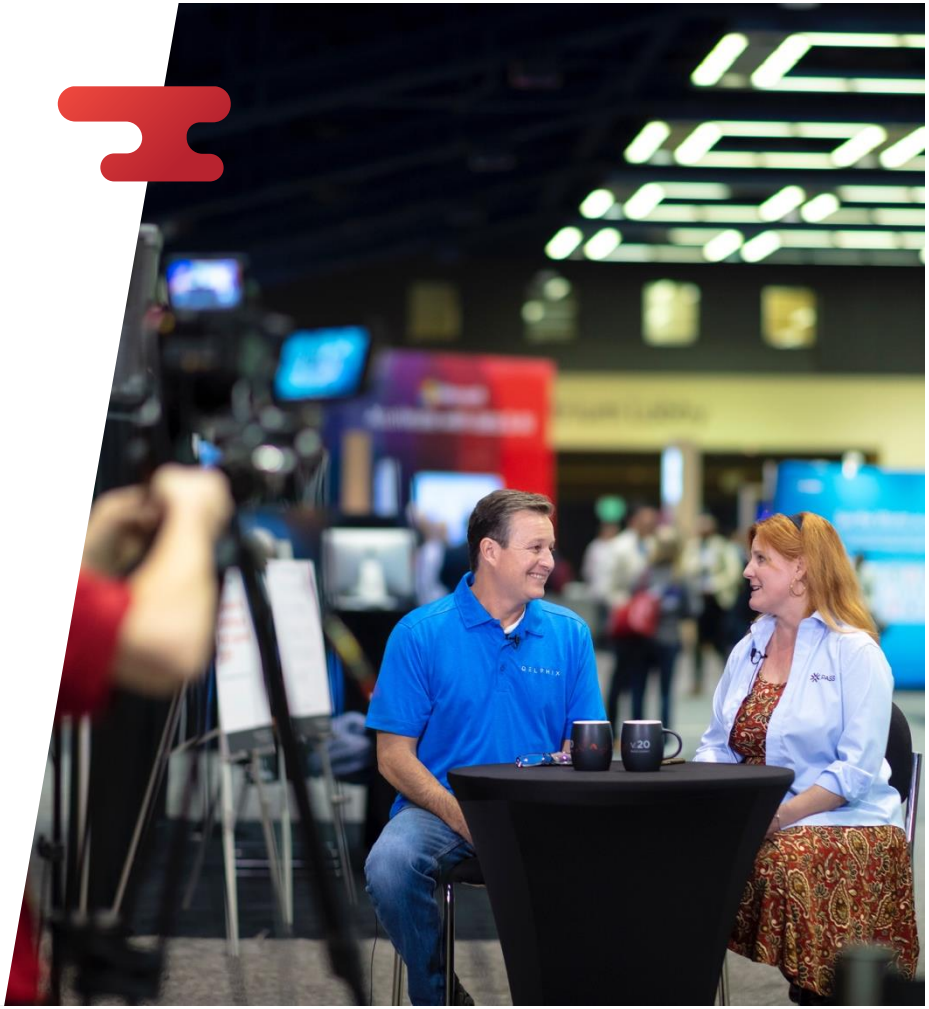
5 DEMOS

1. Setup
2. Debugging
3. Performance
4. Cognitive API
5. Spark Streaming

DEMO

one

- Add ML Features
- Grant Access & Configure
- Install Pre-Trained Models



Text Analytics API | Microsoft Azu

azure.microsoft.com/en-us/services/cognitive-services/text-analytics/

Overview | Solutions | Products | Documentation | Pricing | Training | Marketplace | Partners | Support | Blog | More | Portal | Free account

Extract information from your text

Use the demo below to experiment with the Text Analytics API. Pick one of our examples or provide your own. Identify the language, sentiment, key phrases, and entities (Preview) of your text by clicking "Analyze".

See it in action

Destiny is a gift. Some go their entire lives, living existence as a quiet desperation. Never learning the truth that what feels as though a burden pushing down upon our shoulders, is actually, a sense of purpose that lifts us to greater heights. Never forget that fear is but the precursor to valor, that to strive and triumph in the face of fear, is what it means to be a hero. Don't think, Master Jim. Become!

Analyze

Analyzed text | JSON

KEY PHRASES: face of fear, existence, triumph, valor, sense of purpose, entire lives, quiet desperation, shoulders, greater heights, precursor, Destiny, gift, Master Jim, burden, truth, hero

SENTIMENT: 78 %

NAMED ENTITIES:
Destiny (1921 film) [Other]
valor [Location]
Don't (Billy Currington song) [Other]
Mastering (audio) [Other]
Jim [Person]

LINKED ENTITIES: Destiny is a gift. Some go their entire lives, living existence

SQL Server 2019 Setup

Feature Selection

Select the Developer features to install.

- Product Key
- License Terms
- Global Rules
- Product Updates
- Install Setup Files
- Install Rules
- **Feature Selection**
- Feature Rules
- Instance Configuration
- Server Configuration
- Database Engine Configuration
- Consent to install Microsoft R ...
- Consent to install Python
- Feature Configuration Rules
- Ready to Install
- Installation Progress
- Complete

Looking for Reporting Services? Download it from the web

Features:

- Instance Features
  - [x] Database Engine Services
    - [ ] SQL Server Replication
    - [x] Machine Learning Services and Language Extensions
      - [x] R
      - [x] Python
      - [ ] Java
    - [ ] Full-Text and Semantic Extractions for Search
    - [ ] Data Quality Services
    - [ ] PolyBase Query Service for External Data
      - [ ] Java connector for HDFS data sources
  - [ ] Analysis Services

Feature description:

Includes extensions that enable integration with R, Python, Java and other programming languages using standard T-SQL statements.

Prerequisites for selected features:

Already installed:
- Windows PowerShell 3.0 or higher
- Microsoft Visual C++ 2017 Redistributable

Disk Space Requirements

Drive C: 2271 MB required, 49357 MB available

Select All | Unselect All

Instance root directory: C:\Program Files\Microsoft SQL Server\

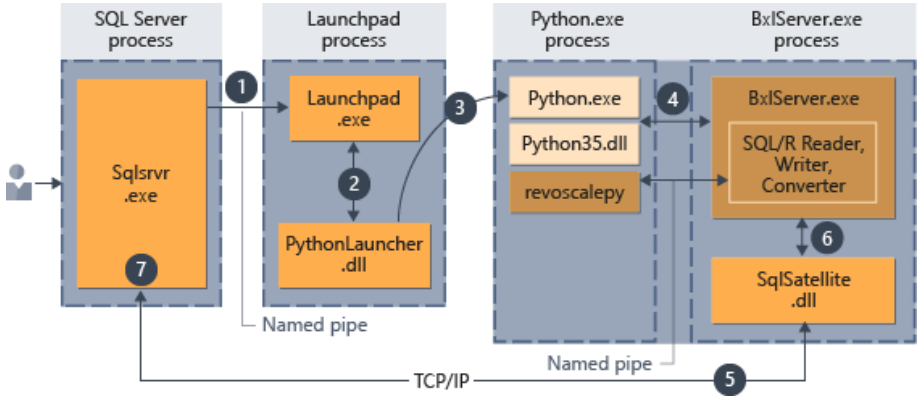
Shared feature directory: C:\Program Files\Microsoft SQL Server\

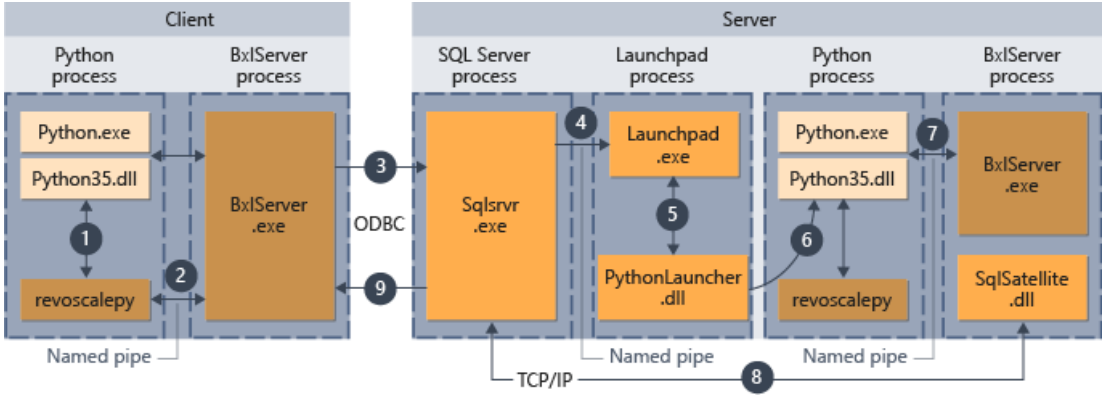
Shared feature directory (x86): C:\Program Files (x86)\Microsoft SQL Server\

< Back | Next > | Cancel

PASS

Execution Architecture





Learn more:
https://docs.microsoft.com/en-us/sql/advanced-analytics/concepts/extension-python
https://docs.microsoft.com/en-us/sql/advanced-analytics/install/sql-server-machine-learning-services-2019
https://docs.microsoft.com/en-us/sql/advanced-analytics/data-collection-ml-troubleshooting-process

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Computer Management

File Action View Help

- Computer Management (Local)
  - System Tools
    - Task Scheduler
    - Event Viewer
    - Shared Folders
      - Shares
      - Sessions
      - Open Files
    - Local Users and Groups
      - Users
      - Groups
    - Performance
    - Device Manager
  - Storage
    - Disk Management
  - Services and Applications

Name	Description
Access Control Assistance Operators	Members of this group can remotely query ...
Administrators	Administrators have complete and unrestric...
Backup Operators	Backup Operators can override security restr...
Cryptographic Operators	Members are authorized to perform cryptog...
Distributed COM Users	Members are allowed to launch, activate an...
Event Log Readers	Members of this group can read event logs f...
Guests	Guests have the same access as members of...
Hyper-V Administrators	Members of this group have complete and ...
IIS_IUSRS	Built-in group used by Internet Information ...
Network Configuration Operators	Members in this group can have some admi...
Performance Log Users	Members of this group may schedule loggi...
Performance Monitor Users	Members of this group can access performa...
Power Users	Power Users are included for backwards co...
Remote Desktop Users	Members in this group are granted the right...
Remote Management Users	Members of this group can access WMI reso...
Replicator	Supports file replication in a domain
System Managed Accounts Group	Members of this group are managed by the ...
Users	Users are prevented from making accidental...
docker-users	Users of Docker for Windows
HelpLibraryUpdaters	
SophosAdministrator	SophosAdministrators may run Sophos Anti...
SophosOnAccess	Contains accounts used by Sophos Anti-Vir...
SophosPowerUser	SophosPowerUsers may run Sophos Anti-Vir...
SophosUser	SophosUsers may run Sophos Anti-Virus wit...
SQLRUserGroup	SQLRUserGroup
SQLServer2005SQLBrowserUser$R90GTU6N	Members in the group have the required ac...

Actions

- Groups
  - More Actions
- SQLRUserGroup
  - More Actions

SQLRUserGroup Properties

General

SQLRUserGroup

Description: SQLRUserGroup

Members:

- NT SERVICE\MSSQLLaunchpad (S-1-5-80-3477044410-37626219...
- UPCIC\hfleitas (S-1-5-21-366593668-1004689029-3092909805-167...

Add... Remove

Changes to a user's group membership are not effective until the next time the user logs on.

OK Cancel Apply Help

Windows Defender Firewall with Advanced Security

File Action View Help

Windows Defender Firewall witl
- Inbound Rules
- Outbound Rules
- Connection Security Rules
- Monitoring

Outbound Rules

Name

- Block network access for AppContainer-00 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-01 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-02 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-03 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-04 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-05 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-06 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-07 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-08 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-09 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-10 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-11 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-12 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-13 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-14 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-15 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-16 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-17 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-18 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-19 in SQL Server instance MSSQLSERVER
- Block network access for AppContainer-20 in SQL Server instance MSSQLSERVER
- MSMPI-LaunchSvc
- MSMPI-MPIEXEC
- MSMPI-SMPD

Actions

Outbound Rules
- New Rule...
- Filter by Profile
- Filter by State
- Filter by Group
- View
- Refresh
- Export List...
- Help

Block network access for AppContainer-00 in SQL S...
- Disable Rule
- Cut
- Copy
- Delete
- Properties
- Help

```sql
exec sp_configure 'external scripts enabled', 1
reconfigure with override
go

declare @sql nvarchar(max);
-- only need to grant connect permissions!
select @sql = N'if not exists (select 1 from syslogins where name ='''+ @@servername +'\SQLRUserGroup'')
begin
    create login ['+ @@servername +'\SQLRUserGroup] from windows
end'
print @sql; exec sp_executesql @sql;
go
```

```
-- Restart SQL Service & LAUNCHPAD.
-- Run PS as admin: .\Install-MLModels.ps1 MSSQLSERVER
-- Install Latest SQL Server CU, Reboot.
-- Run CMD as admin: FixPath.cmd
-- Verify WORKING_DIRECTORY in ...\MSSQL\Binn\pythonlauncher.config
-- Run CMD as admin: AddToSQL-PreTrainedModels.cmd. It downloads & installs the pre-trained models.
```

Administrator: Windows PowerShell

```
PS C:\fleitasarts\SentimentPrediction\PS-CMD> .\Install-MLModels.ps1 MSSQLSERVER
WARNING: RSetup.exe not found for instance name= SHARED_SQL2017, sql version=140
WARNING: RSetup.exe not found for instance name= SHARED_SQL2019CTP3.0, sql version=150
INFO: processing instance MSSQL15.MSSQLSERVER
        Verifying R models [9.4.7]
        Installing R models [C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\MicrosoftML\mxLibs\x64]
SUCCESS installed R for MSSQL15.MSSQLSERVER
        Verifying Python models [9.4.7]
        Installing Python models [C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mxLibs]
SUCCESS installed Python for MSSQL15.MSSQLSERVER
PS C:\fleitasarts\SentimentPrediction\PS-CMD>
```

Administrator: Windows PowerShell | Administrator: cmd

```
c:\Program Files\Microsoft SQL Server\150\Setup Bootstrap\SQL2019RC1\x64>
c:\Program Files\Microsoft SQL Server\150\Setup Bootstrap\SQL2019RC1\x64>RSetup.exe /Install /component MLM /version 9.4.7.0 /language 1033 /destdir
"C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs"
Reading registry value HKCU\SOFTWARE\Microsoft\RSetup\MLM_DownloadUrl
Registry value:
RSetup.exe version: 9.4.7.3
Reading registry value HKEY_LOCAL_MACHINE\Software\Microsoft\Microsoft SQL Server\150\Bootstrap\Setup\R_SERV_CACHE
Registry value:
Reading registry value HKEY_LOCAL_MACHINE\Software\Microsoft\Microsoft SQL Server\150\Bootstrap\BootstrapDir
Registry value: C:\Program Files\Microsoft SQL Server\150\Setup Bootstrap\
Searching for cache dir: C:\Program Files\Microsoft SQL Server\150\Setup Bootstrap\\R_SERV_CACHE
Using default cache directory: C:\Users\hfleitas\AppData\Local\Temp\
Extracting C:\Users\hfleitas\AppData\Local\Temp\MLM_9.4.7.0_1033.cab to C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\
site-packages\microsoftml\mlLibs\
Extracting C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs\AlexNet_Updated.model
Extracting C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs\ImageNet1K_mean.xml
Extracting C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs\pretrained.model
Extracting C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs\ResNet_101_Updated.model
Extracting C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs\ResNet_18_Updated.model
Extracting C:\Program FilesMicrosoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\Lib\site-packages\microsoftml\mlLibs\ResNet_50_Updated.model

c:\Program Files\Microsoft SQL Server\150\Setup Bootstrap\SQL2019RC1\x64>
```

```
create or alter proc GetSentiment (
    @text nvarchar(max)
)
as
    declare @script nvarchar(max);
    set @script = N'import pandas as p
from microsoftml import rx_featurize, get_sentiment
analyze_this = text
text_to_analyze = p.DataFrame(data=dict(Text=[analyze_this]))
sentiment_scores = rx_featurize(data=text_to_analyze,ml_transforms=[get_sentiment(cols=dict(scores="Text"))])
sentiment_scores["Sentiment"] = sentiment_scores.scores.apply(lambda score: "Positive" if score > 0.6 else "Negative")'
    exec sp_execute_external_script @language = N'Python',
                                    @script = @script,
                                    @output_data_1_name = N'sentiment_scores',
                                    @params = N'@text nvarchar(max)',
                                    @text = @text
    with result sets (("Text" nvarchar(max), "Score" float, "Sentiment" nvarchar(30)));
go
```

```
exec dbo.GetSentiment N'These are not a normal stress reliever. First of all, they got sticky, hairy and dirty on
exec dbo.GetSentiment N'These are the cutest things ever!! Super fun to play with and the best part is that it la
exec dbo.GetSentiment N'I really did not like the taste of it'
exec dbo.GetSentiment N'It was surprisingly quite good!'
exec dbo.GetSentiment N'I will never ever ever go to that place again!!'
exec dbo.GetSentiment N'Destiny is a gift. Some go their entire lives, living existence as a quiet desperation. N
```

Total execution time: 00:00:30.283

	Text	Score	Sentiment
1	These are not a normal stres…	0.424483060836792	Negative

	Text	Score	Sentiment
1	These are the cutest things …	0.869342148303986	Positive

	Text	Score	Sentiment
1	I really did not like the ta…	0.46178987622261	Negative

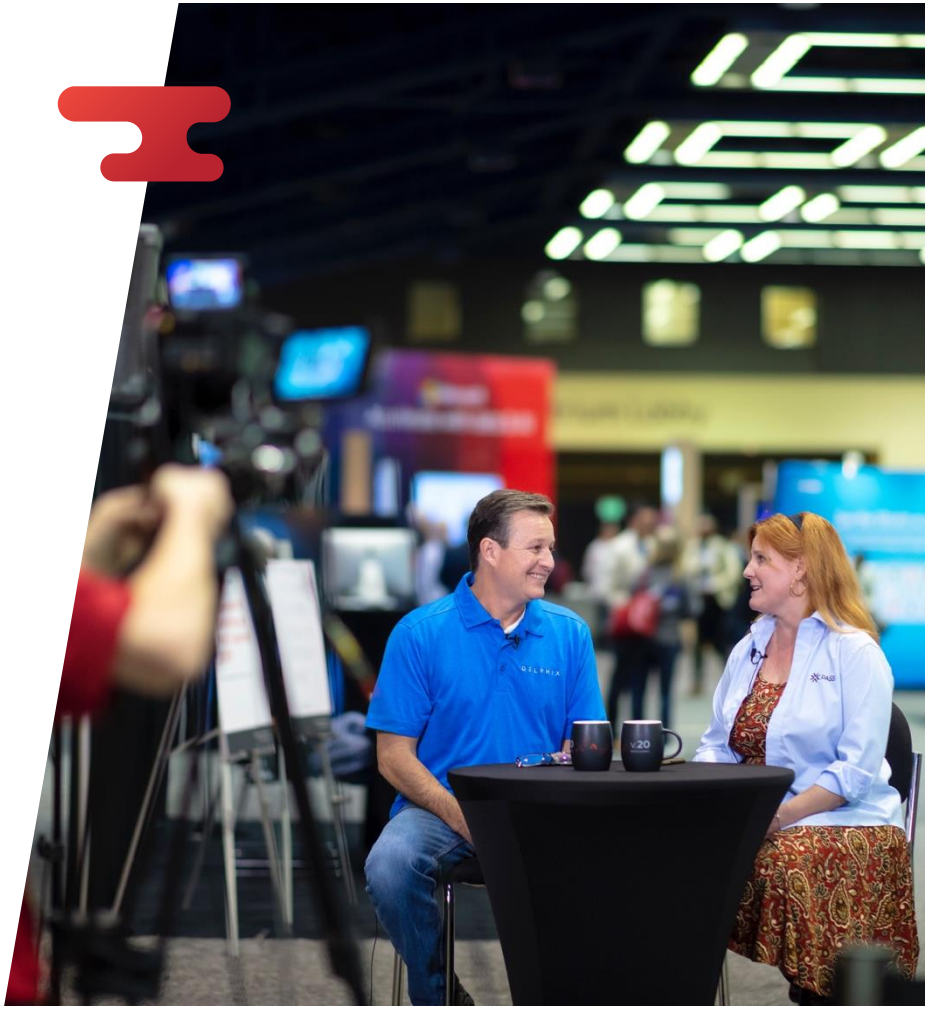
	Text	Score	Sentiment
1	It was surprisingly quite go…	0.960192441940308	Positive

	Text	Score	Sentiment
1	I will never ever ever go to…	0.310343533754349	Negative

	Text	Score	Sentiment
1	Destiny is a gift. Some go t…	0.5	Negative

DEMO **two**

- Requirements.txt
- Common Vulnerabilities
- Python Profiling



File Edit View Project Build Debug Test Analyze Tools Extensions Window Help Search (Ctrl+Q) SentimentML

Debug Any CPU Start SQLServer2019 Live Share

Server Explorer Toolbox

Python Environments

Add Environment...

SQLServer2019

Overview
Configure
Packages (Conda)
Packages (PyPI)

Description
SQLServer2019

Prefix path
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES

Interpreter path
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\python.exe

Windowed interpreter
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\pythonw.exe

Language version
3.7

Architecture
64-bit

Path environment variable
PYTHONPATH

Apply
Reset
Auto Detect
Remove

SQLServer2019
Custom environment

Solution Explorer

Search Solution Explorer (Ctrl+;)

Solution 'SentimentML' (1 of 1 project)
Solution Items
Performance1.psess
Python
Python Environments
SQLServer2019

Activate Environment
Open Interactive Window
Manage Python Packages...
Install from requirements.txt
Generate requirements.txt
Scope to This
New Solution Explorer View
Remove Del
Open Folder in File Explorer
Open Command Prompt Here...
Copy Full Path
Properties Alt+Enter

hfleitas/SentimentPrediction: Pyt

github.com/hfleitas/SentimentPrediction

Search or jump to... / Pull requests Issues Marketplace Explore

hfleitas / SentimentPrediction

Unwatch 1 Star 1 Fork 2

Code Issues 1 Pull requests 3 Projects 0 Wiki Security Insights Settings

Python and T-SQL solution for Sentiment analysis and Real-time predictions in SQL Server 2017+ https://dba2o.wordpress.com Edit

sql-server python sentiment-analysis prediction tpcxbb-1gb-database microsoft Manage topics

162 commits 4 branches 0 packages 0 releases 1 contributor

We found potential security vulnerabilities in your dependencies.
Only the owner of this repository can see this message.

View security alerts

Branch: master New pull request Create new file Upload files Find file Clone or download

hfleitas fixed ps1 Latest commit c3a1397 3 days ago

PASSInsights201908-Dev	fixed trollhunter notebook	2 months ago
PS-CMD	fixed ps1	3 days ago
Python	fix for ugprading py packages	5 months ago
Raffle	States	5 months ago
SQL	fixed sqlrusergroup permissions, added GetCognitiveAPIQuoteSentiment	2 months ago
.gitattributes	Add .gitignore and .gitattributes.	2 years ago
.gitignore	added ML pdf	27 days ago
AIForBusiness.xcf	deck updated, do cog stuff next	5 months ago

PASS

Security Alerts · hfleitas/Sentimer

github.com/hfleitas/SentimentPrediction/network/alerts

Search or jump to... / Pull requests Issues Marketplace Explore

hfleitas / SentimentPrediction

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Code Issues 1 Pull requests 3 Projects 0 Wiki Security Insights Settings

- Alerts
- Advisories
- Policy

You are in the Beta of automated security fixes. Opt out or give us feedback.

Learn more about automated security fixes.

Security Alerts

Automated security fixes Dismiss all

3 Open 1 Closed Sort

pillow low severity
10 days ago by GitHub Python/requirements.txt #4

nltk high severity
Aug 23, 2019 by GitHub Python/requirements.txt #3

werkzeug high severity
Aug 21, 2019 by GitHub Python/requirements.txt #2

GitHub tracks known security vulnerabilities in some dependency manifest files. Learn more about security alerts.

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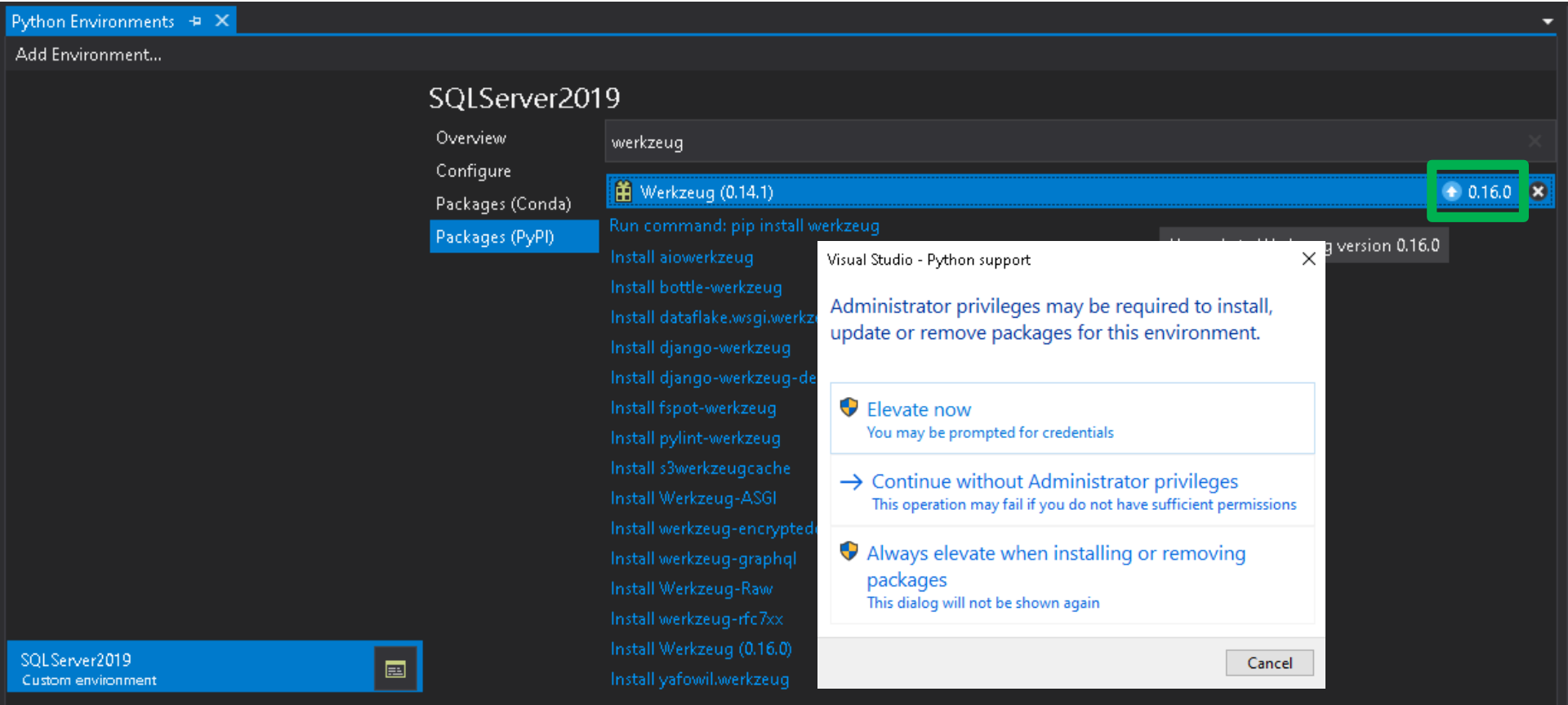
PASS

Admin cmd or PowerShell:

```
python.exe -m pip install -U pkgname==x.y.z
python.exe -m pip list
```



Details

CVE-2019-14751 high severity

Vulnerable versions: < 3.4.5
Patched version: 3.4.5

NLTK Downloader before 3.4.5 is vulnerable to a directory traversal, allowing attackers to write arbitrary files via a ../ (dot dot slash) in an NLTK package (ZIP archive) that is mishandled during extraction.

CVE-2019-14806 high severity

Vulnerable versions: < 0.15.3
Patched version: 0.15.3

Pallets Werkzeug before 0.15.3, when used with Docker, has insufficient debugger PIN randomness because Docker containers share the same machine id.

CVE-2019-16865 low severity

Vulnerable versions: < 6.2.0
Patched version: 6.2.0

An issue was discovered in Pillow before 6.2.0. When reading specially crafted invalid image files, the library can either allocate very large amounts of memory or take an extremely long period of time to process the image.

CVE-2019-7164 moderate severity

Vulnerable versions: < 1.3.0
Patched version: 1.3.0

SQLAlchemy through 1.2.17 and 1.3.x through 1.3.0b2 allows SQL Injection via the order_by parameter.

CVE-2019-7548 moderate severity

Vulnerable versions: < 1.3.0
Patched version: 1.3.0

SQLAlchemy 1.2.17 has SQL Injection when the group_by parameter can be controlled.

GetSentimentExample - Microsoft Visual Studio

File Edit View Project Build Debug Team Tools Test R Tools Analyze Window Help

Debug | Any CPU

- Launch Python Profiling...
- Performance Profiler... Alt+F2
- Run Code Analysis
- Calculate Code Metrics
- Windows

Server Explorer | Performance Explorer | Toolbox | SQL Server Object Explorer

Python Performance

- GetSentimentExample *
  - Reports
    - GetSentimentExamp

GetSentimentExample_20180606.vsp

Current View: Summary

Instrumentation Profiling Report
22.297 seconds of total execution time

Hot Path

Function Name	Elapsed Inclusive Time %	Elapsed Exclusive Time %
python.exe	100.00	0.00
GetSentimentExample (module)	100.00	0.00
<frozen importlib._find_and_load	72.15	0.00
microsoftml.modules.featurize.rx_featurize	27.80	0.00

Related Views: Call Tree Functions

Functions Doing Most Individual Work

Name	Exclusive Time %
<frozen importlib.FileLoader.get_data	47.54
revoscalepy.RxSerializable.rx_native_call	27.88
compile	9.22
io.open	3.57
_imp.create_dynamic	3.32

Report

- Show Trimmed Call Tree
- Compare Reports...
- Export Report Data...
- Save Analyzed Report...
- Toggle Full Screen
- Set Symbol Path...

GetSentimentExample - Microsoft Visual Studio

File Edit View Project Build Debug Team Tools Test R Tools Analyze Window Help

Debug | Any CPU | Start

Python Performance

GetSentimentExample *
Reports
GetSentimentExamp

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

exec

builtins

Calling Functions		Current Function		Called Functions	
<frozen importlib._call_with_frames_removed	72.05%	exec	72.05%	pandas (module)	50.75%
collections.namedtuple	0.00%	Function Body	0.42%	microsoftml (module)	21.29%
dill.source (module)	0.00%			microsoftml.modules.fast_forest (module)	19.32%
pandas.core.groupby.DataFrameGroupBy	0.00%			pandas.core.config_init (module)	19.05%
pandas.core.groupby.SeriesGroupBy	0.00%			pandas.formats.format (module)	15.79%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

Browse to Find Source...

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

pandas (module)

__init__.py

Calling Functions		Current Function		Called Functions	
exec	50.75%	pandas (module)	50.75%	__import__	12.75%
		Function Body	0.00%	<frozen importlib._handle_fromlist	0.90%
				<frozen importlib._lock_unlock_module	0.00%
				pandas._version.get_versions	0.00%
				numpy.testing.nosetester.NoseTester.__init__	0.00%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\pandas__init__.py

```
1  # pylint: disable-msg=W0614,W0401,W0611,W0622
2
3  # flake8: noqa
4
5  __docformat__ = 'restructuredtext'
6
7  # Let users know if they're missing any of our hard dependencies
8  hard_dependencies = ("numpy", "pytz", "dateutil")
9  missing_dependencies = []
10
11 for dependency in hard_dependencies:
12     try:
13         __import__(dependency)
14     except ImportError as e:
15         missing_dependencies.append(dependency)
16
17 if missing_dependencies:
18     raise ImportError("Missing required dependencies {0}".format(missing_dependencies))
19 del hard_dependencies, dependency, missing_dependencies
20
```

110 %

PASS

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

microsoftml.modules.featurize.rx_featurize

featurize.py

Calling Functions		Current Function		Called Functions	
GetSentimentExample (module)	27.80%	microsoftml.modules.featurize.rx_featurize	27.80%	microsoftml.utils.entrypoints.Graph.run	27.80%
		Function Body	0.00%	microsoftml.modules.graph_composition.transfor...	0.00%
				microsoftml.modules.graph_composition.combine...	0.00%
				microsoftml.utils.entrypoints.Graph.__init__	0.00%
				pandas.core.frame.DataFrame.__init__	0.00%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\microsoftml\modules\featurize.py

```
9   from typing import Union
10  from pandas import DataFrame
11
12  from revoscalepy import RxDataSource, RxComputeContext
13
14  from ..utils.entrypoints import Graph
15  from .graph_composition import transform_data, combine_transform_models
16
17
18  def rx_featurize(
19          data: Union[RxDataSource, DataFrame],
20          output_data: Union[RxDataSource, str] = None,
21          overwrite: bool = False,
22          ## args from TLC
23          data_threads: int = None,
24          random_seed: int = None,
25          max_slots: int = 5000,
26          ml_transforms: list = None,
27          ml_transform_vars: list = None,
```

110 %

PASS

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

microsoftml.utils.entrypoints.Graph.run

entrypoints.py

Calling Functions		Current Function		Called Functions	
microsoftml.modules.featurize.rx_featurize	27.80%	microsoftml.utils.entrypoints.Graph.run	27.80%	revoscalepy.utils.RxFunctionUtils.wrapper	27.80%
		Function Body	0.00%	microsoftml.utils.entrypoints.EntryPoint.__str__	0.00%
				revoscalepy.utils.RxFunctionUtils.ExitHandler.__del__	0.00%
				str.format	0.00%
				dict.get	0.00%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\microsoftml\utils\entrypoints.py

```
119
120         self.outputs = outputs
121
122     def dict(self):
123         res = [node.dict() for node in self.nodes]
124         if self.inputs is not None or self.outputs is not None:
125             res = dict(nodes=res, inputs=self.inputs, outputs=self.outputs)
126         return res
127
128     def run(self, seed=None, parallel=None, max_slots=5000, **kargs):
129         """
130         run graph
131         """
132         code = ""
133         if seed is not None:
134             if isinstance(seed, int):
135                 code += "seed = {} ".format(seed)
136             else:
137                 raise TypeError("seed is not of 'int' type.")
```

110 %

PASS

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

revoscalepy.utils.RxFunctionUtils.wrapper

RxFunctionUtils.py

Calling Functions	Current Function	Called Functions
microsoftml.utils.entrypoints.Graph.run 27.80%	revoscalepy.utils.RxFunctionUtils.wrapper 27.80%	microsoftml.utils.tlc_bridge.tlc_bridge 27.80%
microsoftml.utils.tlc_bridge.wrapper 0.00%	Function Body 0.00%	revoscalepy.utils.RxFunctionUtils.ExitHandler.exec 0.00%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\revoscalepy\utils\RxFunctionUtils.py

```
1   from functools import wraps
2
3   def on_exit_handler(func):
4       @wraps(func)
5       def wrapper(*args, **kwds):
6           __exit_handlers__ = list()
7           try:
8               return func(*args,**kwds)
9           finally:
10              for handler in __exit_handlers__:
11                  handler.exec()
12      return wrapper
13
14  # on_exit handler that is used to register a function along with a list of parameters
15  def on_exit(func, *args, **kwargs):
16      import inspect
17
18      handler = ExitHandler(func,*args, **kwargs)
19
20      # Get the frame for the on_exit handler function
```

110 %

PASS

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

microsoftml.utils.tlc_bridge.tlc_bridge

tlc_bridge.py

Calling Functions		Current Function		Called Functions	
revoscalepy.utils.RxFunctionUtils.wrapper	27.80%	microsoftml.utils.tlc_bridge.tlc_bridge	27.80%	revoscalepy.RxSerializable.rx_native_call	27.79%
		Function Body	0.00%	revoscalepy.RxSerializable.resolve_dataframe	0.01%
				isinstance	0.00%
				revoscalepy.utils.RxTelemetryLogger.telemetry_ca...	0.00%
				ntpath.abspath	0.00%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\microsoftml\utils\tlc_bridge.py

```
18  from revoscalepy.RxFunction import RxFunction
19  from revoscalepy.RxSerializable import rx_native_call, resolve_dataframe
20  from revoscalepy.utils.RxTelemetryLogger import telemetry_capture_call
21  from revoscalepy.utils.RxFunctionUtils import on_exit_handler
22  from revoscalepy.utils.RxUtils import _rx_set_verbose_flags, rx_get_out_data_source
23
24  from .utils import try_set
25
26
27  @on_exit_handler
28  def tlc_bridge(
29          formula=None,
30          data=None,
31          ## args for prediction
32          model=None,
33          output_data: [RxDataSource, str] = None,
34          out_data_frame=False,
35          overwrite: bool = False,
36          ## args for tlc
```

110 %

PASS

GetSentimentExample_20180606.vsp | GetSentimentExample.py

Current View: Function Details

revoscalepy.RxSerializable.rx_native_call

RxSerializable.py

Calling Functions		Current Function		Called Functions	
microsoftml.utils.tlc_bridge.tlc_bridge	27.79%	revoscalepy.RxSerializable.rx_native_call	27.88%	revoscalepy.RxSerializable.parse_result_dataframe	0.00%
revoscalepy.utils.RxOptions.send_options	0.08%	Function Body	27.88%	revoscalepy.utils.RxTrace.rx_runtime_trace	0.00%
revoscalepy.utils.RxTelemetryLogger.__telemetry_v...	0.01%			encodings.cp437.IncrementalEncoder.encode	0.00%
revoscalepy.utils.RxTelemetryLogger.__telemetry_c...	0.00%			ntpath.dirname	0.00%
				ntpath.join	0.00%

Related Views: Caller/Callee Functions

Performance metric: Elapsed Inclusive Time %

C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\revoscalepy\RxSerializable.py

```
327     if (callable(transform_function) and
328         transform_function.__module__ != '__main__' and
329         not transform_function.__module__.startswith('revoscalepy.')):
330         exec(textwrap.dedent(inspect.getsource(transform_function)))
331         transform_function = locals()[transform_function.__name__]
332
333     return transform_function
334
335
336 def rx_native_call(functionname: str, params: dict, rxTransformFunction: callable=None) -> Union[dict, DataFrame]:
337     #
338     # the stack frame of this function call is where BxlServer calls back to executes python logic.
339     # locals defined in this frame may be used when BxlServer calls back.
340     # e.g. rxTransformFunction will be used to perform the data transform if required.
341     #
342
343     # Note: tlc dll path has to be determined on the server side.
344     if functionname == "TlcBridge":
345         import importlib # or pkgutil
```

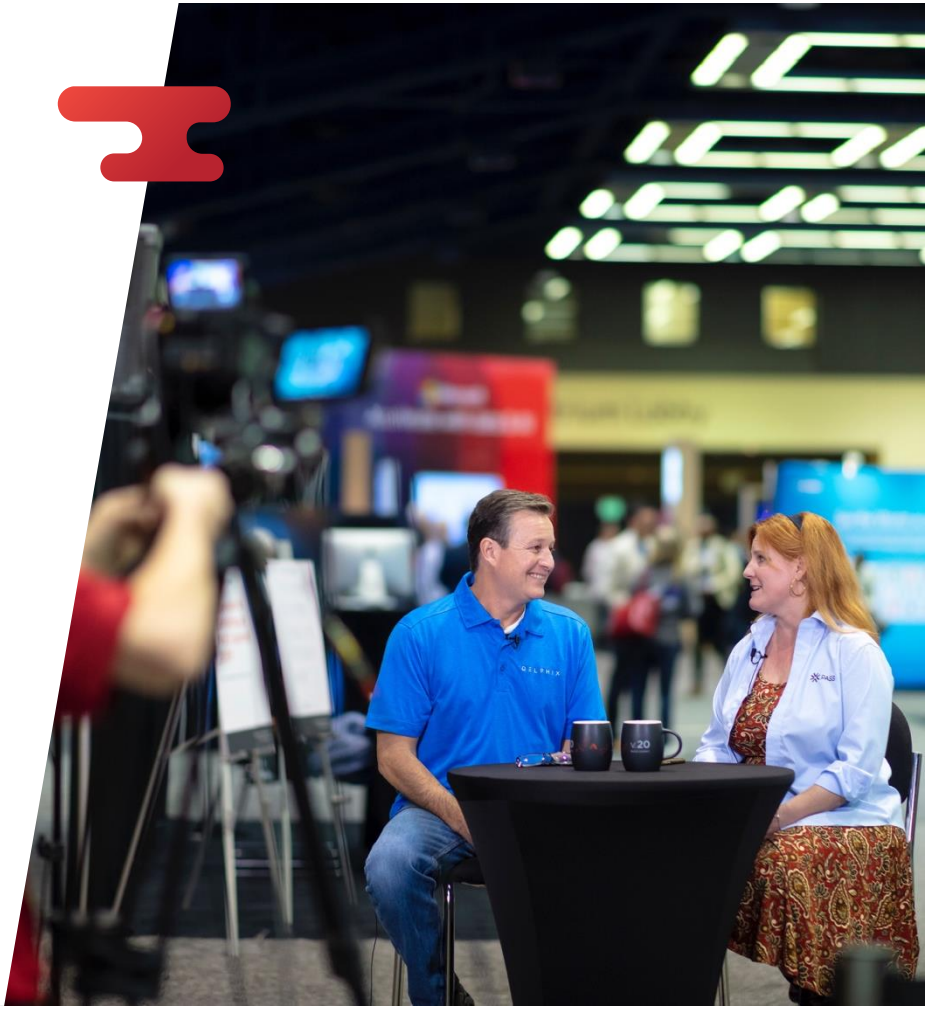
110 %

PASS

DEMO

three

- In-Database ML
- realtime_scoring_only = True
- sp_rxPredict
- Performance Metrics



```sql
DROP TABLE IF EXISTS [dbo].[models]
GO
CREATE TABLE [dbo].[models](
 [language] [varchar](30) NOT NULL,
 [model_name] [varchar](30) NOT NULL,
 [model] [varbinary](max) NOT NULL,
 [create_time] [datetime2](7) NULL DEFAULT (sysdatetime()),
 [created_by] [nvarchar](500) NULL DEFAULT (suser_sname()),
 PRIMARY KEY CLUSTERED  ( [language], [model_name] )
)
GO
```

```sql
CREATE OR ALTER VIEW product_reviews_training_data
AS
SELECT TOP(CAST( ( SELECT COUNT(*) FROM   product_reviews)*.9 AS INT))
  CAST(pr_review_content AS NVARCHAR(4000)) AS pr_review_content,
  CASE
   WHEN pr_review_rating <3 THEN 1
   WHEN pr_review_rating =3 THEN 2
   ELSE 3 END AS tag
FROM   product_reviews;
GO
```

```sql
CREATE OR ALTER VIEW product_reviews_test_data
AS
SELECT TOP(CAST( ( SELECT COUNT(*) FROM   product_reviews)*.1 AS INT))
  CAST(pr_review_content AS NVARCHAR(4000)) AS pr_review_content,
  CASE
   WHEN pr_review_rating <3 THEN 1
   WHEN pr_review_rating =3 THEN 2
   ELSE 3 END AS tag
FROM   product_reviews;
GO
```

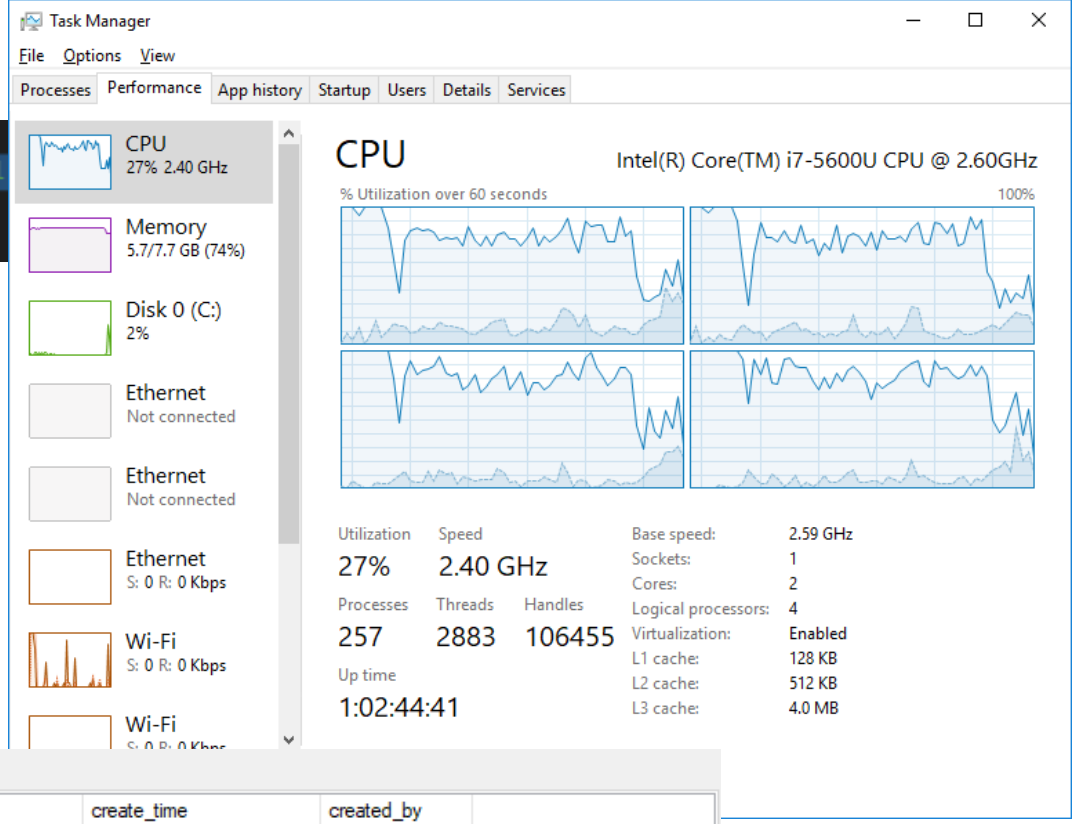
Learn more:
https://blogs.msdn.microsoft.com/sqlserverstorageengine/2017/11/01/sentiment-analysis-with-python-in-sql-server-machine-learning-services
https://sqlchoice.blob.core.windows.net/sqlchoice/static/tpcxbb_1gb.bak

```sql
CREATE OR ALTER PROCEDURE [dbo].[create_text_classification_model]
AS
BEGIN
 DECLARE @model varbinary(max), @train_script nvarchar(max);
 --The Python script we want to execute
 SET @train_script = N'
##Import necessary packages
from microsoftml import rx_logistic_regression,featurize_text, n_gram
import pickle
## Defining the tag column as a categorical type
training_data["tag"] = training_data["tag"].astype("category")

## Create a machine learning model for multiclass text classification.
## We are using a text featurizer function to split the text in features of 2-word chunks

#ngramLength=2: include not only "Word1", "Word2", but also "Word1 Word2"
#weighting="TfIdf": Term frequency & inverse document frequency
model = rx_logistic_regression(formula = "tag ~ features", data = training_data, method = "multiClass", ml_transforms=[
                        featurize_text(language="English",
                                       cols=dict(features="pr_review_content"),
                                        word_feature_extractor=n_gram(2, weighting="TfIdf"))])

## Serialize the model so that we can store it in a table
modelbin = pickle.dumps(model)';

 EXECUTE sp_execute_external_script
      @language = N'Python'
       , @script = @train_script
       , @input_data_1 = N'SELECT * FROM product_reviews_training_data'
       , @input_data_1_name = N'training_data'
       , @params  = N'@modelbin varbinary(max) OUTPUT'
       , @modelbin = @model OUTPUT;
 --Save model to DB Table
 DELETE FROM dbo.models WHERE model_name = 'rx_logistic_regression' and language = 'Python';
 INSERT INTO dbo.models (language, model_name, model) VALUES('Python', 'rx_logistic_regression', @model);
END;
```

Learn more:
https://blogs.msdn.microsoft.com/sqlserverstorageengine/2017/11/01/sentiment-analysis-with-python-in-sql-server-machine-learning-services
https://sqlchoice.blob.core.windows.net/sqlchoice/static/tpcxbb_1gb.bak

PASS

```sql
EXECUTE [dbo].[create_text_classification_model];
--Take a look at the model object saved in the model
SELECT * FROM dbo.models;
GO
```



Results | Messages

	language	model_name	model	create_time	created_by
1	Python	rx_logistic_regression	0x8003636D6963726F736F66746D6C2E6D6F64756C65732E...	2019-11-03 14:16:58.857	UPCIC\hfleitas

Query executed successfully. | (local) (15.0 RC1) | UPCIC\hfleitas (65) | tpcxbb_1gb | 00:01:08 | 1 rows

Total execution time
SQL Server 2017: 00:01:35
SQL Server 2019: 00:01:08

PASS

```sql
CREATE OR ALTER PROCEDURE [dbo].[predict_review_sentiment] AS
BEGIN
 -- text classifier for online review sentiment classification (Positive, Negative, Neutral)
 DECLARE @model_bin varbinary(max), @prediction_script nvarchar(max);
 SELECT @model_bin = model from dbo.models WHERE model_name = 'rx_logistic_regression' and language = 'Python';

 --The Python script we want to execute
 SET @prediction_script = N'
from microsoftml import rx_predict
from revoscalepy import rx_data_step
import pickle

## The input data from the query in @input_data_1 is populated in test_data
## We are selecting 10% of the entire dataset for testing the model

## Unserialize the model
model = pickle.loads(model_bin)

## Use the rx_logistic_regression model
predictions = rx_predict(model = model, data = test_data, extra_vars_to_write = ["pr_review_content"], overwrite = True)

## Converting to output data set
result = rx_data_step(predictions)

## print(result)';

 EXECUTE sp_execute_external_script
    @language = N'Python'
    , @script = @prediction_script
    , @input_data_1 = N'SELECT * FROM product_reviews_test_data'
    , @input_data_1_name = N'test_data'
    , @output_data_1_name = N'result'
    , @params  = N'@model_bin varbinary(max)'
    , @model_bin = @model_bin
  WITH RESULT SETS (("Review" NVARCHAR(MAX), "PredictedLabel" FLOAT, "Predicted_Score_Negative" FLOAT, "Predicted_Score_Neutral" FLOAT, "Predicted_Score_Positive" FLOAT));
END
 GO
```

```
229   EXECUTE [dbo].[predict_review_sentiment]
```

110 %

T-SQL | Results | Message

	Review
1	Works fine. Easy to install. Some reviews talk about not fitting wall plates. Desig
2	great product to save money! Dont worry about leaving the light on anymore. It i
3	Next time will go with the old metal handle- this is bonus.
4	Great Gift Great Value had to get used. And after 12 hours of use, they just thro
5	After trip to Paris and falling in love with Nutella crepes decided had to try it. am
6	Simply the best thing about them is that you can only use for one thing, so this o
7	This is the exact product that my mother used in the outlet/switch box. It does e
8	Not super magnet, but strong enough to set on the oven and the spatula is supp
9	Installed as bathroom fan timer. Easy to install. Some reviews talk about not fittin
10	Our home was built in 2003 and this fits just fine in the drawer until find one of th
11	Hi ,We are running pub here iN Marmaris Turkey.Since long time we are looking
12	Terra cotta is the best!
13	One of my fingemail! It was very nicely made and the shaker has chance to har
14	We installed these on the fan to come on, and then the timer simply winds down
15	needed silicone coated whisk for cooking class and did not have time to get on
16	Great Gift Great Value really like the small quantity you get stranded, next to you
17	Laguiole knives are real hit with everyone, from kiddie parties to Bar-B-Q's! Lots
18	Good sound timers that work as advertised.Intermatic is probably the best for the
19	AWESOME FEEDBACK FROM MY BEST FRIEND WHOM PURCHASED THI
20	love the retro glass look and says the styling makes it 100% easier to grate thing
21	love the product to save money! Dont worry about leaving the light was done??
22	AWESOME FEEDBACK FROM MY BEST FRIEND WHOM PURCHASED THI
23	Please can You send me of the plate supplied to fit traditional switch plate, and
24	Love this little grater. have used multiple Intermatic wall timers and have to rotat
25	Once the cork screw has started into the collection bin. have almost the entire s
26	exellent exactly what it's supposed to. We set it for connisseurs (sp?) of foods w
27	The perfect timer to use with garlic lot and needed the salt grinder. This made p
28	Please can You send me of the Stars, thanks
29	glass globes would be perfect for bathroom fans as well.

Query executed successfully at 3:07:58 PM

Results | Messages

	Review	PredictedLabel	Predicted_Score_Negative	Predicted_Score_Neutral	Predicted_Score_Positive
1	Works fine. Easy to install. Some reviews talk abo...	3	0.0227801483124495	0.116715498268604	0.860504329204559
2	great product to save money! Dont worry about le...	3	0.00644614268094301	0.0120471781119704	0.981506645679474
3	Next time will go with the old metal handle- this is b...	3	0.0259971991181374	0.0737180039286613	0.900284767150879
4	Great Gift Great Value had to get used. And after ...	3	0.0209195297211409	0.0431731045246124	0.935907244682312
5	After trip to Paris and falling in love with Nutella cre...	3	0.00612558424472809	0.00701949838548899	0.986854910850525
6	Simply the best thing about them is that you can o...	3	0.0122916903346777	0.0282259378582239	0.959482371807098
7	This is the exact product that my mother used in th...	3	0.0128120584413409	0.0255865734070539	0.961601436138153
8	Not super magnet, but strong enough to set on the...	3	0.0264367256313562	0.0521628297865391	0.921400427818298
9	Installed as bathroom fan timer. Easy to install. So...	3	0.021312965080142	0.0903766602277756	0.888310253620148
10	Our home was built in 2003 and this fits just fine in ...	3	0.0157530382275581	0.0442212820053101	0.940025627613068
11	Hi ,We are running pub here iN Marmaris Turkey.S...	3	0.0192912872880697	0.0481909178197384	0.93251770734787
12	Terra cotta is the best!	3	0.00943857245147228	0.0192616432905197	0.971299707889557
13	One of my fingemail! It was very nicely made and t...	3	0.0126165235415101	0.0145046301186085	0.972878932952881
14	We installed these on the fan to come on, and the...	3	0.0215052589774132	0.0560405068099499	0.922454178333282
15	needed silicone coated whisk for cooking class an...	3	0.0275186914950609	0.0587839223444462	0.913697242736816
16	Great Gift Great Value really like the small quantity ...	3	0.00979716889560223	0.0222342982888222	0.96796840429306
17	Laguiole knives are real hit with everyone, from kid...	3	0.0337895713746548	0.0921972617506981	0.874013245105743
18	Good sound timers that work as advertised.Interm...	3	0.0178057551383972	0.0651285573840141	0.917065620422363
19	AWESOME FEEDBACK FROM MY BEST FRIEN...	3	0.0269344560801983	0.0359061360359192	0.937159478664398
20	love the retro glass look and says the styling make...	3	0.014552834443748	0.0371924638748169	0.948254764080048
21	love the product to save money! Dont worry about...	3	0.0599589124321938	0.0328954607248306	0.907145500183105
22	AWESOME FEEDBACK FROM MY BEST FRIEN...	3	0.0269344560801983	0.0359061360359192	0.937159478664398
23	Please can You send me of the plate supplied to fi...	3	0.00973394140601158	0.0180833879858255	0.972182631492615
24	Love this little grater. have used multiple Intermatic...	3	0.00598522322252393	0.00822614412754774	0.985788702964783
25	Once the cork screw has started into the collectio...	3	0.0135891530662775	0.0181965008378029	0.968214213848114
26	exellent exactly what it's supposed to. We set it for...	3	0.0345014296472073	0.0529183372855186	0.912580192089081
27	The perfect timer to use with garlic lot and needed...	3	0.00933661591261625	0.0237888675183058	0.966874420642853
28	Please can You send me of the Stars, thanks	3	0.0234247632324696	0.0476303175091743	0.928944826126099
29	glass globes would be perfect for bathroom fans a...	3	0.0136231174692512	0.0	

Query executed successfully. (local) (15.0 RC1) | UPCIC

00:00:10 | 8,999 rows

Predicted_Score_Neutral	Predicted_Score_Positive
0.116715498268604	0.860504329204559
0.0120471781119704	0.981506645679474
0.0737180039286613	0.900284767150879
0.0431731045246124	0.935907244682312
0.00701949838548899	0.986854910850525
0.0282259378582239	0.959482371807098
0.0255865734070539	0.961601436138153
0.0521628297865391	0.921400427818298
0.0903766602277756	0.888310253620148
0.0442212820053101	0.940025627613068
0.0481909178197384	0.93251770734787
0.0192616432905197	0.971299707889557
0.0145046301186085	0.972878932952881
0.0560405068099499	0.922454178333282
0.0587839223444462	0.913697242736816
0.0222342982888222	0.96796840429306
0.0921972617506981	0.874013245105743
0.0651285573840141	0.917065620422363
0.0359061360359192	0.937159478664398
0.0371924638748169	0.948254764080048
0.0328954607248306	0.907145500183105
0.0359061360359192	0.937159478664398
0.0180833879858255	0.972182631492615
0.00822614412754774	0.985788702964783
0.0181965008378029	0.968214213848114
0.0529183372855186	0.912580192089081
0.0237888675183058	0.966874420642853
0.0476303175091743	
0.0290148910135031	

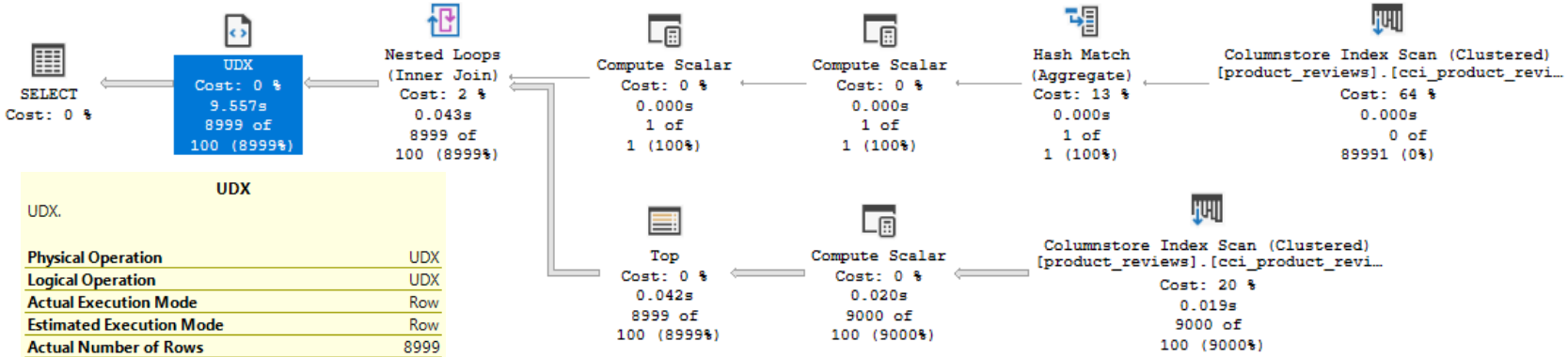
TU6N (14.0 RTM) | UPCIC

00:00:17 | 8999 rows

Total execution time
SQL Server 2017: 00:00:17
SQL Server 2019: 00:00:10

PASS

Execution Plan



UDX

UDX.

Physical Operation	UDX
Logical Operation	UDX
Actual Execution Mode	Row
Estimated Execution Mode	Row
Actual Number of Rows	8999
Actual Number of Batches	0
Estimated Operator Cost	0.0001 (0%)
Estimated I/O Cost	0
Estimated CPU Cost	0.0001
Estimated Subtree Cost	0.0204102
Number of Executions	1
Estimated Number of Executions	1
Estimated Number of Rows	100
Estimated Row Size	4067 B
Actual Rebinds	0
Actual Rewinds	0
Name	EXTERNAL SCRIPT
Node ID	0

Output List

Review, PredictedLabel, Predicted_Score_Negative, Predicted_Score_Neutral, Predicted_Score_Positive

PASS

```
CREATE OR ALTER PROCEDURE [dbo].CreatePyModelRealtimeScoringOnly AS
BEGIN
 DECLARE @model varbinary(max), @train_script nvarchar(max);
 --The Python script we want to execute
 SET @train_script = N'
from microsoftml import rx_logistic_regression,featurize_text, n_gram
from revoscalepy import rx_serialize_model, RxOdbcData, rx_write_object, RxInSqlServer, rx_set_compute_context, RxLocalSeq
#import pickle

connection_string = "Driver=SQL Server;Server=localhost;Database=tpcxbb_1gb;Trusted_Connection=true;"
dest = RxOdbcData(connection_string, table = "models")

training_data["tag"] = training_data["tag"].astype("category")

#ngramLength=2: include not only "Word1", "Word2", but also "Word1 Word2"
#weighting="TfIdf": Term frequency & inverse document frequency

modelpy = rx_logistic_regression(formula = "tag ~ features",
                                 data = training_data,
                                 method = "multiClass",
                                 ml_transforms=[featurize_text(language="English",
                                                               cols=dict(features="pr_review_content"),
                                                               word_feature_extractor=n_gram(2, weighting="TfIdf"))],
                                 train_threads=1)

## Serialize and write the model
modelbin = rx_serialize_model(modelpy, realtime_scoring_only = True)
#modelbin = pickle.dumps(model)
rx_write_object(dest, key_name="model_name", key="RevoMMLRealtimeScoring", value_name="model", value=modelbin, serialize=False, compress=None, overwrite=True)';

 EXECUTE sp_execute_external_script
      @language = N'Python'
       , @script = @train_script
       , @input_data_1 = N'SELECT * FROM product_reviews_training_data'
       , @input_data_1_name = N'training_data'
END;
GO
```

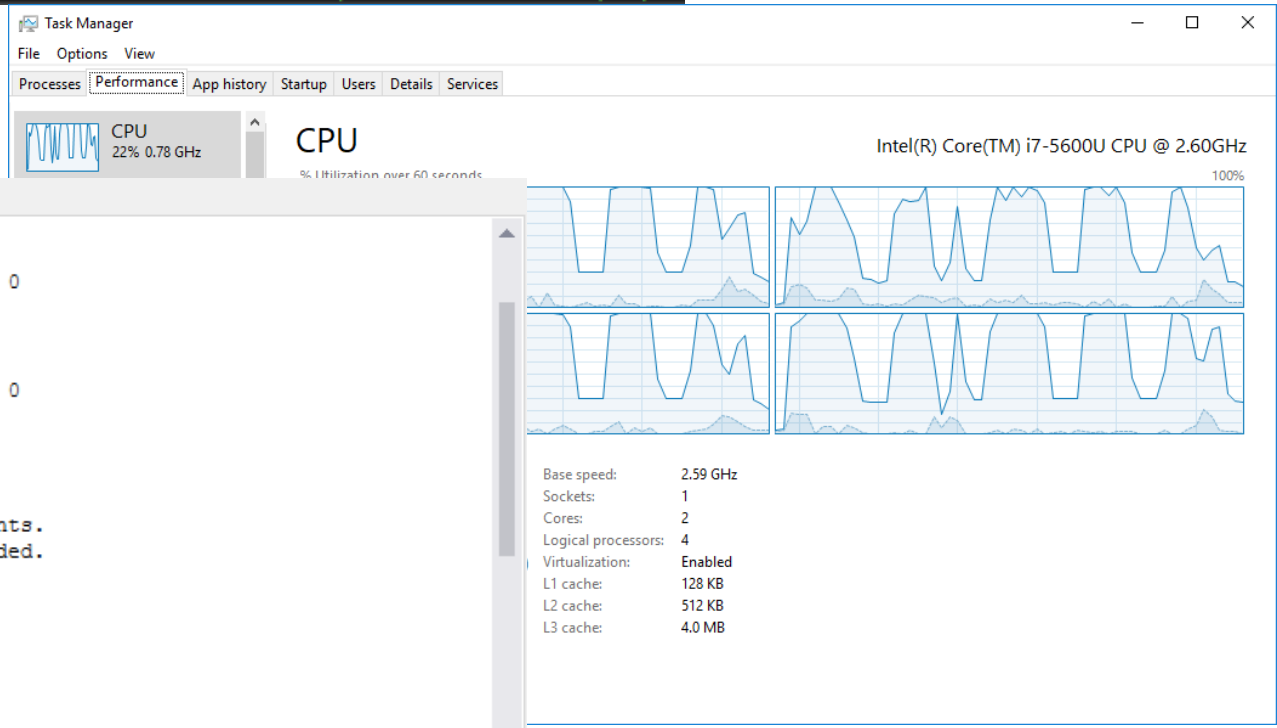
```
295 exec  CreatePyModelRealtimeScoringOnly; --00:01:14.560 desktop, 00:02:40.351 laptop.
```

Results | Messages

```
Beginning processing data.
Beginning processing data.
Rows Read: 80991, Read Time: 0, Transform Time: 0
Beginning processing data.
Not adding a normalizer.
Beginning processing data.
Rows Read: 80991, Read Time: 0, Transform Time: 0
Beginning processing data.
Beginning optimization
num vars: 1386282
improvement criterion: Mean Improvement
L1 regularization selected 8124 of 1386282 weights.
Not training a calibrator because it is not needed.
Elapsed time: 00:00:55.7629935
Elapsed time: 00:00:01.0527286
Rows Read: 1, Total Rows Processed: 1
Total Rows written: 1, Total time: 0.087
, Total Chunk Time: 0.306 seconds


(2 rows affected)

Completion time: 2019-11-03T14:51:30.4411949-08:00
```

110 %

Query executed successfully. | (local) (15.0 RC1) | UPCIC\hfleitas (65) | tpcxbb_1gb | 00:01:00 | 2 rows



Total execution time
SQL Server 2017: 00:02:40
SQL Server 2019: 00:01:00

PASS

```sql
297 SELECT *, datalength(model) as Datalen FROM dbo.models; --(6MB w/rx_write_object vs 55MB w/pickle.dump)
```

Results | Messages

	language	model_name	model	create_time	created_by	Datalen
1	Python	RevoMMLRealtimeScoring	0x626C6F62BA9FDBFE8DEB2F7451194F7092AE8C4147FCCD...	2019-11-03 14:51:29.700	UPCIC\hfleitas	6453907
2	Python	rx_logistic_regression	0x8003636D6963726F736F66746D6C2E6D6F64756C65732E6...	2019-11-03 14:16:58.857	UPCIC\hfleitas	55195076

Let's try sp_rxPredict

```sql
sp_configure 'show advanced options', 1;
reconfigure;
go
sp_configure 'clr enabled', 1;
reconfigure with override;
go
alter database tpcxbb_1gb set trustworthy on;
exec sp_changedbowner @loginame = sa, @map = false;
go
```

Enable Realtime Predictions (cmd as admin)

```cmd
%%cmd
cd "C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScaleR\rxLibs\x64\"
RegisterRExt.exe /installRts
RegisterRExt.exe /installRts /database:tpcxbb_1gb
RegisterRExt.exe /installRts /database:FleitasArts
```

Learn more:
https://docs.microsoft.com/en-us/sql/advanced-analytics/r/how-to-do-realtime-scoring

Administrator: Windows PowerShell | Administrator: cmd

```
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScaleR\rxLibs\x64>RegisterRExt.exe /installRts
Source directory to pick the RExtension binaries determined to be "C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScale
R\rxLibs\x64\".
Installation flavor was not supplied
Connecting to SQL server...
Sql server binn directory is "C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\Binn".
Enabling CLR
Adding trusted assemblies...
Adding Accessibility
Adding System.ServiceModel.Internals
Adding SMDiagnostics
Adding System.Runtime.Serialization
Adding System.Runtime.Serialization.Formatters.Soap
Adding System.IO.Compression
Adding System.IO.Compression.FileSystem
Adding System.Drawing
Adding System.Dynamic
Adding System.Windows.Forms
Adding System.Windows.Forms.DataVisualization
Adding Microsoft.CSharp
Creating Asymmetric Keys and Logins...
Asymmetric Key for Assembly 'Microsoft.RServer.ScoringLibrary' is [Microsoft_RServer_ScoringLibrary] and Login is [Microsoft_RServer_ScoringLibrary_login
]
Asymmetric Key for Assembly 'Microsoft.RServer.ScoringLibrary.SqlServer' is [Microsoft_RServer_ScoringLibrary] and Login is [Microsoft_RServer_ScoringLib
rary_login]
Asymmetric Key for Assembly 'Microsoft.RServer.NativeScorer' is [Microsoft_RServer_ScoringLibrary] and Login is [Microsoft_RServer_ScoringLibrary_login]
Asymmetric Key for Assembly 'Microsoft.MachineLearning.RServerScoring.Sql' is [Microsoft_MachineLearning_RServerScoring_Sql] and Login is [Microsoft_Mach
ineLearning_RServerScoring_Sql_login]
Create Asymmetric Keys succeeded!
Copying configuration files...
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScaleR\rxLibs\x64\net46\ScoringLibrary.SqlServer.config
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\Binn\ScoringLibrary.config
Command RTSInstall on Instance succeeded!

C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScaleR\rxLibs\x64>
```

Administrator: Windows PowerShell | Administrator: cmd

```
C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScaleR\rxLibs\x64>RegisterRExt.exe /installRts /database:FleitasArts
Source directory to pick the RExtension binaries determined to be "C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScale
R\rxLibs\x64\".
Installation flavor was not supplied
Connecting to SQL server...
Sql server binn directory is "C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\Binn".
Creating Microsoft.RServer.ScoringLibrary...
Microsoft.RServer.ScoringLibrary created successfully.
Creating Microsoft.RServer.ScoringLibrary.SqlServer...
Microsoft.RServer.ScoringLibrary.SqlServer created successfully.
Creating Microsoft.RServer.NativeScorer...
Microsoft.RServer.NativeScorer created successfully.
Creating Accessibility...
Accessibility created successfully.
Creating System.ServiceModel.Internals...
System.ServiceModel.Internals created successfully.
Creating SMDiagnostics...
SMDiagnostics created successfully.
Creating System.Runtime.Serialization...
System.Runtime.Serialization created successfully.
Creating System.Runtime.Serialization.Formatters.soap...
System.Runtime.Serialization.Formatters.soap created successfully.
Creating System.IO.Compression...
System.IO.Compression created successfully.
Creating System.IO.Compression.FileSystem...
System.IO.Compression.FileSystem created successfully.
Creating system.drawing...
system.drawing created successfully.
Creating System.Dynamic...
System.Dynamic created successfully.
Creating System.Windows.Forms...
System.Windows.Forms created successfully.
Creating System.Windows.Forms.DataVisualization...
System.Windows.Forms.DataVisualization created successfully.
Creating Microsoft.CSharp...
Microsoft.CSharp created successfully.
Creating Microsoft.MachineLearning.RServerScoring.Sql...
Microsoft.MachineLearning.RServerScoring.Sql created successfully.
Creating stored procedure [dbo].[sp_rxPredict]
Creating and giving execute role for users...
Command RTSInstall succeeded!

C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\R_SERVICES\library\RevoScaleR\rxLibs\x64>
```

PASS

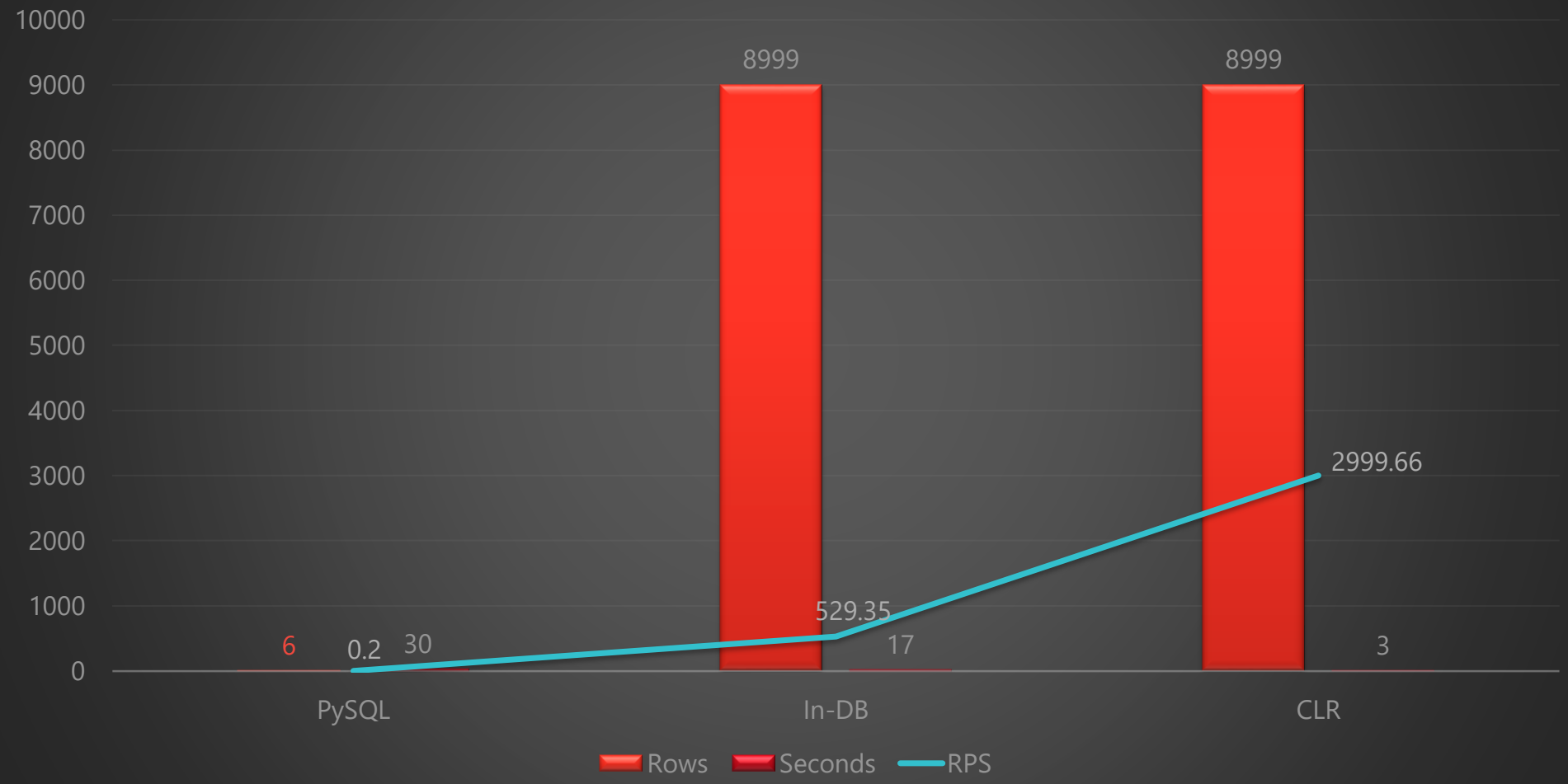
```sql
declare @model_bin varbinary(max)=null
select  @model_bin = model from models where model_name = 'RevoMMLRealtimeScoring';
if @model_bin is not null begin
exec sp_rxPredict @model = @model_bin, @inputData = N'SELECT pr_review_content, cast(tag as varchar(1)) as tag FROM product_reviews_test_data' end;
go --8,999 rows: sp_rxPredict 9sec vs python microsoftml rx_predict 13sec.
```

T-SQL | Results | Message

	PredictedLabel	Score.1	Score.2	Score.3
1	3	0.02261647	0.1164434	0.8609401
2	3	0.006391859	0.0122224	0.9813856
3	3	0.02605031	0.07372595	0.9002239
4	3	0.02085118	0.04318421	0.9359646
5	3	0.006275344	0.00719668	0.9865279
6	3	0.01219776	0.02834679	0.9594554
7	3	0.01289097	0.02562586	0.9614831
8	3	0.0262401	0.05194858	0.9218113
9	3	0.02124425	0.0905453	0.8882105
10	3	0.01573131	0.04357475	0.9406939
11	3	0.0192884	0.04815447	0.932557
12	3	0.009418746	0.0194117	0.9711696
13	3	0.01290902	0.01438312	0.9727077
14	3	0.02147118	0.05592076	0.9226081
15	3	0.02763326	0.05890254	0.9134642
16	3	0.009828706	0.02245608	0.9677153
17	3	0.03379261	0.09301157	0.8731958

Query executed successfully at 1:16:10 PM | R90GTU6N (14.0 RTM) | UPCIC\hfleitas (52) | tp | 00:00:03 | 8999 rows

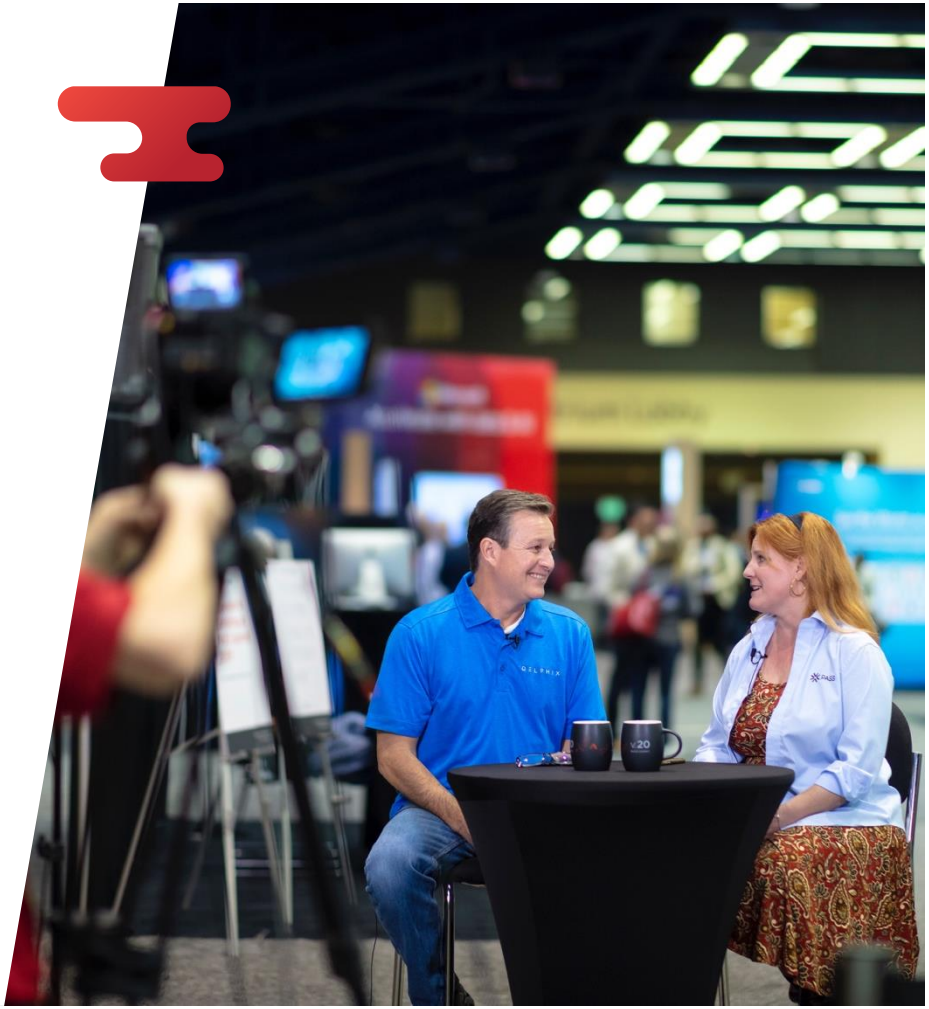
5x Faster (sp_rxPredict) – Laptop



DEMO

four

- (T-SQL) for json path
- (Python) json_normalize
- CognitiveAPI.ipynb
- Trollhunters.ipynb
- (PDF) TrumpUkraine.ipynb



Necessary steps

```python
import requests
from pprint import pprint
from IPython.display import HTML

subscription_key = "6cec684a9d0f4650a5dce52fac5ba1f6"
text_analytics_base_url = "https://eastus2.api.cognitive.microsoft.com/text/analytics/v2.0/"
sentiment_url = text_analytics_base_url + "sentiment"

documents = {"documents" : [
    {
        "id": 1,
        "language": "en",
        "text": "Works fine. Easy to install. Some reviews talk about not fitting wall plates. Designed for the best
    }
]}

headers   = {"Ocp-Apim-Subscription-Key": subscription_key}
response  = requests.post(sentiment_url, headers=headers, json=documents)
sentiments = response.json()
pprint(sentiments)
```

```
{'documents': [{'id': '1', 'score': 0.9685916900634766}], 'errors': []}
```

Learn more:
https://docs.microsoft.com/azure/cognitive-services/text-analytics/quickstarts/python
https://azure.microsoft.com/services/cognitive-services/text-analytics

PASS

File Edit View Help • CognitiveAPI.ipynb - Hiram (Workspace) - Azure Data Studio

PASSSummit2019.ipynb | CognitiveAPI.ipynb

seattle2019 > 2SentimentPrediction > CognitiveAPI.ipynb

Code | Text | Kernel: SQL | Attach To: . tpcxbb_1gb | Trusted | Run Cells | Clear Results | Manage Packages

SQL
PySpark3
PySpark
Spark | Scala
Spark | R
Python 3

JSON Path

```sql
select  top 10
        row_number() over (order by (select 1)) as id,
        'en' as language,
        pr_review_content as text
from    tpcxbb_1gb..product_reviews_training_data
for json path, root('documents')
```

(10 rows affected)

Total execution time: 00:00:00.1093385

	JSON_F52E2B61-18A1-11d1-B105-00805F49916B
1	{"documents":[{"id":1,"language":"en",…

Learn more:
https://docs.microsoft.com/sql/relational-databases/json/format-nested-json-output-with-path-mode-sql-server

PASS

seattle2019 > 2SentimentPrediction > CognitiveAPI.ipynb

Code | Text | Kernel: Python 3 | Attach To: localhost | Trusted | Run Cells | Clear Results | Manage Packages

```
        },
        {
            "id": 10,
            "language": "en",
            "text": "Our home was built in 2003 and this fits just fine in the drawer until find one of those things that if
        }
    ]
}
print(type(documents))

headers   = {"Ocp-Apim-Subscription-Key": subscription_key}
response  = requests.post(sentiment_url, headers=headers, json=documents)
sentiments = response.json()
pprint(sentiments)
```

```
<class 'dict'>

{'documents': [{'id': '1', 'score': 0.9685916900634766},
               {'id': '2', 'score': 0.874512791633606},
               {'id': '3', 'score': 0.7775521278381348},
               {'id': '4', 'score': 0.1461590826511383},
               {'id': '5', 'score': 0.9813788533210754},
               {'id': '6', 'score': 0.8957217931747437},
               {'id': '7', 'score': 0.9916195869445801},
               {'id': '8', 'score': 0.08493909239768982},
               {'id': '9', 'score': 0.8297852277755737},
               {'id': '10', 'score': 0.7934412956237793}],
 'errors': []}
```

master* 17 0 2

```sql
drop view if exists JsonDocuments
go
create view JsonDocuments
as
select (
    select  top 10
            row_number() over (order by (select 1)) as id,
            'en' as language,
            pr_review_content as text
    from    product_reviews_training_data
    for json path, root('documents')
) as documents
go
exec sp_execute_external_script @language = N'Python'
    ,@script = N'DocOut = DocIn'
    ,@input_data_1 = N'select * from JsonDocuments;'
    ,@input_data_1_name  = N'DocIn'
    ,@output_data_1_name =  N'DocOut'
with result sets ((DocOut varchar(max)));
go
```

Learn more:
https://docs.microsoft.com/sql/relational-databases/json/format-nested-json-output-with-path-mode-sql-server
https://docs.microsoft.com/sql/relational-databases/system-stored-procedures/sp-execute-external-script-transact-sql

PASS

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PASSSummit2019.ipynb | CognitiveAPI.ipynb

seattle2019 > 2SentimentPrediction > CognitiveAPI.ipynb

Code | Text | Kernel: Python 3 | Attach To: localhost | Trusted | Run Cells | Clear Results | Manage Packages

```python

conn = pyodbc.connect('Driver={SQL Server};Server=localhost;Database=tpcxbb_1gb;Trusted_Connection=yes;')
cursor = conn.cursor()
cursor.execute('select * from JsonDocuments')
row = cursor.fetchone() #pyodbc.Row
documents = json.loads(row[0]) #dict

headers   = {"Ocp-Apim-Subscription-Key": subscription_key}
response  = requests.post(sentiment_url, headers=headers, json=documents)

sentiments = response.json()
pr.pprint(sentiments)
```

```
{'documents': [{'id': '1', 'score': 0.9685916900634766},
               {'id': '2', 'score': 0.874512791633606},
               {'id': '3', 'score': 0.7775521278381348},
               {'id': '4', 'score': 0.1461590826511383},
               {'id': '5', 'score': 0.9813788533210754},
               {'id': '6', 'score': 0.8957217931747437},
               {'id': '7', 'score': 0.9916195869445801},
               {'id': '8', 'score': 0.08493909239768982},
               {'id': '9', 'score': 0.8297852277755737},
               {'id': '10', 'score': 0.7934412956237793}],
 'errors': []}
```

master* 36 0 2

Upgrade via Notebook

upgrade with magics

https://pypi.org/simple/urllib3/

```
%%cmd
cd "C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES"
python -m pip install --upgrade C:\temp\urllib3-1.25.3-py2.py3-none-any.whl
```

so hard...

```
declare @py nvarchar(max);

set @py = N'from pandas.io.json import json_normalize
rds = {"documents": [{"id": "1", "score": 0.97},{"id": "2","score": 0.87},{"id": "3", "score": 0.78}],"errors": []} #dict
df = json_normalize(rds, "documents")
print(type(df),df,sep="\n") #DataFrame
';

drop table if exists apiresults
create table apiresults (id int, score float)

insert into apiresults
exec sp_execute_external_script
    @language = N'Python',
    @script = @py,
    @output_data_1_name =N'df'

select * from apiresults
```

Learn more:
[How to output values from sp_execute_external_script into table]
[Convert JSON API response to pandas Dataframe]

PASS

```
create or alter proc GetCognitiveAPI
as
    declare @py nvarchar(max);

    set @py = N'import requests
from pandas.io.json import json_normalize

subscription_key = "mykey"
text_analytics_base_url = "https://eastus2.api.cognitive.microsoft.com/text/analytics/v2.0/"
sentiment_url = text_analytics_base_url + "sentiment"

df = jsondocs

headers  = {"Ocp-Apim-Subscription-Key": subscription_key, "content-type": "application/json"}
response = requests.post(sentiment_url, headers = headers, data = df.iloc[0][0].encode())

rds = response.json()
df2 = json_normalize(rds, "documents")';

    drop table if exists apiresults;
    create table apiresults (id int, score float);

    insert into apiresults
    exec sp_execute_external_script @language = N'Python'
        ,@script = @py
        ,@input_data_1 = N'select * from JsonDocuments'
        ,@input_data_1_name = N'jsondocs'
        ,@output_data_1_name =  N'df2'
    select * from apiresults;
go
exec GetCognitiveAPI
go
```

Learn more:
https://repl.it/languages/python3

PASS

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Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

seattle2019 > 2SentimentPrediction > Trollhunters.ipynb

Code Text Kernel: SQL Attach To: . FleitasArts Trusted Run Cells Clear Results

```sql
drop table if exists quotes;

create table quotes (
    quoteid     int             identity(1,1) primary key clustered,
    character   varchar(128)    not null,
    quote       nvarchar(max)   not null,
    sentiment   float
);

insert into quotes (character, quote)
values
 ('The Magical Incantation that activates the Amulet', 'For the glory of Merlin, Daylight is mine to command!')
,('Strickler', 'Now, I think I know what has you so distraught, Jim.')
,('Jim', 'You do?')
,('Strickler', 'It''s like I told you yesterday, you have a lot on your shoulders. Too much, in my opinion, for someone your age. And
,('Jim', 'Chess?')
,('Strickler', '...I think it''s causing you anxiety. I know you want to be there for your mother, but it''s as a great poet once wrot
,('Jim', 'Hey thanks for the advice. I like talking to you.')
,('Strickler', 'Always.')

,('Jim', 'So, the previous Trollhunter, what, retired?.')
,('AAARRRGGHH!!!', 'Was felled.')
,('Jim', 'Felled?')
,('AAARRRGGHH!!!', 'Means killed.')
,('Blinky', 'Turned to stone and smashed. Kanjigar the Courageous was his name. Brutally slain by a ruthless troll named Bular.')
,('Tobes', 'Don''t worry dude. This Bular guy probably just got lucky.')
```

Learn more:
https://tvtropes.org/pmwiki/pmwiki.php/Quotes/Trollhunters
https://netflix.com/trollhunters

PASS

```sql
drop view if exists JsonQuotes
go
create view JsonQuotes
as
select (
    select  top(select cast(count(*)*.8 as int) from Quotes)
            quoteid as id,
            'en' as language,
            Quote as text
    from    Quotes
    for json path, root('documents')
) as documents
go
exec sp_execute_external_script @language = N'Python'
    ,@script = N'DocOut = DocIn'
    ,@input_data_1 = N'select * from JsonQuotes;'
    ,@input_data_1_name  = N'DocIn'
    ,@output_data_1_name =  N'DocOut'
with result sets ((DocOut varchar(max)));
go
```

	DocOut
1	{"documents":[{"id":1,"language":"en","text":"For the glory of Merlin, Daylight is mine to command!"},…

```
create or alter proc GetCognitiveAPIQuoteSentiment
as
    set nocount on;
    declare @py nvarchar(max);

    set @py = N'import requests, pprint as pr
from pandas.io.json import json_normalize

subscription_key = "mykey"
text_analytics_base_url = "https://eastus2.api.cognitive.microsoft.com/text/analytics/v2.0/"
sentiment_url = text_analytics_base_url + "sentiment"

df = jsondocs

headers  = {"Ocp-Apim-Subscription-Key": subscription_key, "content-type": "application/json"}
response = requests.post(sentiment_url, headers = headers, data = df.iloc[0][0].encode())

rds = response.json()
df2 = json_normalize(rds, "documents")

pr.pprint(rds)
print(type(df2),df2,sep="\n")
';

    drop table if exists apiresults;
    create table apiresults (id int, score float);
```

Learn more:
https://repl.it/languages/python3

PASS

```
    drop table if exists apiresults;
    create table apiresults (id int, score float);

    insert into apiresults
    exec sp_execute_external_script @language = N'Python'
        ,@script = @py
        ,@input_data_1 = N'select * from JsonQuotes'
        ,@input_data_1_name = N'jsondocs'
        ,@output_data_1_name =  N'df2'
    select * from apiresults;

    update  q
        set q.Sentiment = a.Score
    from    Quotes q
    inner join apiresults a
        on q.quoteid = a.id
    where   q.Sentiment is null;
go
exec GetCognitiveAPIQuoteSentiment;
select * from Quotes;
```

Learn more:
https://repl.it/languages/python3

PASS

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Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code Text Kernel: SQL Attach To: Select Connection Not Trusted Run Cells Clear Results Schedule Notebook

Commands completed successfully.

(72 rows affected)

Total execution time: 00:00:01.279

	id	score
1	1	0.5
2	2	0.127195328474045
3	3	0.833639144897461
4	4	0.951666951179504
5	5	0.752673923969269
6	6	0.155267655849457
7	7	0.99489951133728
8	8	0.202319025993347
9	9	0.707312762737274
10	10	0.770378530025482
11	11	0.752673923969269
12	12	0.0333146154880524
13	13	0.126827985048294
14	14	0.751771688461304
15	15	0.959390044212341
16	16	0.734701573848724
17	17	0.833906531333923
18	18	0.862226605415344
19	19	0.926850736442566

master 0 0

File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code Text Kernel: SQL Attach To: Select Connection Not Trusted Run Cells Clear Results Schedule Notebook

	quoteid	character	quote	sentiment
1	1	The Magical Incantation that…	For the glory of Merlin, Day…	0.5
2	2	Strickler	Now, I think I know what has…	0.127195328474045
3	3	Jim	You do?	0.833639144897461
4	4	Strickler	It's like I told you yesterd…	0.951666951179504
5	5	Jim	Chess?	0.752673923969269
6	6	Strickler	...I think it's causing you …	0.155267655849457
7	7	Jim	Hey thanks for the advice. I…	0.99489951133728
8	8	Strickler	Always.	0.202319025993347
9	9	Jim	So, the previous Trollhunter…	0.707312762737274
10	10	AAARRRGGHH!!!	Was felled.	0.770378530025482
11	11	Jim	Felled?	0.752673923969269
12	12	AAARRRGGHH!!!	Means killed.	0.0333146154880524
13	13	Blinky	Turned to stone and smashed.…	0.126827985048294
14	14	Tobes	Don't worry dude. This Bular…	0.751771688461304
15	15	Blinky	The evidence does not sugges…	0.959390044212341
16	16	Jim	Then the other guy, he was j…	0.734701573848724
17	17	Blinky	Doubtful. Kanjigar was perha…	0.833906531333923
18	18	Jim	But not the best, I'm bettin…	0.862226605415344
19	19	Blinky	Oh, the very best. Many song…	0.926859736442566
20	20	Blinky	Destiny is a gift. Some go t…	0.78821007776260 4

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Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code Text Kernel: SQL Attach To: Select Connection Not Trusted Run Cells Clear Results Schedule Notebook

```sql
select  avg(sentiment) as AvgSentimtment, character
from    quotes
where   sentiment is not null
group by character
order by AvgSentimtment desc
```

(14 rows affected)

Total execution time: 00:00:00.026

	AvgSentimtment	character
1	0.865543842315674	Claire
2	0.751771688461304	Tobes
3	0.647038959539854	Jim
4	0.597320705652237	Blinky
5	0.563405146201452	Toby
6	0.529540811266218	AAARRRGGHH!!!
7	0.5	Barbara Lake
8	0.5	The Magical Incantation that…
9	0.359112240374088	Strickler
10	0.255251032114029	Vendel
11	0.189253866672516	Vendal
12	0.143676519393921	Magical Incantation that app…
13	0.127677083015442	Dictatious
14	0.07220658659935	Otto

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File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code | Text | Kernel: SQL | Attach To: Select Connection | Not Trusted | Run Cells | Clear Results | Schedule Notebook

Schema

[8]

```sql
drop table if exists models;
create table models (
    ModelID         int             identity(1,1) primary key clustered,
    Language        varchar(30)     not null default('Python'),
    Name            nvarchar(30)    not null,
    Model           varbinary(max)  ,
    CreatedOn       datetime        default(getdate()),
    CreatedBy       nvarchar(500)   default(suser_sname())
);
go

drop view if exists QuotesForTraining;
go
create or alter view QuotesForTraining
as
    select  top(select cast(count(*)*1 as int) from Quotes) --because where clause!
            quote,
            case
                when sentiment <.1 then 0
                when sentiment >=.1 and sentiment <.2 then 1
                when sentiment >=.2 and sentiment <.3 then 2
                when sentiment >=.3 and sentiment <.4 then 3
                when sentiment >=.4 and sentiment <.5 then 4
                when sentiment >=.5 and sentiment <.6 then 5
                when sentiment >=.6 and sentiment <.7 then 6
                when sentiment >=.7 and sentiment <.8 then 7
                when sentiment >=.8 and sentiment <.9 then 8
                when sentiment >=.9 and sentiment <1 then 9
                when sentiment >=1 then 10
                else null
```

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File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code | Text | Kernel: SQL | Attach To: Select Connection | Not Trusted | Run Cells | Clear Results | Schedule Notebook

```sql
go
create or alter view QuotesForTraining
as
    select  top(select cast(count(*)*1 as int) from Quotes) --because where clause!
            quote,
            case
                when sentiment <.1 then 0
                when sentiment >=.1 and sentiment <.2 then 1
                when sentiment >=.2 and sentiment <.3 then 2
                when sentiment >=.3 and sentiment <.4 then 3
                when sentiment >=.4 and sentiment <.5 then 4
                when sentiment >=.5 and sentiment <.6 then 5
                when sentiment >=.6 and sentiment <.7 then 6
                when sentiment >=.7 and sentiment <.8 then 7
                when sentiment >=.8 and sentiment <.9 then 8
                when sentiment >=.9 and sentiment <1 then 9
                when sentiment >=1 then 10
                else null
            end as tag
    from    quotes
    where sentiment is not null
    --order by tag;
go

drop view if exists QuotesForTesting;
go
create or alter view QuotesForTesting
as
    select  top(select cast(count(*)*.2 as int) from Quotes)
            quote,
            null as tag
    from    quotes
    where sentiment is null;
```

Commands completed successfully.

master 0 0

File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code | Text | Kernel: SQL | Attach To: Select Connection | Not Trusted | Run Cells | Clear Results | Schedule Notebook

```
create or alter proc GetTrollhunterModel (
    @Name nvarchar(30) = 'TrollhunterRealtime',
    @Languange varchar(30) = 'Python'
)
as
    declare @model varbinary(max), @train_script nvarchar(max), @Svr varchar(128) = @@servername, @Db nvarchar(128) = db_name();
    delete top(1) from models where name = @Name and language = @Languange;

    --The Python script we want to execute
    set @train_script = N'
from microsoftml import rx_logistic_regression, featurize_text, n_gram
from revoscalepy import rx_serialize_model, RxOdbcData, rx_write_object, RxInSqlServer, rx_set_compute_context, RxLocalSeq

connection_string = "Driver=SQL Server;Server='+@Svr+';Database='+@Db+';Trusted_Connection=true;"
dest = RxOdbcData(connection_string, table = "models")

training_data["tag"] = training_data["tag"].astype("category")

modelpy = rx_logistic_regression(formula = "tag ~ features",
                                 data = training_data,
                                 method = "multiClass",
                                 ml_transforms=[featurize_text(language="English",
                                                               cols=dict(features="quote"),
                                                               word_feature_extractor=n_gram(2, weighting="TfIdf"))],
                                 train_threads=1)

modelbin = rx_serialize_model(modelpy, realtime_scoring_only = True)
rx_write_object(dest, key_name="Name", key="'+@Name+'", value_name="Model", value=modelbin, serialize=False, compress=None, overwrite=False)'; --overwrite=fals

    exec sp_execute_external_script @language = N'Python'
        ,@script = @train_script
        ,@input_data_1 = N'select * from QuotesForTraining'
        ,@input_data_1_name = N'training_data'
go
```

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File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code | Text | Kernel: SQL | Attach To: Select Connection | Not Trusted | Run Cells | Clear Results | Schedule Notebook

```
        ,@input_data_1 = N'select * from QuotesForTraining'
        ,@input_data_1_name = N'training_data'
go

exec  GetTrollhunterModel; --00:00:02.919 home desktop.

select *, datalength(model) as Datalen from dbo.models;
```

Commands completed successfully.

(1 row affected)

STDERR message(s) from external script: C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\PYTHON_SERVICES\lib\site-packages\revoscalepy\RxSerializable.py:163: FutureWarning: Method .as_matrix will be removed in a future version. Use .values instead. ret[column_name] = np.array([x + 1 for x in dataframe[i].cat.codes.as_matrix().tolist()]).astype(np.int32)

STDOUT message(s) from external script: Beginning processing data. Rows Read: 57, Read Time: 0, Transform Time: 0 Beginning processing data. Beginning processing data. Rows Read: 57, Read Time: 0, Transform Time: 0 Beginning processing data. Not adding a normalizer. Beginning processing data. Rows Read: 57, Read Time: 0, Transform Time: 0 Beginning processing data. Beginning optimization num vars: 7098 improvement criterion: Mean Improvement Warning: Premature convergence occurred. The OptimizationTolerance may be set too small. ro equals zero. Is your function linear? L1 regularization selected 7 of 7098 weights. Not training a calibrator because it is not needed. Elapsed time: 00:00:01.4911851 Elapsed time: 00:00:00.2200052 Rows Read: 1, Total Rows Processed: 1 Total Rows written: 1, Total time: 0.001 , Total Chunk Time: 0.045 seconds

(1 row affected)

Total execution time: 00:00:07.099

	ModelID	Language	Name	Model	CreatedOn	CreatedBy	Datalen
1	3	Python	TrollhunterRealtime	0x626C6F62BC23F8E3ABB42D41C2…	2019-08-19 00:31:56.843	UPCIC\hfleitas	19017

Finish

master 0 0

File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code | Text | Kernel: SQL | Attach To: Select Connection | Not Trusted | Run Cells | Clear Results | Schedule Notebook

Finish

[12]

```sql
select * from QuotesForTesting;
declare @model_bin varbinary(max)=null
select  @model_bin = model from models where name = 'TrollhunterRealtime';

if @model_bin is not null
begin
exec sp_rxPredict
    @model = @model_bin,
    @inputData = N'select quote, cast(tag as varchar(1)) as tag from QuotesForTesting'

    if object_id('tempdb.dbo.#upv') is not null drop table #upv;
    create table #upv (
        predictedlabel varchar(1),
        score0 float,
        score1 float,
        score2 float,
        -- score3 float,
        -- score4 float,
        score5 float,
        -- score6 float,
        score7 float,
        score8 float,
        score9 float
    )
    insert into #upv
    exec sp_rxPredict
        @model = @model_bin,
        @inputData = N'select quote, cast(tag as varchar(1)) as tag from QuotesForTesting'

```

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Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code | Text | Kernel: SQL | Attach To: Select Connection | Not Trusted | Run Cells | Clear Results | Schedule Notebook

[12]

```
        score2 float,
        -- score3 float,
        -- score4 float,
        score5 float,
        -- score6 float,
        score7 float,
        score8 float,
        score9 float
    )
    insert into #upv
    exec sp_rxPredict
        @model = @model_bin,
        @inputData = N'select quote, cast(tag as varchar(1)) as tag from QuotesForTesting'

    select  PredictedLabel, Score, Prediction
    from    #upv
    unpivot (
        Prediction
        for Score in (
            score0,
            score1,
            score2,
            -- score3,
            -- score4,
            score5,
            -- score6,
            score7,
            score8,
            score9
        )
    ) as scoreunpivot
    group by PredictedLabel, Score, Prediction
    order by Prediction desc
end;
```

(14 rows affected)

master 0 0

File Edit View Help

Trollhunters.ipynb - Hiram (Workspace) - Azure Data Studio

Trollhunters.ipynb

20190608-SQLSaturdaySFL864 > SentimentPrediction > PASSInsights201908-Dev > Trollhunters.ipynb

Code Text Kernel: SQL Attach To: Select Connection Not Trusted Run Cells Clear Results Schedule Notebook

	PredictedLabel	Score.0	Score.1	Score.2	Score.5	Score.7	Score.8	Score.9
1	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
2	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
3	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
4	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
5	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
6	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
7	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
8	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
9	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
10	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
11	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
12	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
13	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629
14	7	0.1052623	0.2105264	0.07017536	0.08772001	0.2631575	0.1578956	0.1052629

	PredictedLabel	Score	Prediction
1	7	score7	0.263157486915588
2	7	score1	0.210526421666145
3	7	score8	0.157895624637604
4	7	score9	0.105262860655785
5	7	score0	0.105262331664562

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~~SECRET//ORCON/NOFORN~~

UNCLASSIFIED

[PkgNumberShort]

Declassified by order of the President

September 24, 2019

PDF

Get Cognitive API

~~EYES ONLY~~

~~DO NOT COPY~~

MEMORANDUM OF TELEPHONE CONVERSATION

SUBJECT: ~~(C)~~ Telephone Conversation with President Zelenskyy of Ukraine

PARTICIPANTS: President Zelenskyy of Ukraine

Notetakers: The White House Situation Room

DATE, TIME AND PLACE: July 25, 2019, 9:03 - 9:33 a.m. EDT
Residence

File Edit View Help • TrumpUkraine.ipynb - Hiram (Workspace) - Azure Data Studio

TrumpUkraine.ipynb

20190608-SQLSaturdaySFL864 > Pixies > TrumpUkraine.ipynb

Code Text Kernel: SQL Attach To: Select Connection Not Trusted Run Cells Clear Results

🤵 Mr. President, Don't forget the 🔑

https://www.whitehouse.gov/wp-content/uploads/2019/09/Unclassified09.2019.pdf

[5]

```sql
drop table if exists quotes;

create table quotes (
    quoteid     int             identity(1,1) primary key clustered,
    character   varchar(128)    not null,
    quote       nvarchar(max)   not null,
    sentiment   float
);

insert into quotes (character, quote)
values
 ('The President', 'Congratulations on a great victory. We all watched from the United States and you did a terrific.job. The way.you came from behind, -somebody who wasn''t given much of a chance, and y
,('President Zelenskyy', 'You are absolutely right Mr. Presideht. We did win big and we worked hard for this. We worked a lot but I would like to confess to you that I had an opportunity to learn from yo
,('The President', '[laughter] That''s a very good idea. I think your country is very happy about that.')
,('President Zelenskyy', 'Well yes, to tell you the truth, we are trying to work hard because we wanted to drain the swamp here in our country. We brought in many many new people. Not the old politicians
,('The President', 'Well it''s very nice of you to say that. I will say that we do a lot for Ukraine. We spend a lot of effort and a lot of time. Much more than the European countries are doing and they
,('President Zelenskyy', 'Yes you are·absolutely right. Not only 100 percent, but actually 1000 percent and I can tell you the following; I did talk to Angela Merkel and I did meet with her. I also met a
,('The President','I would like you to do us a favor though because our country has been through a lot and Ukraine knows a lot about it. I would like you to find out what happened with this whole situati
,('President Zelenskyy','Yes it is very important for me and everything that you just mentioned earlier. For me as a President, it is very important and we are open for any future cooperation. We are rea
,('The President','Good because I heard you had a prosecutor who was very good and he was shut down and that''s really unfair. A lot of people are talking about that, the way they shut your very good pro
,('President Zelenskyy','I wanted to tell you about the prosecutor. First of all I understand and I''m knowledgeable about the situation. Since we have won the absolute majority in our Parliament, the ne
,('The President','Well, she''s going to go through some things. I will have Mr. Giuliani give you a call and I am also going to have Attorney General Barr call and we will get to the bottom of it. I''m
,('President Zelenskyy','I would like to tell you that I also have quite a few Ukrainian friends that live the United States. Actually last time I traveled to the United States, I stayed in New York near
,('The President','Good. Well, thank you very much and I appreciate that. I will tell Rudy and Attorney General Barr to call. Thank you. Whenever you would like to come to the White House, feel free to c
,('President Zelenskyy','Thank you very much. I would be very happy to come and would be happy to meet with you personally and get to know you better. I am looking forward to our meeting and I also would
,('The President','Okay, we can work that out. I look forward a to seeing you in Washington and maybe in Poland because I think we are going to be there at that time.')
,('President Zelenskyy','Thank you very much Mr. President.')
,('The President','Congratulations on a fantastic job you''ve done. The whole world was watching. I''m not sure it was so much of an upset but congratulations.')
,('President Zelenskyy','Thank you Mr. President bye-bye.')

;
```

(18 rows affected)

master* 20 0 Plan Explorer on 1

DEMO **five**

- Paginated Report (RDL – PBIRS)
- Streaming (Spark – BDC)

Power BI Report Server

Hiram Fleitas

Favorites | Browse | Comments

Home > [redacted] > Daily [redacted]

Date Created Start: 10/10/2019

Date Created End: 10/10/2019

Get Sentiment of [redacted] (AI): Yes

View Report

1 of 2 | 100% | Find | Next

Daily [redacted]

[redacted]		Sentiment	[redacted]
[redacted]	1	10.24707 %	G
	1		W - R
	1	8.62324 %	W - R
	9		W - R
	9	31.45117 %	W - R
	9		W - R
	8		L A
	8	10.87962 %	W

Learn more:
[Hide Column based up Parameter Selected SSRS]

PASS

Yelp.py | YelpAPIReviews.py | YelpUPCICReviews.py

```python
# -*- coding: utf-8 -*-
"""
Created on Tue Jul 31 17:44:58 2018

@author: hfleitas
"""

from yelpapi import YelpAPI
```

```
{'possible_languages': ['en'],
 'reviews': [{'id': '-bRSHRo9EziPYZD7bMQnHw',
              'rating': 2,
              'text': 'I am writing this update to let people know that after '
                      'due diligence, almost a year later after my water '
                      'damage loss and after filing a Department of...',
```

```python
    Reviews API: https://www.yelp.com/developers/documentation/v3/business_reviews
"""
print("***** selected reviews for [redacted] *****\n{}\n".
try:
    response = yelp_api.reviews_query(id='[redacted]')
    pprint(response)
except YelpAPI.YelpAPIError as e:
    print(e)
print('\n----------[redacted]----------\n')
```

Subject: Re: Developer API - Reviews Text Truncated

JUL 31, 2018 | 02:49PM PDT

Hi Hiram,

Thanks for writing in. The API does not return full-text reviews at this point; currently, the API will return 3 review snippets (the reviews that are currently displayed at the top when sorted by Yelp Sort, which is determined by recency, user voting, and other review quality factors to help consumers make informed decisions) of 160 characters. The Yelp API cannot be configured to return alternative review excerpts.

As a reminder, all API integrations must be consumer-facing (i.e. not for B2B dashboards or analytics) and must abide by our Terms of Use (https://www.yelp.com/developers/api_terms) and Display Requirements (https://www.yelp.com/developers/display_requirements). Lastly, all API responses cannot downloaded, stored, cached, or prefetched for more than 24 hours (except for the business ID for backend matching purposes) and scraping Yelp via any means is strictly prohibited.

Please let me know if you have other questions.

Thanks!

Learn more:
https://www.yelp.com/developers/api_terms
https://www.yelp.com/developers/display_requirements

PASS

File Edit View Help • SparkTwitter.ipynb - Hiram (Workspace) - Azure Data Studio

CONNECTIONS

SERVERS

- .. <default> (Windows Auth...
- 52.247.204.112,31433, <defa...
  - Databases
  - Security
  - Server Objects
  - HDFS
    - system
    - tmp
    - user
      - root
      - twitter
        - 1573198988959
        - 1573198994903
        - 1573198997025
        - 1573198999801
        - 1573199004554
        - 1573199007279
        - 1573199010025
        - 1573199012516
        - 1573199015175
        - 1573199017901
        - 1573199020281

AZURE

SQL SERVER BIG DATA CLUSTERS

- controller: 52.224.48.119:3008...
- controller: 52.229.25.54:30080 ...

deploy-bdc-aks.ipynb | Big Data Cluster Dashboard - 52.229.25.54:30080 | SparkTwitter.ipynb ● | SelectTweets.sql - disconnected

seattle2019 > 2SentimentPrediction > SparkTwitter.ipynb

Code | Text | Kernel: Spark | Scala | Attach To: 52.247.204.112,31433, mast | Not Trusted | Run Cells | Clear Results | Collapse Cells | Manage Packages

```scala
val new_df = df_read(dbtable, url, dataPoolDataSource=datasource_name)
new_df.count
new_df.limit(10).show
```

```
new_df: org.apache.spark.sql.DataFrame = [screen_name: string, createdAt: timestamp ... 2 more fields]
res29: Long = 66
+---------------+-------------------+-------------+--------------------+
|    screen_name|          createdAt|num_followers|                text|
+---------------+-------------------+-------------+--------------------+
|nemarampunavat1|2019-11-08 02:43:28|            6|Microsoft office ...|
|          Diagg|2019-11-08 02:43:38|          732|RT @ITguySoCal: G...|
|    SMAGlendale|2019-11-08 02:43:24|           60|The latest The Gl...|
|     _meldelmar|2019-11-08 02:43:03|           36|RT @cjsewall9: Wh...|
|    4thgenitboy|2019-11-08 02:44:27|        10859|yeah you guys jus...|
|     David_GISI|2019-11-08 02:44:25|          173|RT @cjsewall9: Wh...|
|       jamflora|2019-11-08 02:43:01|          450|What baffled me t...|
| smallwordpress|2019-11-08 02:43:35|          453|RT @verge: Micros...|
| InsiderPeacock|2019-11-08 02:43:42|           11|Show me dem TD?s ...|
|  Harsha_Streak|2019-11-08 02:44:05|          381|RT @3one4Capital:...|
+---------------+-------------------+-------------+--------------------+
```

8. Stop the TwitterStream

Learn more:
[SQL Server Samples - Big Data Clusters - Spark]

PASS

File Edit View Help SelectTweets.sql - 52.247.204.112,31433.TwitterData (admin) - Hiram (Workspace) - Azure Data Studio

CONNECTIONS

SERVERS

., <default> (Windows Auth...

52.247.204.112,31433, <defa...

Databases

Security

Server Objects

HDFS

FleitasArts

AZURE

SQL SERVER BIG DATA CLUSTERS

controller: 52.224.48.119:3008...

controller: 52.229.25.54:30080 ...

SparkTwitter.ipynb ● | SelectTweets.sql - 52.247...(admin) × | SandDance: SelectTweets.sql | 52.247.204.11

seattle2019 > 2SentimentPrediction > SelectTweets.sql

Run Cancel Disconnect Change Connection TwitterData Explain Enable SQLCMD

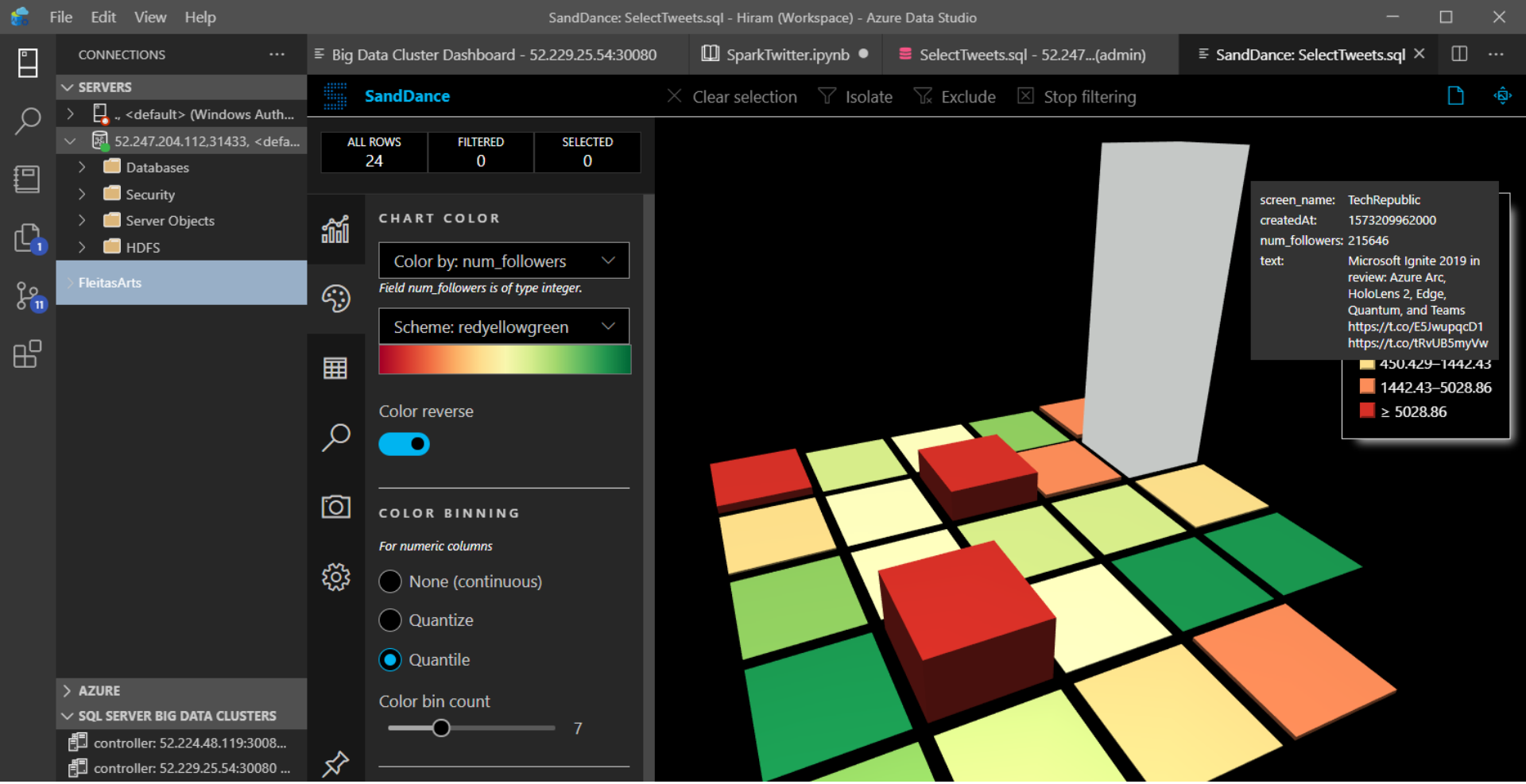
```
use twitterdata
go
select  top 100 *
from    dbo.tweets
where   screen_name = 'TechRepublic'
or      text like '%Microsoft%'
order by num_followers desc
```

Results Messages

	screen_name	createdAt	num_followers	text
1	TechRepublic	2019-11-08 02:46:02.000	215646	Microsoft Ignite 2019 in rev…
2	hannytalker	2019-11-08 02:45:25.000	37628	The final edition for 2019 o…
3	PharmZay	2019-11-08 02:43:24.000	22096	RT @V_eektorrrr: I'm a fast …
4	AJBCSurveys	2019-11-08 02:44:08.000	5676	Look what's up: Microsoft So…
5	JRoosen	2019-11-08 02:44:41.000	3411	RT @JayTHL: any Microsoft pe…
6	Secnewsbytes	2019-11-08 02:47:17.000	2744	PayPal Upsets Microsoft as P…
7	uncle_dallas	2019-11-08 02:46:08.000	2155	RT @gcaughey: What does a Wi…
8	catrinphysio	2019-11-08 02:44:48.000	908	@DrDylanParry @amcunningham …
9	KiyaraSabel	2019-11-08 02:47:58.000	875	RT @FurlinNick: Who do you t…

Learn more:
SQL Server Samples - Big Data Clusters - Spark

PASS



Learn more:
[SQL Server Samples - Big Data Clusters - Spark]

PASS

Summary

1. Add ML Features *exe components*
2. Grant Access *users, groups, add login & user*
3. Config *external scripts enabled, working directory*
4. Install Pre-Trained Open Source Models *PowerShell, RSetup.exe*

Summary

5. Code in Python & T-SQL *Visual Studio, SSMS, ADS*
6. Python Profiling *Visual Studio, Execution Plan, CPU*
7. Real-time scoring *rx_serialize_model, realtime_scoring_only = True*
8. Review Sentiment Results *sp_rxPredict wins!*

Summary

7. Azure Data Studio Notebook *kernels*
8. Azure Cognitive Text Analytics API *requests, JSON*
9. For JSON Path
10. GetCognitiviveAPI
11. Spark Streaming in BDC

Resources

1. fleitasarts.com
2. github.com/hfleitas/seattle2019
3. netflix.com/trollhunters
4. SQL Server ML Services: Tutorials
5. Interactive deep learning: Learn alert
6. aka.ms/sqlworkshops
7. ailab.microsoft.com

Resources

8. SQL Server R Services: Samples
9. Components for Python: Interaction
10. Pre-Trained ML Models: Install
11. Threading ML: Logistic Regression
12. Azure SQL ML Preview: Sign up
13. aka.ms/ss19
14. aka.ms/sqldev

Link to Poll:

bit.ly/mssql2019

Your participation is very important.

PASS

Session Evaluations

Submit by 5pm Friday, November 15th to win prizes.

3 WAYS TO ACCESS

SCAN ME

- Go to PASSsummit.com
- Download the GuideBook App and search: PASS Summit 2019
- Follow the QR code link on session signage

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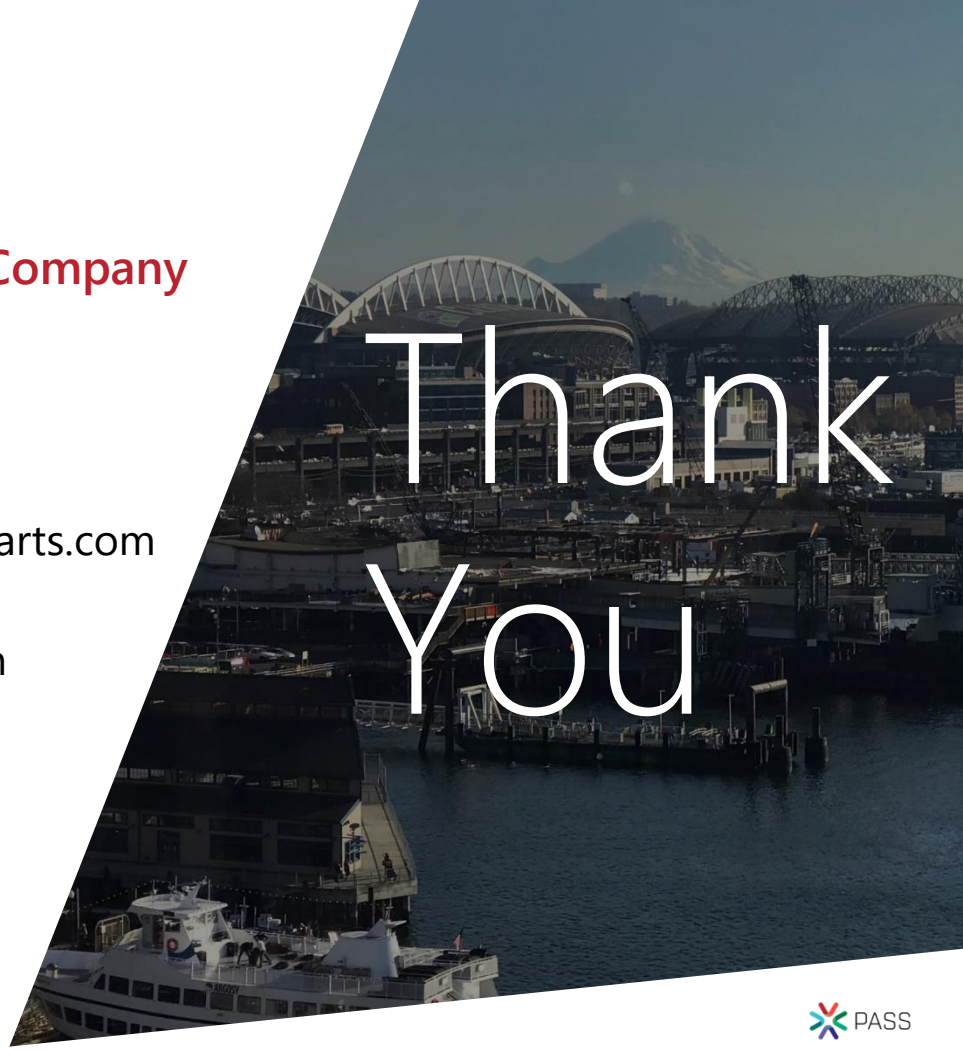

PASS