



Twitter Sentiment Analysis using Azure Cognitive Services

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1. Introduction

This document outlines how to use Azure Cognitive Services (Text Analytics) to perform sentiment analysis from captured Tweet and also build a fundamental dashboard (using Power BI) to give user end to end experience.

2. Solution Components

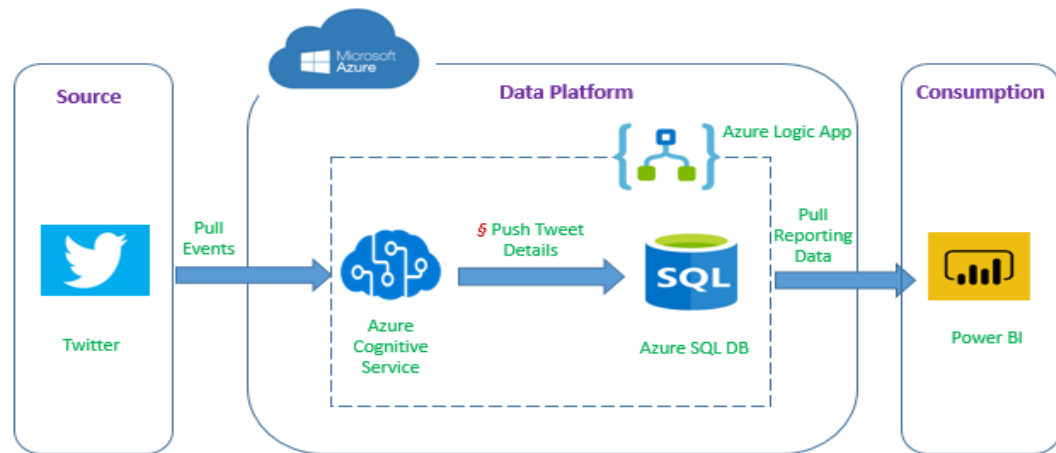
Azure Logic apps is Microsoft Azure's Integration and Work flow offering in the Cloud. Azure Logic apps directly competes with existing Integration and Workflow cloud offering such as Amazon's Simple Workflow Service. If you are SMB or event larger Enterprise then Logic Apps offers a solution to automating business processes/workflows which you may have been developing bespoke Applications for.

The **Text Analytics API** is a cloud-based service that provides advanced natural language processing over raw text, and includes four main functions: sentiment analysis, key phrase extraction, language detection, and entity linking. The API is a part of Azure Cognitive Services, a collection of machine learning and AI algorithms in the cloud for your development projects.

Microsoft **Azure SQL Database** is a managed cloud database provided as part of Microsoft Azure. A cloud database is a database that runs on a cloud computing platform, and access to it is provided as a service. Managed database services take care of scalability, backup, and high availability of the database.


Power BI is a business analytics service by Microsoft. It aims to provide interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their own reports and dashboards.

3. Solution Diagram



\$ This includes raw Tweet details like Tweet Text, Tweeted By etc. along with output from Cognitive service like Sentiment Score

4. Detailed Steps

Step 1 – Create a Cognitive Service (Text Analytics) component and note down its key and endpoint (marked with numbered  below).

Dashboard > Cognitive Services

Cognitive Services


sandiphandsomoutlook (Default Directory)

+ Add Edit columns Refresh Assign tags

Subscriptions: Free Trial – Don't see a subscription? [Open Directory + Subscription settings](#)

Filter by name... All resource groups All locations All tags No grouping

1 items

<input type="checkbox"/>	NAME	KIND	LOCATION	STATUS	PRICING TIER	SUBSCRIPTION
<input type="checkbox"/>	 my-demo-text-analytics-service	TextAnalytics	West Europe	Active	Free	Free Trial

Dashboard > Cognitive Services > AI + Machine Learning

Cognitive Services

sandiphandsonoutlook (Default Directory)

+ Add Edit columns More

Filter by name...

NAME

my-demo-text-analytics-service

AI + Machine Learning

Text Analytics

Pricing: All Operating System: All Publisher: All

Results

NAME	PUBLISHER	CATEGORY
Text Analytics	Microsoft	Cognitive Services
Credeon Secure Full-text Search	Hitachi Solutions, Ltd.	
Analytics Zoo: A unified Analytics + AI platform	Intel Software	
Sentiment Analysis Container – Azure Cognitive Services	Microsoft	
Azure Data Explorer	Microsoft	
Sonnet Tokenization Engine	Mountain Fog	
Prose Sentence Extraction Engine	Mountain Fog	

Create

Text Analytics

* Name
sample-text-analytics-service ✓

* Subscription
Free Trial

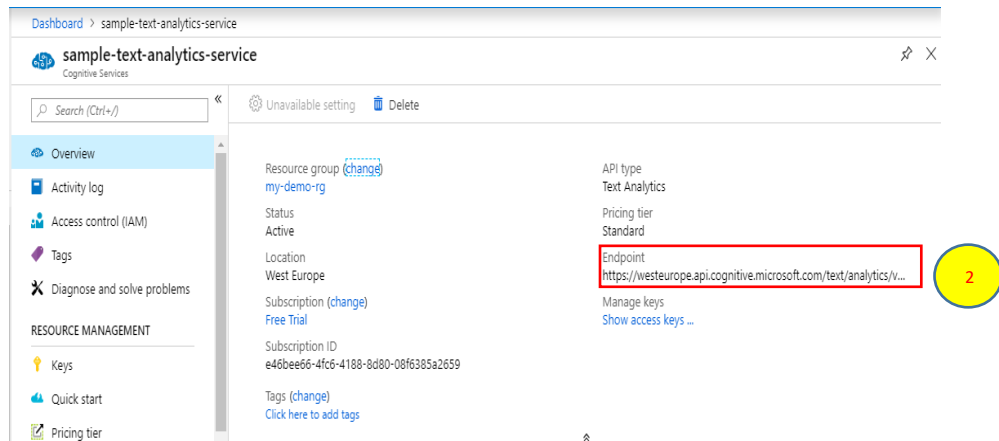
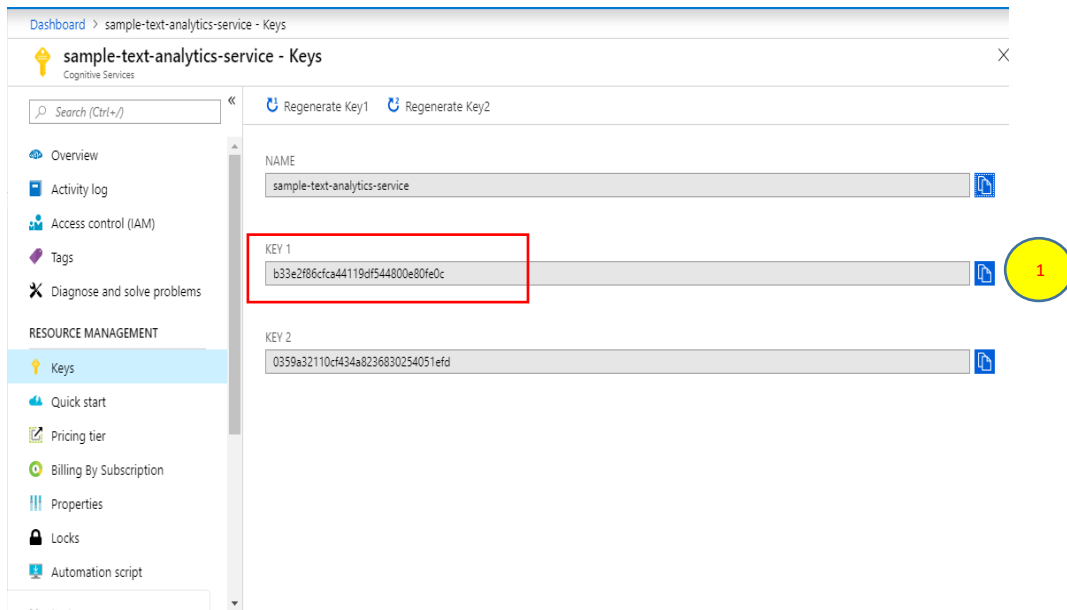
* Location
West Europe

* Pricing tier (View full pricing details)
S (1000 Calls per minute)

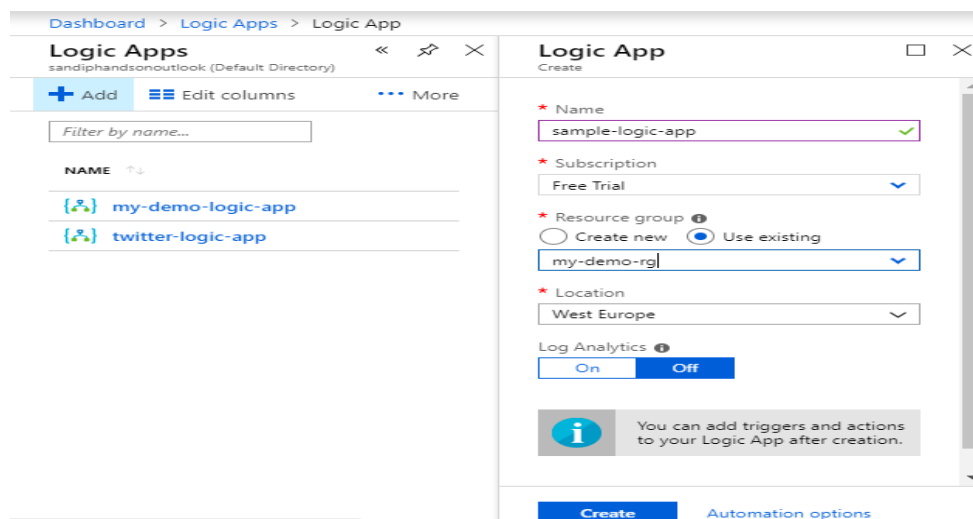
* Resource group
my-demo-rg

Create new

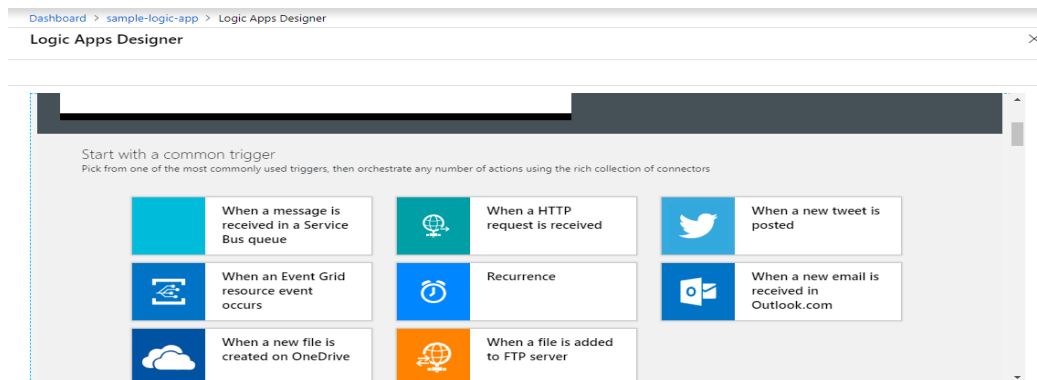
Create Automation options



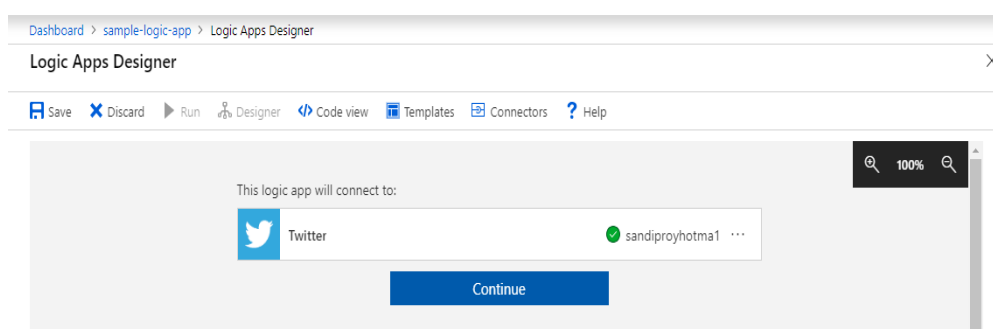
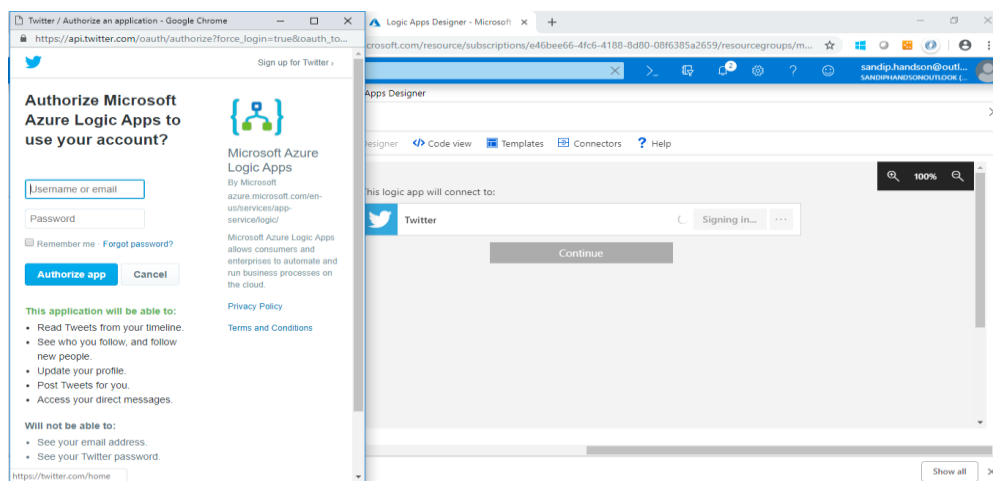
Step 2 – Create a Logic App (workflow engine) as below:



Select Twitter as entry triggering point i.e. start workflow when a new tweet is posted.



And authorize the Azure service to fetch data from Twitter through existing login.



Now mark the particular event we want to capture through Twitter and also specify the frequency of the trigger/invoke.

When a new tweet is posted

* Search text
#SayNoToWar

How often do you want to check for items?

* Interval
30

* Frequency
Second

Add new parameter

Connected to sandiproyhotma1. [Change connection.](#)

Dashboard > sample-logic-app > Logic Apps Designer

Logic Apps Designer

Save Discard Run Designer Code view Templates Connectors Help

When a new tweet is posted

+ New step

Once the tweet action is designed, choose previously created Text Analytics service so that Twitter data (Text) is feed into the Text Analytics engine.

When a new tweet is posted

Choose an action

Search connectors and actions

For You All Built-ins Connectors Enterprise Custom

Recent

SQL Server Control Power BI Text Analytics Event Hubs Request

Recommended based on your activity

Text Analytics Connector

Detect Language (preview)
Returns the detected language and a numeric score between 0 and 1. Scores close to 1 indicate 100% certainty that the identified language is...

Detect Sentiment (preview)
Returns a numeric score between 0 and 1. Scores close to 1 indicate positive sentiment, while scores close to 0 indicate negative sentiment. Currently, t...

Key Phrases (preview)
Returns a list of strings denoting the key talking points in the input text.

Detect Sentiment(Preview)

Text

The text to analyze.

Add new parameter

Connected to my-demo-text-analytics-service. [Change connection.](#)

Once Text Analytics engine is integrated with Twitter output text, it will start analysing the Tweet Text and assign score indicating the sentiment for the same.

Please note that the Text Analytics API returns a numeric score (generated using classification techniques) between 0 and 1. Scores close to 1 indicate positive sentiment, and scores close to 0 indicate negative sentiment. To be more exact - scores between 0 to 0.3 indicates negative, 0.3 to 0.7 neutral and 0.7 to 1 positive sentiment.

Once the sentiments are available to us, we can store them against each tweets in persistent layer (e.g. Azure SQL DB) for further reporting purpose.

We will develop a small logic using Logic App's Condition action to store sentiment category (i.e. positive [P], negative [N] or neutral [U]) along with the Tweet text, Tweet created by and Tweet score.

```

IF [ SCORE > 0.7 ]
    INSERT ROW IN SQL DB WITH POSITIVE sentiment (indicator 'P')
ELSE
    IF [ SCORE > 0.3 ]
        INSERT ROW IN SQL DB WITH NEUTRAL sentiment (indicator 'U')
    ELSE
        INSERT ROW IN SQL DB WITH NEGATIVE sentiment (indicator 'N')
    END
END
END

```

Logic Apps Designer

Save Discard Run Designer Code view Templates Connectors Help

Insert row

Table name

TWEET_SENTIMENTS

TWEET_TEXT

TWEETED_BY

SENTIMENT_SCORE

SENTIMENT_CATEGORY

Connected to twitter-sqldb-conn. [Change connection.](#)

Add dynamic content from the apps and connectors used in this flow.

Dynamic content

Expression

Search dynamic content

Original tweet user profile image url

Url of the profile image

Profile image url

Url of the profile image

Tweet id

Id of the tweet

Tweet language

Language code of the tweet

Tweet text

Text content of the tweet

Tweeted by

If true

Insert row

Table name

TWEET_SENTIMENTS

TWEET_TEXT

Tweet text

x

TWEETED_BY

Tweeted by

x

SENTIMENT_SCORE

Score

x

SENTIMENT_CATEGORY

P

Connected to twitter-sqldb-conn. [Change connection.](#)

If false

Insert row 3

Table name

TWEET_SENTIMENTS

TWEET_TEXT

Tweet text

x

TWEETED_BY

Tweeted by

x

SENTIMENT_SCORE

Score

x

SENTIMENT_CATEGORY

N

Connected to twitter-sqldb-conn. [Change connection.](#)

If false

Condition 2

And

Score x is greater than 0.5

If true

Insert row 2

Table name: TWEET_SENTIMENTS

TWEET_TEXT: Tweet text x

TWEETED_BY: Tweeted by x

SENTIMENT_SCORE: Score x

SENTIMENT_CATEGORY: U

Once we have designed the record capturing in SQL DB, run the Logic App and go to SQL DB window to see the tweets getting captured there.

Query 1

Run

select * from TWEET_SENTIMENTS;

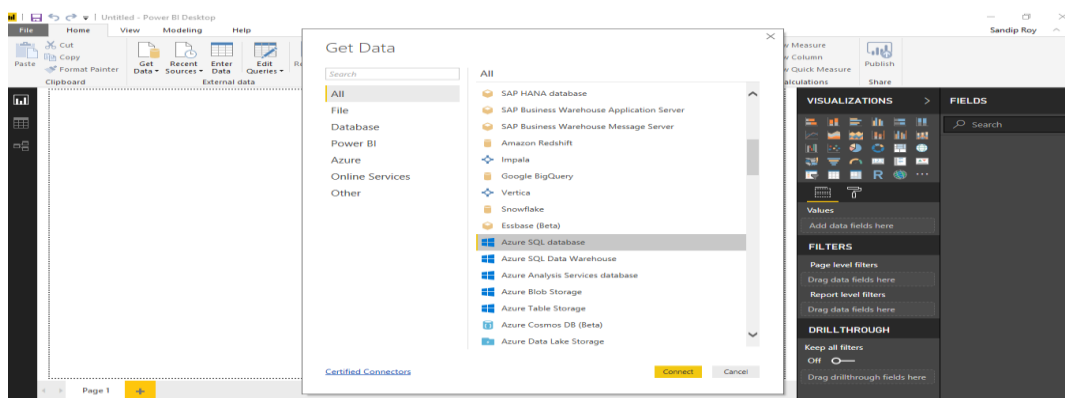
Results

TWEET_TEXT	TWEETED_BY	SENTIMENT_SCORE	SENTIMENT_CATEGORY
RT @shren_muraya: D1: #WelsomeBackAbhinandan And now we...	SANDY SABURGAN	0.50	U
RT @TahSiddiqi: Can our PM Imran Khan also handover Maso...	ImNuh	0.50	U
RT @CBNNews: For: Whoever would love life and see good days...	DulleyTopBooks	0.22	N
RT @TahSiddiqi: Can our PM Imran Khan also handover Maso...	vinod1978do	0.50	U
RT @VURWA: What a time to be alive Alhumdulillah My Pakista...	Hasrat139	0.50	U
RT @RaseAkram: @TahSiddiqi Can France handover you on h...	humak_Rasheed26	0.50	U
RT @TheNubianGoddess: ?? A flower does not think of competing...	TheNubianGoddess1	0.95	P

Query succeeded | 0s

Step 3 – Launch Power BI application from Desktop and establish connection (no data import in Power BI but allow direct execution against SQL DB) with Azure SQL DB.

Please note while connecting Azure SQL DB server outside from Azure (e.g. Reporting tools Power BI Desktop or any Database Client) make sure that your client IP is empowered to connect the DB server.



SQL Server database

Server

my-demo-sql-db-server.database.windows

Database (optional)

my-demo-sql-db

Data Connectivity mode

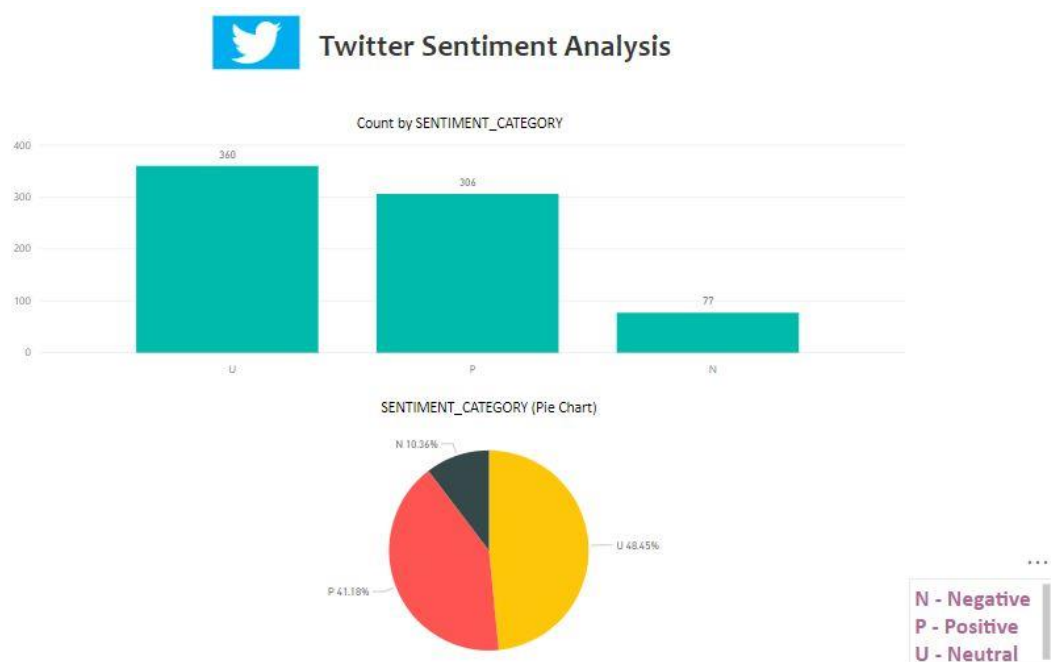
☐ Import
 ☒ DirectQuery

Advanced options

OK

Cancel

Sample Dashboard (shown below)



5. References

<https://docs.microsoft.com/en-us/azure/cognitive-services/text-analytics/overview>
<https://docs.microsoft.com/en-us/azure/logic-apps/logic-apps-overview>