

Objective

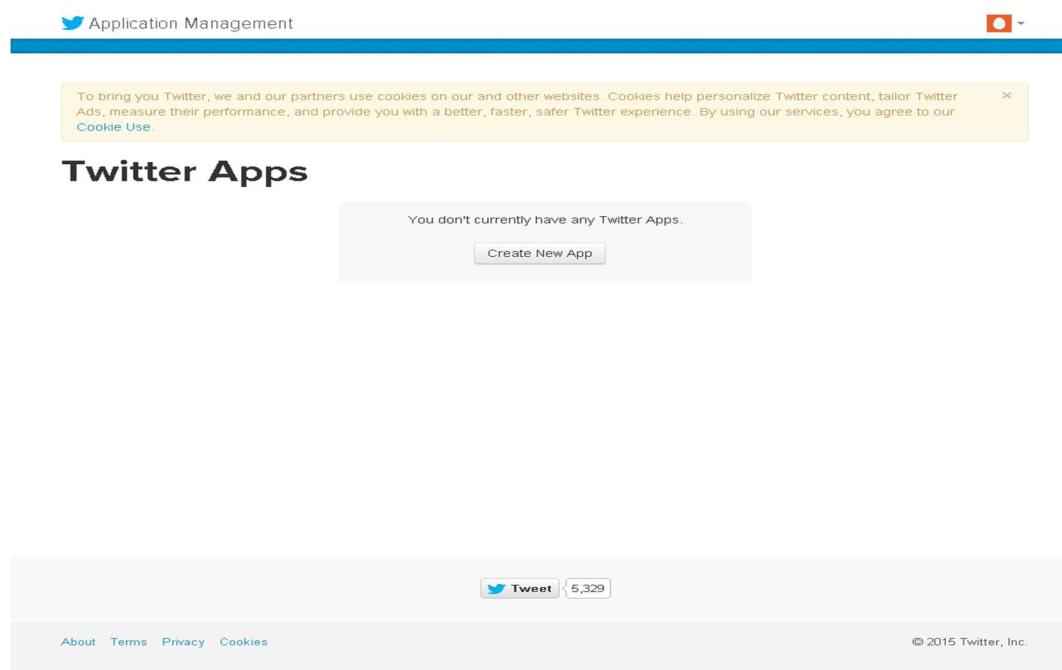
Get familiar with the Twitter API and data load processes.

Every day, Global Bike Inc. produces thousands of bikes. Currently, the Shop Floor workers have to walk to the working stations, which are fixed to a certain place, in order to scan their products and to confirm that a new bike was completed. This is not only a waste of time which costs a lot of money, but also an exhausting part of the workers' daily routine, which can make up to several kilometers a day just to confirm their charges. To counteract these vice president (Operations) engages production planner to do some research about various mobile devices as an alternative to the fixed working stations. Production planner is really enthusiastic about this idea and being a passionate Twitter user, he decides to do some analysis on Twitter data first, to get to know the opinions of users about the new iPad Pro and the Surface Pro 4. At lunch he tells his systems & database administrator about his ideas. Database administrator is always up to date on the newest technologies and suggests production planner to use GBI's SAP HANA system for analyzing the data, as there is a brand new functionality for loading Twitter Data into the database.

1) Create an App for your Twitter Account

To load the data via the Twitter API you need to register an app. For this task you need a Twitter account. After creating an app, we will create access tokens to access the app.

Go to <https://apps.twitter.com/> and logon with your twitter account. Click on Create New App.



The screenshot shows the Twitter Application Management interface. At the top, there is a blue header bar with the Twitter logo and the text "Application Management". Below the header, a yellow banner displays a cookie consent message: "To bring you Twitter, we and our partners use cookies on our and other websites. Cookies help personalize Twitter content, tailor Twitter Ads, measure their performance, and provide you with a better, faster, safer Twitter experience. By using our services, you agree to our Cookie Use." A small "X" icon is in the top right corner of the banner. The main content area is titled "Twitter Apps" in bold black text. It contains a message: "You don't currently have any Twitter Apps." Below this message is a "Create New App" button. At the bottom of the page, there is a footer bar with links for "About", "Terms", "Privacy", and "Cookies", and a copyright notice: "© 2015 Twitter, Inc."

Enter a name (e.g. "GBI_010_Load"), a description (e.g. "GBI_010 Twitter Data Load") and a website (e.g. "http://www.sap-ucc.com"). Replace 010 with your student id. Read the Developer Agreement and accept it by checking the box "Yes, I agree".

Click on **Create your Twitter application**.

Create an application

Application Details

Name *

GBI_000 Load

Your application name. This is used to attribute the source of a tweet and in user-facing authorization screens. 32 characters max.

Description *

GBI_000 Twitter Data Load

Your application description, which will be shown in user-facing authorization screens. Between 10 and 200 characters max.

Website *

http://www.sap-ucc.com

Your application's publicly accessible home page, where users can go to download, make use of, or find out more information about your application. This fully-qualified URL is used in the source attribution for tweets created by your application and will be shown in user-facing authorization screens.
(If you don't have a URL yet, just put a placeholder here but remember to change it later.)

Callback URL

Where should we return after successfully authenticating? OAuth 1.0a applications should explicitly specify their oauth_callback URL on the request token step, regardless of the value given here. To restrict your application from using callbacks, leave this field blank.

Developer Agreement

an independent company responsible for the information of Twitter users who live outside the United States. Any attempted assignment in violation of this paragraph is null and void, and Twitter may terminate this Agreement. This Agreement does not create or imply any partnership, agency or joint venture. This Agreement will be governed by and construed in accordance with the laws of the State of California, without regard to or application of conflicts of law rules or principles. All claims arising out of or relating to this Agreement will be brought exclusively in the federal or state courts of San Francisco County, California, USA, and you consent to personal jurisdiction in those courts. Despite the foregoing, you agree that money damages would be an inadequate remedy for Twitter in the event of a breach or threatened breach of a provision of this Agreement protecting Twitter's intellectual property or Confidential Information, and that in the event of such a breach or threat, Twitter, in addition to any other remedies to which it is entitled, is entitled to such preliminary or injunctive relief (including an order prohibiting Company from taking actions in breach of such provisions), without the need for posting bond, and specific performance as may be appropriate. The parties agree that neither the United Nations Convention on Contracts for the International Sale of Goods, nor the Uniform Computer Information Transaction Act (UCITA) shall apply to this Agreement, regardless of the states in which the parties do business or are incorporated. No waiver by Twitter of any covenant or right under this Agreement will be effective unless memorialized in a writing duly authorized by Twitter. If any part of this Agreement is determined to be invalid or unenforceable by a court of competent jurisdiction, that provision will be enforced to the maximum extent permissible and the remaining provisions of this Agreement will remain in full force and effect.

 Yes, I agree**Create your Twitter application**

You will get a confirmation that your application has been created and the details of your app will appear.

To bring you Twitter, we and our partners use cookies on our and other websites. Cookies help personalize Twitter content, tailor Twitter Ads, measure their performance, and provide you with a better, faster, safer Twitter experience. By using our services, you agree to our [Cookie Use](#).

X

Your application has been created. Please take a moment to review and adjust your application's settings.

GBI_000 Load

[Test OAuth](#)[Details](#) [Settings](#) [Keys and Access Tokens](#) [Permissions](#)

GBI_000 Twitter Data Load

<http://www.sap-ucc.com>

Organization

Information about the organization or company associated with your application. This information is optional.

Organization None

Organization website None

Application Settings

Your application's Consumer Key and Secret are used to authenticate requests to the Twitter Platform.

Access level Read and write (modify app permissions)

Consumer Key (API Key) LVgdZ [REDACTED] ([manage keys and access tokens](#))

Callback URL None

Callback URL Locked No

Sign in with Twitter Yes

App-only authentication <https://api.twitter.com/oauth2/token>Request token URL https://api.twitter.com/oauth/request_tokenAuthorize URL <https://api.twitter.com/oauth/authorize>Access token URL https://api.twitter.com/oauth/access_token

Go to tab "Keys and Access Tokens" to create the Access Tokens for your app.

You can see that a Consumer Key, also known as API Key, and a Consumer Secret, also known as API Secret, have already been created. For accessing Twitter data via the Twitter Adapter you also need an Access Token and Access Key.

To create those scroll to the bottom of the page and click on **Create my access token**.

To bring you Twitter, we and our partners use cookies on our and other websites. Cookies help personalize Twitter content, tailor Twitter Ads, measure their performance, and provide you with a better, faster, safer Twitter experience. By using our services, you agree to our [Cookie Use](#).

X

GBI_000 Load

[Test OAuth](#)[Details](#)[Settings](#)[Keys and Access Tokens](#)[Permissions](#)

Application Settings

Keep the "Consumer Secret" a secret. This key should never be human-readable in your application.

Consumer Key (API Key) LVgdZ [REDACTED]

Consumer Secret (API Secret) gDFJ7 [REDACTED]

Access Level Read and write ([modify app permissions](#))

Owner [REDACTED]

Owner ID [REDACTED]

Application Actions

[Regenerate Consumer Key and Secret](#)[Change App Permissions](#)

Your Access Token

You haven't authorized this application for your own account yet.

By creating your access token here, you will have everything you need to make API calls right away. The access token generated will be assigned your application's current permission level.

Token Actions

[Create my access token](#)

You will get a confirmation that the access tokens have been created.

Status

Your application access token has been successfully generated. It may take a moment for changes you've made to reflect.
[Refresh](#) if your changes are not yet indicated.

GBI_000 Load

[Test OAuth](#)

[Details](#)

[Settings](#)

[Keys and Access Tokens](#)

[Permissions](#)

Application Settings

Keep the "Consumer Secret" a secret. This key should never be human-readable in your application.

Consumer Key (API Key) LVgdZ [REDACTED]

Consumer Secret (API Secret) gDFJ7 [REDACTED]

Access Level Read and write ([modify app permissions](#))

Owner [REDACTED]

Owner ID [REDACTED]

Application Actions

[Regenerate Consumer Key and Secret](#)

[Change App Permissions](#)

Your Access Token

This access token can be used to make API requests on your own account's behalf. Do not share your access token secret with anyone.

Access Token [REDACTED] 9Vs98pp

Access Token Secret [REDACTED] AWYtCN

Access Level Read and write

Owner [REDACTED]

Owner ID [REDACTED]

2) Configure the Twitter adapter for your SAP HANA system

For loading data from twitter into the SAP HANA database, you need to configure a Remote Source for the Twitter adapter.

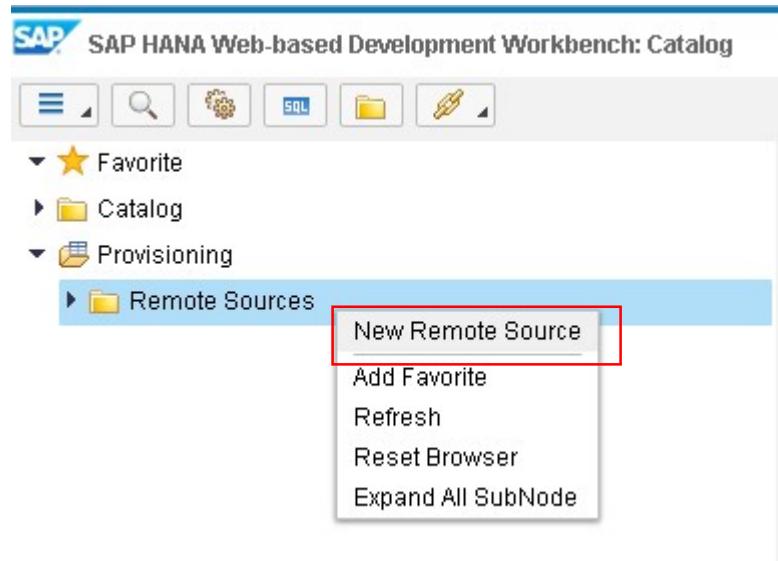
Open the Catalog of your system in a browser using the Web IDE.

<http://db1.hana2.ucc.uwm.edu:8002/sap/hana/ide/catalog/>

Then go to:

Provisioning ► Remote Sources.

Right click on folder Remote Sources and choose **New Remote Source**.



A new screen for configuring a remote source opens.

Enter the following data:

Source Name	GBI_010
Adapter Name	TwitterAdapter
Location	agent
Agent Name	dpagent

It should look as in the following screenshot.

gbi-student-010:COUNTY... gbi-student-010:COUNTY... *New Remote Source*

Source Name	Adapter Name	Location	Agent (Group) Name
GBI_10	TwitterAdapter	agent	dpagent
Property Name		Value	
Configuration			
Credentials			
Credentials Mode		Technical User	
<input checked="" type="checkbox"/> API Key (Consumer Key)			
<input checked="" type="checkbox"/> API Secret (Consumer Secret)			
<input checked="" type="checkbox"/> Access Token (Oauth Token)			
<input checked="" type="checkbox"/> Access Token Secret (Oauth Secret)			

Now click on the + symbol next to API Key, API Secret, Access Token and Access Token Secret to elapse the fields for entering the keys.

Go to your Twitter app and copy and paste the API Key, API Secret, Access Token and Access Token Secret into the corresponding fields.

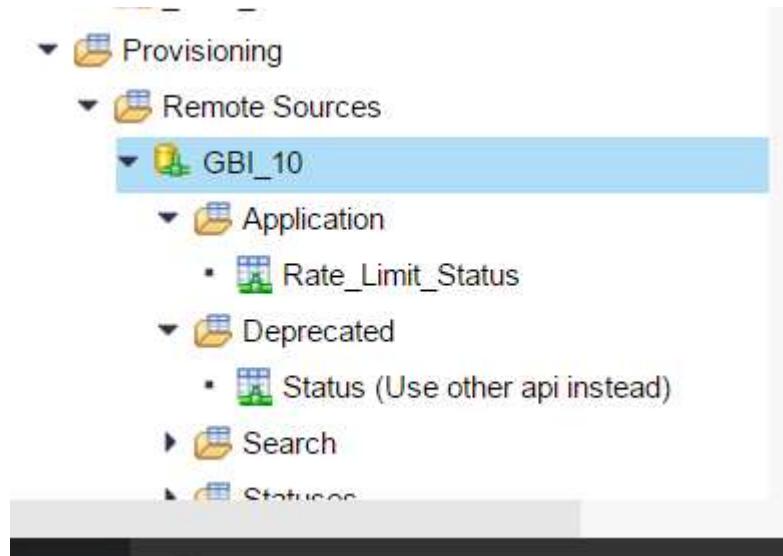
gbi-student-010:COUNTY... gbi-student-010:COUNTY... *New Remote Source*

Source Name	Adapter Name	Location	Agent (Group) Name
GBI_10	TwitterAdapter	agent	dpagent
Property Name		Value	
Configuration			
Credentials			
Credentials Mode		Technical User	
<input checked="" type="checkbox"/> API Key (Consumer Key)		
<input checked="" type="checkbox"/> API Secret (Consumer Secret)		
<input checked="" type="checkbox"/> Access Token (Oauth Token)		
<input checked="" type="checkbox"/> Access Token Secret (Oauth Secret)		

Click on Save  to create the remote source. If your remote source was created successfully, you will get a confirmation and it will be shown on the left side under folder "Remote Sources".

```
1:23:51 PM (Content Persistence) Could not restore tab since editor was not restorable  
1:23:51 PM (Content Persistence) Could not restore tab since editor was not restorable.  
1:23:51 PM (Content Persistence) Could not restore tab since editor was not restorable.  
4:29:59 PM (Remote Source Editor) Remote Source 'GBI_10' saved successfully.
```

When you elapse your Remote Source now, you can see that there are two tables for loading data, Status and Rate_Limit_Status.



The table "Status" contains your home_timeline and can be used for requesting user's timelines or searching via the Twitter API.

The table "Rate_Limit_Status" gives you information about your rate limits. In order to control the use of the Twitter API Twitter has a limit per user how often the API can be used per hour. The limit is divided into 15 minute intervals. Depending on the method you are using, you can call it up to 15 times per 15 minutes or up to 180 times per 15 minutes. Strategies to avoid exceeding the rate limit are caching, prioritizing active users or using an application-only auth.

3) Loading the twitter data using Virtual Function

We need to get an insight as to how the Twitter Adapter of SAP HANA Data Provisioning works. Therefore, load the user timeline of Microsoft to find out how the data looks like.

We want to have a look on the timelines of Apple Inc. and Microsoft to find information that could be interesting for Sentiment Analysis.

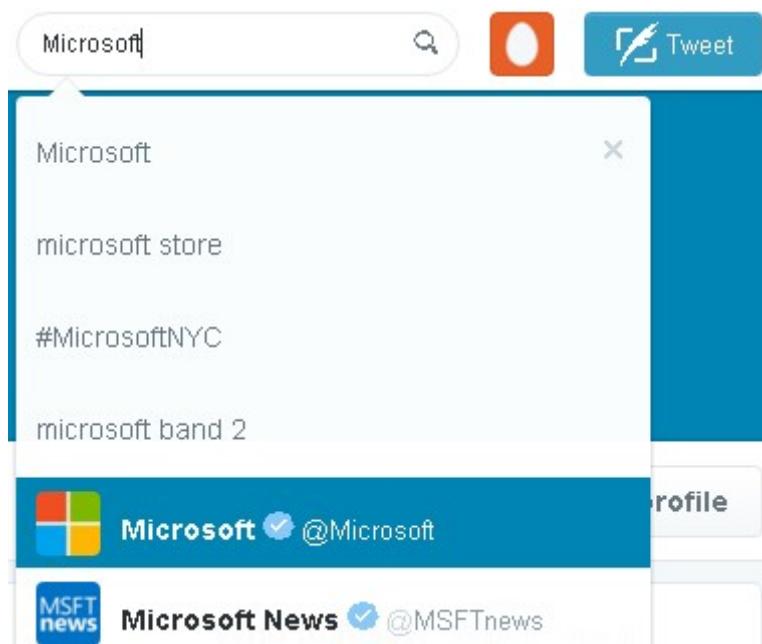
Go to twitter.com and login to your account. In the upper right corner there is a search field to search for users or for any terms. Type in "Apple" or "Microsoft" to find Apple's and Microsoft's official user timeline.

When you type in "Apple", you will find some results, but please be careful. Apple has an official account on twitter with user name "@Apple", however, this isn't broadly used and has just a few followers. Apple owns several Twitter accounts that represent different divisions of the company, e.g. @iTunes or @AppStore. That's why you won't be able to find a timeline for the whole company Apple Inc. with useful data.

The next screenshot shows the result that you will receive when searching for the term "Apple".

A screenshot of a Twitter search results page. At the top, there is a search bar with the word "Apple" typed into it, followed by a magnifying glass icon and a blue "Tweet" button. Below the search bar is a list of search suggestions: "Apple", "Apple TV", "apple tv order", and "Apple Watch". The main results section starts with a card for "Apple Music" (@AppleMusic), which has a black square profile picture with the Apple logo, the text "Apple Music", a blue verified checkmark, and the handle "@AppleMusic". Below this is a card for "Apple" (@APPLEOFFICIAL), featuring a white Apple logo icon, the text "Apple", a grey verified checkmark, and the handle "@APPLEOFFICIAL". Further down are cards for "christina applegate" (@1capplegate), "Applebee's" (@Applebees), and "Apple News" (@applenews). Each card includes a small profile picture, the user's name, a blue verified checkmark, and their Twitter handle. At the bottom of the results, there is a link "Search all people for Apple".

The first entry with the name "@Microsoft" is the official twitter account of Microsoft. Click on it to open the user timeline.



The screenshot on the next page shows Microsoft's timeline.

The Microsoft Twitter profile page shows a scuba diver in clear blue water, with rocky cliffs in the background. The Microsoft logo is at the top left. Key stats: 11.2K tweets, 7.24M followers, 152 favorites, 4 lists. Following 1,662 accounts. Options to follow or refresh.

Microsoft

@Microsoft

The official Twitter page for Microsoft consumer products and your source for major announcements and events.

📍 Redmond, WA
🔗 facebook.com/Microsoft
🕒 Joined September 2009

Tweet to Microsoft

1,029 Photos and videos

Tweets Tweets & replies Photos & videos

Microsoft Retweeted
Xbox @Xbox · Oct 24
Sixty bucks to play.
Zero bucks to watch.
Join #Halo5 [T] LIVE on 10/26 at 3pm PT: xbx.lv/1hGwrbX

Xbox

Who to follow · Refresh · View all

- heise Top-News @heise_to...
- openSAP @openSAP
- TechStage @techstagede

Find friends

Trends · Change

- #earthquake
- #LouisYouMakeUsFeelLikeHome
- Chhota Rajan
- #Stevens
- Peshawar
- #qanda
- Srinagar
- #fbpokal

Scroll down to find some interesting tweets about the Surface Pro, e.g. the one from the 21st of October 2015 which is shown in the screenshot below.

 Microsoft Retweeted
CNET @CNET · Oct 21
The new Surface Pro 4 keeps Microsoft at the top of the tablet hill (rated review) cnet.co/1PA4tEP



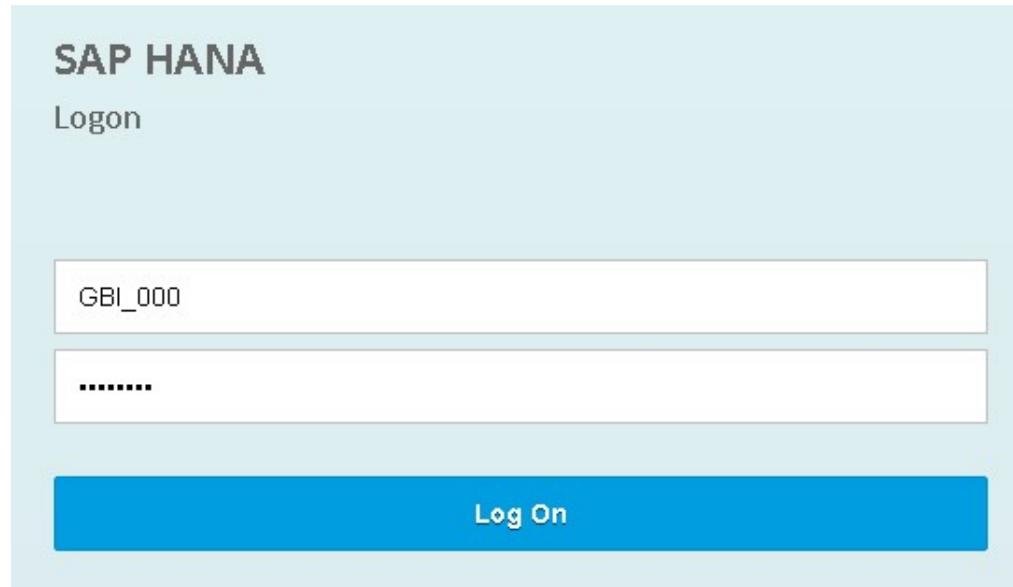
◀ 271 ★ 347 ⋮

To get an insight how the loaded data looks like, you decide to load the Microsoft's user timeline into your database.

Open the SAP HANA Web IDE in your browser. For this, please adapt the following link to your system:

<http://db1.hana2.ucc.uwm.edu:8002/sap/hana/ide/editor/>

Login with your user credentials.



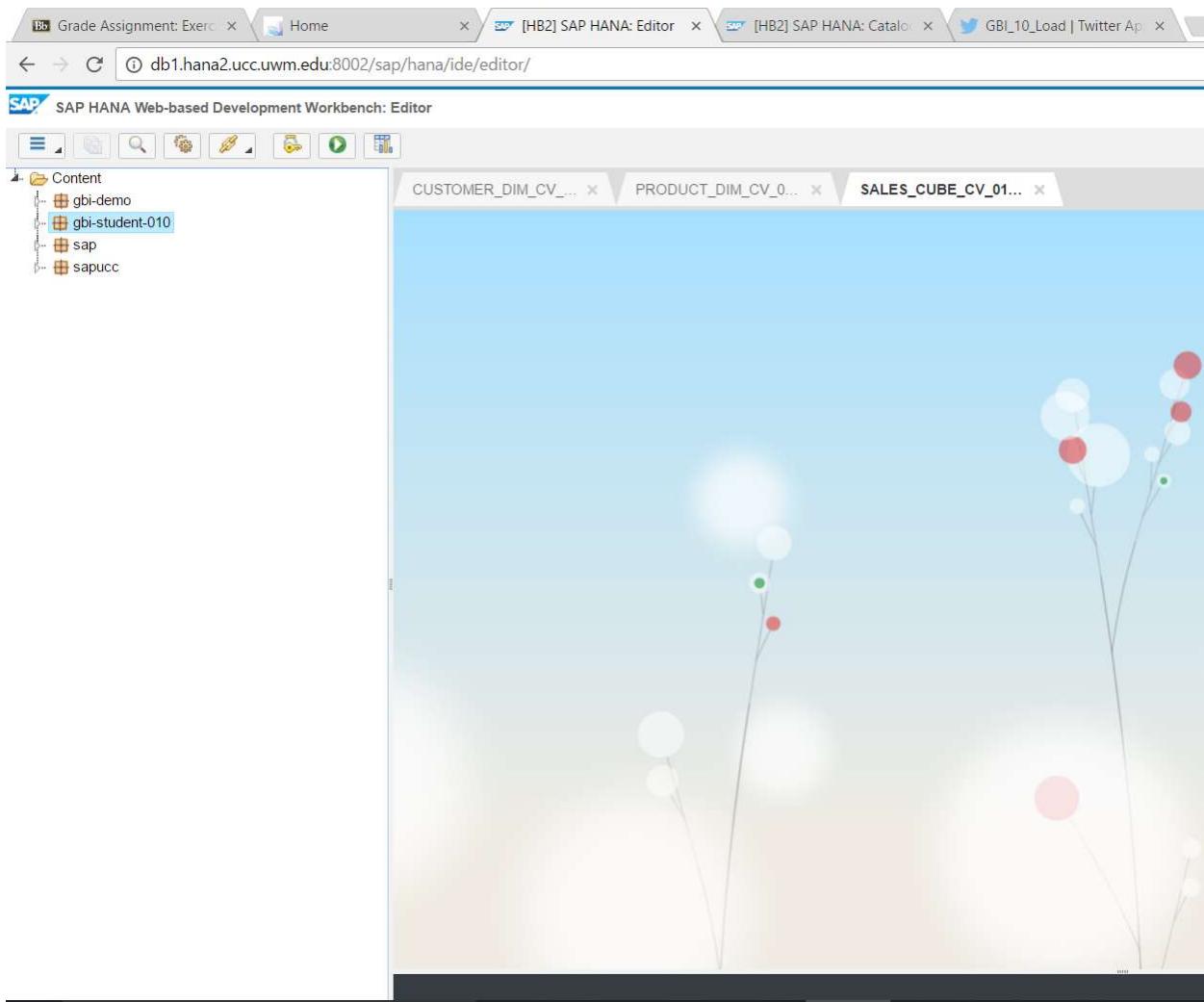
SAP HANA

Logon

GBI_000

Log On

The package "gbi-student-010" will be there in the inside the content folder.



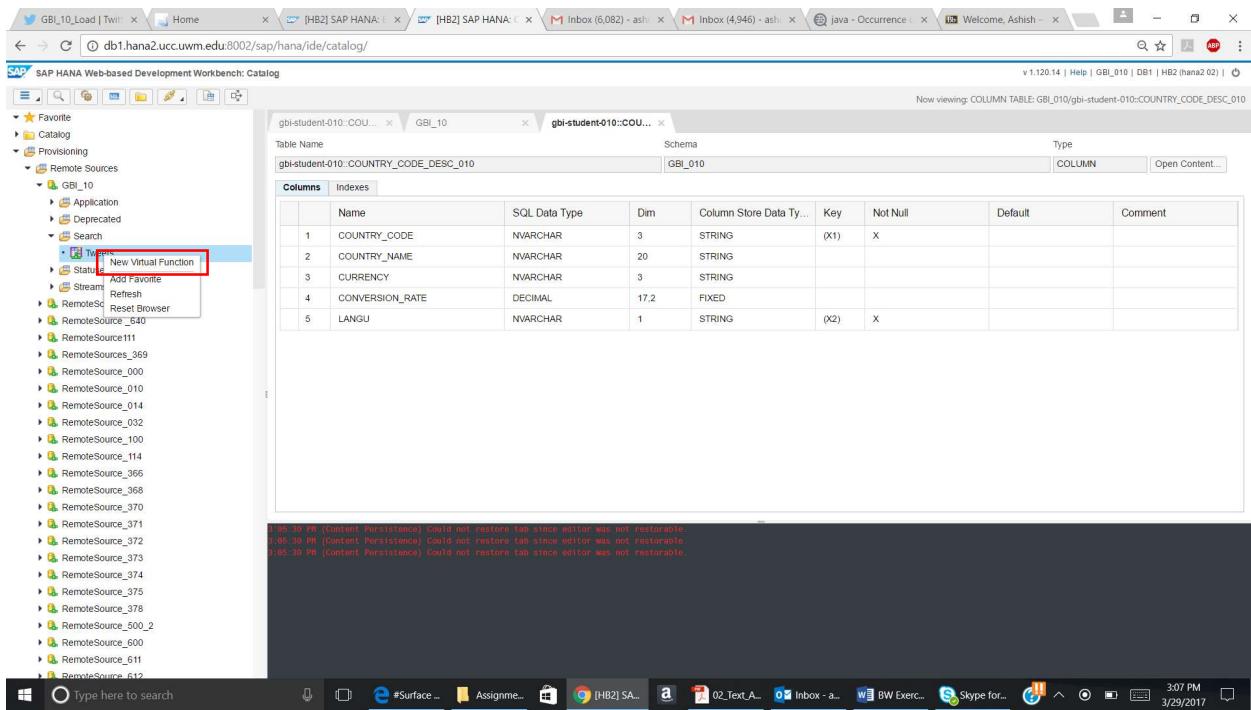
Surface Pro

We will first list down the tweets which are desired or not. We are trying to find the tweets for Surface Pro 4.

Desired	Undesired
#SurfacePro4	#SurfacePro3
#surfacepro4	#Surface
#SURFACEPRO4	Surface
SurfacePro4	#Pro4
	Pro4

	#SurfacePro
	SurfacePro

Right click on the Tweets under Search and click on New Virtual Function.



The screenshot shows the SAP HANA Web-based Development Workbench interface. On the left, there's a sidebar with sections like 'Favorite', 'Catalog', and 'Provisioning'. Under 'Catalog', there's a 'Remote Sources' section with many entries, one of which is 'Tweets'. A context menu is open over the 'Tweets' entry, with the option 'New Virtual Function' highlighted by a red box. The main area displays a table schema for 'gbi-student-010..COUNTRY_CODE_DESC_010'. The table has five columns: COUNTRY_CODE, COUNTRY_NAME, CURRENCY, CONVERSION_RATE, and LANGU. The 'COUNTRY_CODE' column is defined as NVARCHAR(3) with a STRING type and a primary key (X1). The 'COUNTRY_NAME' column is NVARCHAR(20) with a STRING type. The 'CURRENCY' column is NVARCHAR(3) with a STRING type. The 'CONVERSION_RATE' column is DECIMAL(17,2) with a FIXED type. The 'LANGU' column is NVARCHAR(1) with a STRING type and a primary key (X2). The status bar at the bottom shows the date and time as 3/29/2017 3:07 PM.

The below given pop up will come.

SAP HANA Web-based Development Workbench: Catalog

Now viewing: COLUMN TABLE: GBI_010/gbi-student-010:COUNTRY_CODE_DESC_010

v.1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) | ○

gbi-student-010:COU... GBI_10 gbi-student-010:COU...

Table Name Schema Type

gbi-student-010:COUNTRY_CODE_DESC_010 GBI_010 COLUMN Open Content...

Columns Indexes

Name	SQL Data Type	Dim	Column Store Data Ty...	Key	Not Null	Default	Comment
1 COUNTRY_CODE	NVARCHAR	3	STRING	(X1)	X		
2 COUNTRY_NAME	NVARCHAR	20	STRING				
3 CURRENCY	NVARCHAR	3	STRING				
4 CONVERSION_RATE							
5 LANGU							

Create Virtual Function

Input a function name and select a target schema

Function Name: GetSearchTweets

Schema: GBI_010

OK Cancel

1:05:30 PM (Content Persistence) Could not restore tab since editor was not restorable
 1:05:30 PM (Content Persistence) Could not restore tab since editor was not restorable
 1:05:30 PM (Content Persistence) Could not restore tab since editor was not restorable

3:09 PM 3/29/2017

The success message will come.

SAP HANA Web-based Development Workbench: Catalog

Now viewing: COLUMN TABLE: GBI_010/gbi-student-010:COUNTRY_CODE_DESC_010

v.1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) | ○

gbi-student-010:COU... GBI_10 gbi-student-010:COU...

Table Name Schema Type

gbi-student-010:COUNTRY_CODE_DESC_010 GBI_010 COLUMN Open Content...

Columns Indexes

Name	SQL Data Type	Dim	Column Store Data Ty...	Key	Not Null	Default	Comment
1 COUNTRY_CODE	NVARCHAR	3	STRING	(X1)	X		
2 COUNTRY_NAME	NVARCHAR	20	STRING				
3 CURRENCY	NVARCHAR	3	STRING				
4 CONVERSION_RATE	DECIMAL	17,2	FIXED				
5 LANGU	NVARCHAR	1	STRING	(X2)	X		

1:05:30 PM (Content Persistence) Could not restore tab since editor was not restorable
 1:05:30 PM (Content Persistence) Could not restore tab since editor was not restorable
 1:05:30 PM (Content Persistence) Could not restore tab since editor was not restorable
 3:10:24 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets' successfully

3:10 PM 3/29/2017

Now click on the SQL Icon.

The screenshot shows the SAP HANA Web-based Development Workbench interface. The left sidebar contains a navigation tree with categories like Catalog, Tables, and Functions. The main area displays a table named 'gb1-student-010:COUNTRY_CODE_DESC_010' with columns: COUNTRY_CODE, COUNTRY_NAME, CURRENCY, CONVERSION_RATE, and LANGU. The bottom right corner of the main area shows a log of database activity:

```
3:05:39 PM (Content Persistence) Could not restore tab since editor was not restorable  
3:05:39 PM (Content Persistence) Could not restore tab since editor was not restorable  
3:05:39 PM (Content Persistence) Could not restore tab since editor was not restorable  
3:10:24 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets' successfully
```

The SQL console will get open.

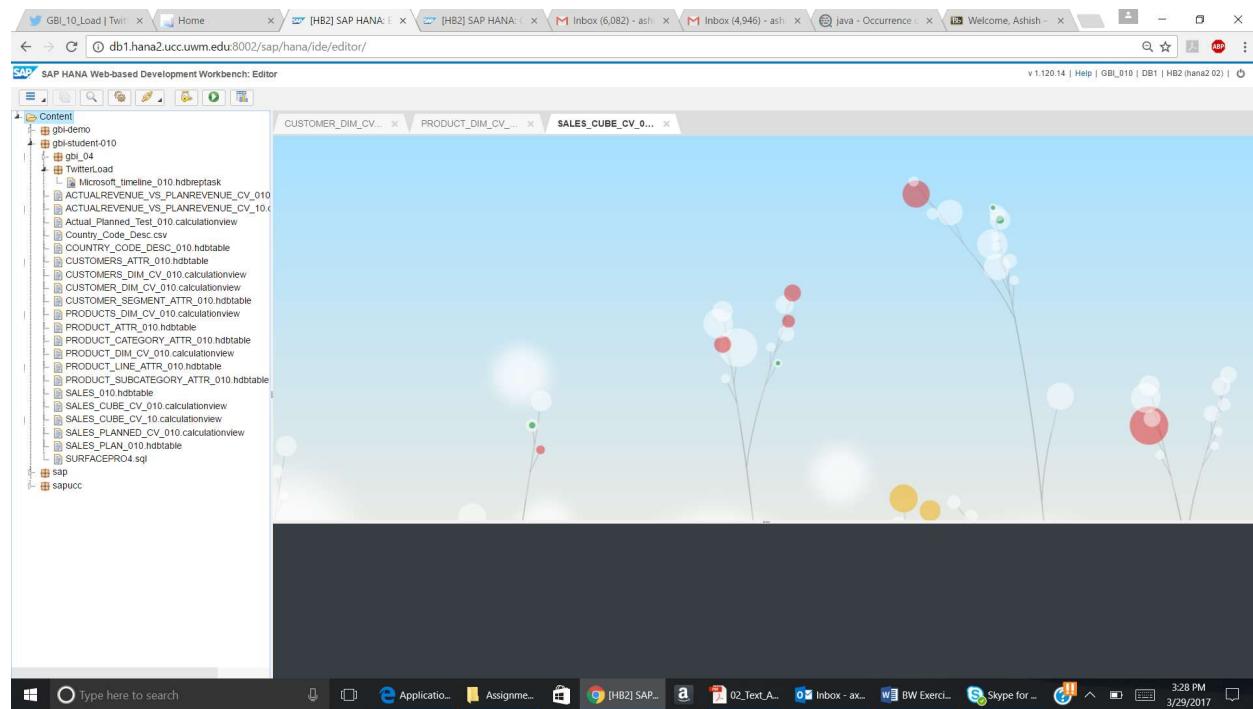
The screenshot shows the SAP HANA Web-based Development Workbench interface with the SQL console open. The title bar indicates 'Now editing: SQL CONSOLE: untitled1.sql - Current Schema: GBI_010'. The SQL editor window is currently empty. The bottom right corner of the main area shows a log of database activity:

```
3:05:39 PM (Content Persistence) Could not restore tab since editor was not restorable  
3:05:39 PM (Content Persistence) Could not restore tab since editor was not restorable  
3:05:39 PM (Content Persistence) Could not restore tab since editor was not restorable  
3:10:24 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets' successfully
```

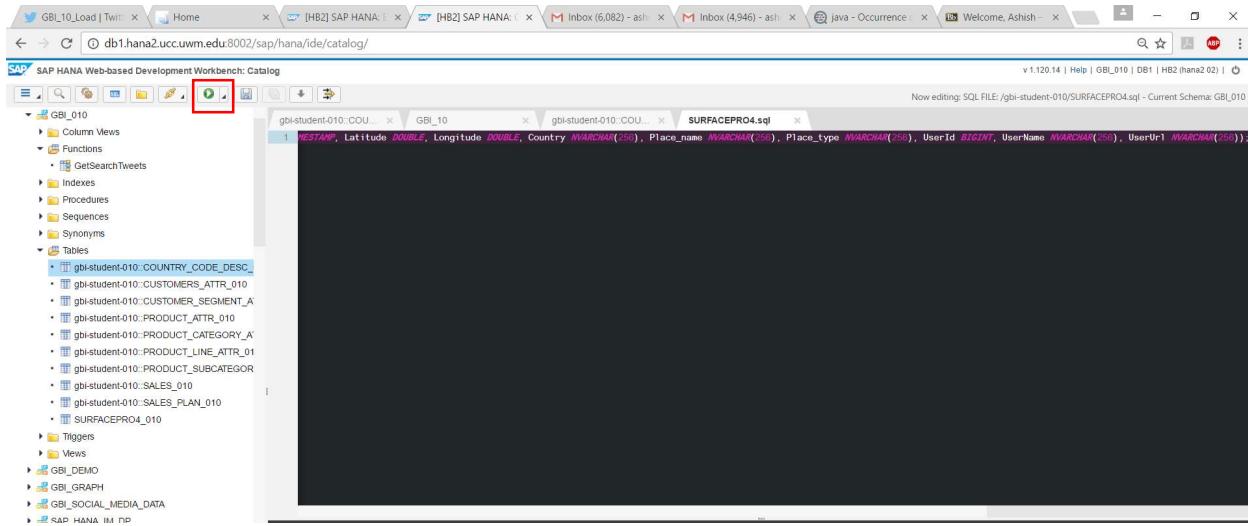
Copy paste the below given SQL query on the query console.

```
CREATE COLUMN TABLE "GBI_010"."SURFACEPRO4_010" (Id BIGINT PRIMARY KEY, ScreenName NVARCHAR(256), Tweet NVARCHAR(256), Source NVARCHAR(256), Truncated TINYINT, InReplyToStatusId BIGINT, InReplyToUserId BIGINT, InReplyToScreenName NVARCHAR(256), Favorited TINYINT, Retweeted TINYINT, FavoriteCount INTEGER, Retweet TINYINT, RetweetCount INTEGER, RetweetedByMe TINYINT, CurrentUserRetweetId BIGINT, PossiblySensitive TINYINT, isoLanguageCode NVARCHAR(256), CreatedAt TIMESTAMP, Latitude DOUBLE, Longitude DOUBLE, Country NVARCHAR(256), Place_name NVARCHAR(256), Place_type NVARCHAR(256), UserId BIGINT, UserName NVARCHAR(256), UserUrl NVARCHAR(256));
```

Save the query under gbi-student-010 as given below. Name the query as SURFACEPRO4_010.sql.



Click on the execute button.



The success message will come.

```

3:19:50 PM (Content Persistence) Could not restore tab since editor was not restorable.
3:19:50 PM (Content Persistence) Could not restore tab since editor was not restorable.
3:19:50 PM (Content Persistence) Could not restore tab since editor was not restorable.
3:25:41 PM (SQL File) File 'SURFACEPRO4.sql' has been saved.
3:25:49 PM (SQL Editor) Statement 'CREATE COLUMN TABLE "GBI_010"."SURFACEPRO4_010" (Id BIGINT PRIMARY KEY, ScreenName NVARCHAR(256), ...)' successfully executed in 12 ms.
  
```

Now we need to get the search tweet into the SURFACEPRO4_010 table from GetSearchTweets table.

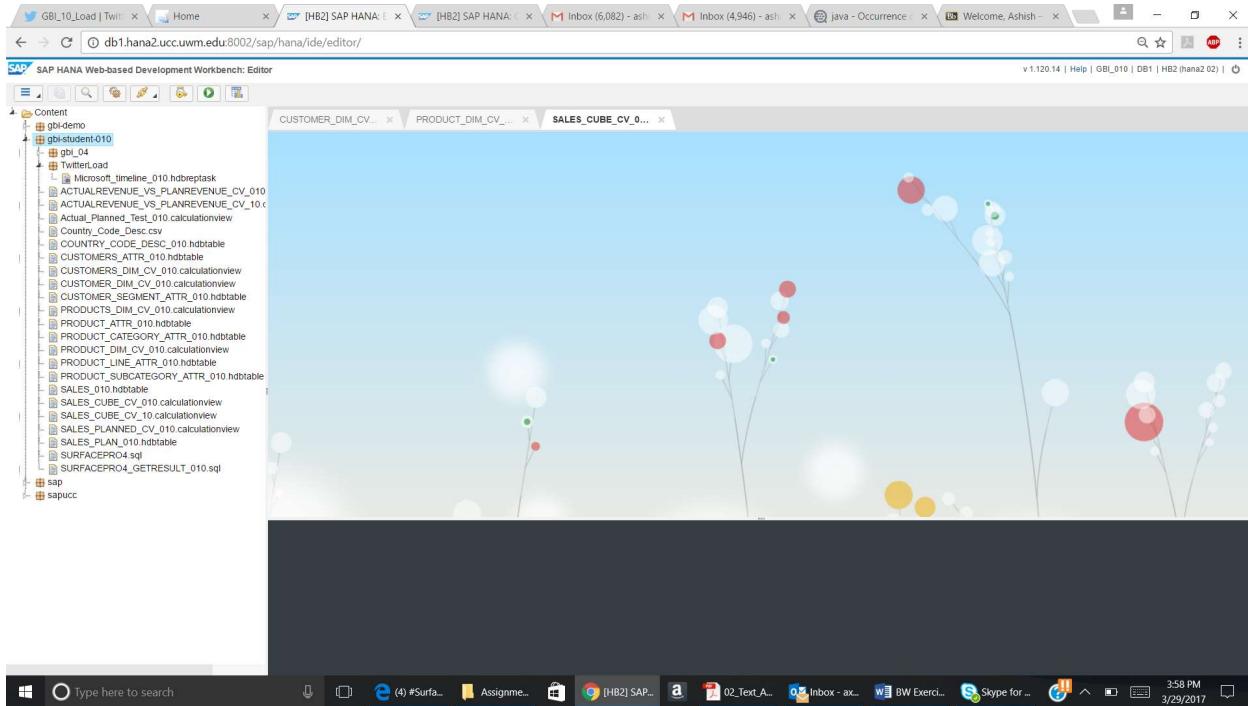
For that we will create the query based on the Desired and Undesired tweets which we have listed down.

Please find below the query:

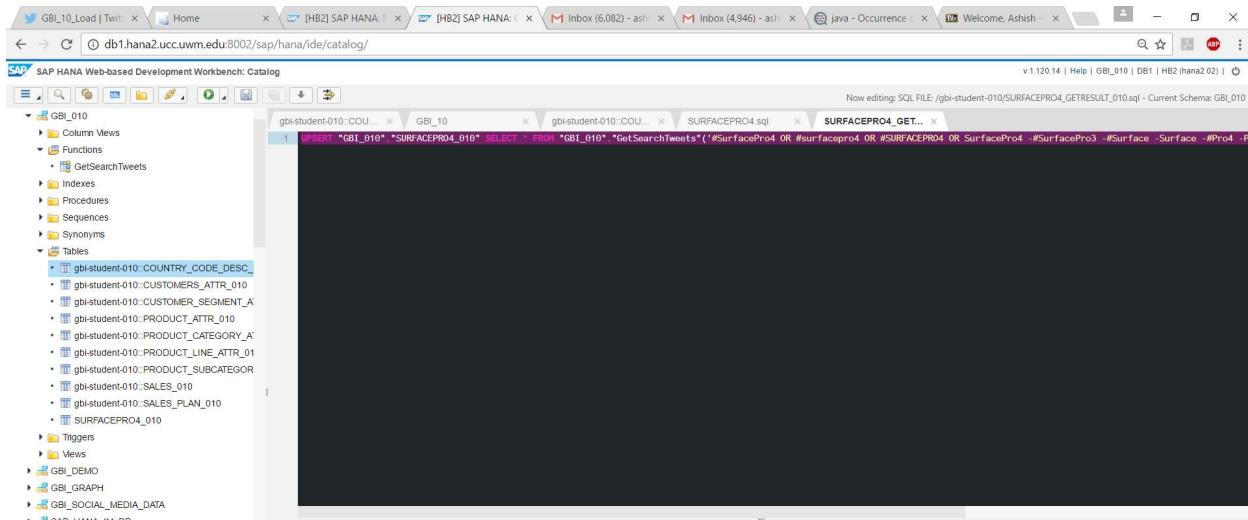
```

UPSERT      "GBI_010"."SURFACEPRO4_010"      SELECT      *      FROM
"GBI_010"."GetSearchTweets"('#SurfacePro4 OR #surfacepro4 OR #SURFACEPRO4
OR SurfacePro4 -#SurfacePro3 -#Surface -Surface -#Pro4 -Pro4 -#SurfacePro -
SurfacePro', 1500, null, null, null, null, null, null, null);
  
```

Now we will save this query. Save the query under gbi-student-010. Name of the query should be SURFACEPRO4_GETRESULT_010.sql.



Now execute the query by clicking on Run button.



The success message will come.

```
3:46:18 PM (SQL File) File 'SURFACEPRO4_GETRESULT_010.sql' has been saved.  
3:47:06 PM (SQL Editor) Statement 'UPINSERT *GBI_010*."SURFACEPRO4_010" SELECT * FROM "GBI_010"."GetSearchTweets"(''#SurfacePro4 OR #surfacepro4 OR #SURFACEPRO4 OR SurfacePro4 -#Surface -#SurfacePro4 -#Pro4 -#Pro4_010'."SURFACEPRO4_010")' successfully executed in 1900 ms - Rows Affected: 322
```

Right click on the table and select Open Content.

SAP HANA Web-based Development Workbench: Catalog

Now editing: SQL FILE: /gbi-student-010/SURFACEPRO4_GETRESULT_010.sql - Current Schema: GBI_010

v 1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) | ○

gbi-student-010.COU... GBI_10 gbi-student-010.COU... SURFACEPRO4_010 SURFACEPRO4.GET... SURFACEPRO4.sql SURFACEPRO4_010

#SURFACEPRO4 OR #surfacepro4 OR #SURFACEPRO4 OR SurfacePro4 #SurfacePro3 #Surface .Surface #Pro4 #Pro4 #SurfacePro .SurfacePro' (500, null, null, null, null, null, null, null)

Favorite Catalog Public Synonyms GBI_010 Column Views Functions GetSearchTweets Indexes Procedures Sequences Synonyms Tables SURFACEPRO4_010 New Synonym Add Favorite Delete Refresh Reset Browser Generate Create Generate Select Generate Insert Open Content Open Definition Search (Ctrl+Shift+F)

4:33:29 PM (Content Persistence) Could not restore tab since editor was not restorable
4:33:29 PM (Content Persistence) Could not restore tab since editor was not restorable
4:33:29 PM (Content Persistence) Could not restore tab since editor was not restorable
4:33:35 PM (Data Preview) Table actions are not supported for 'GBI_010'.SURFACEPRO4_010'; It just supports columns of some classification of data type as Character String, Numeric, Date and Time

Type here to search

4:41 PM 3/29/2017

The below given table will come:

SAP HANA Web-based Development Workbench: Catalog

Now editing: GBI_010/SURFACEPRO4_010

v 1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) | ○

gbi-student-010.COU... GBI_10 gbi-student-010.COU... SURFACEPRO4_010 SURFACEPRO4.GET... SURFACEPRO4.sql SURFACEPRO4_010

322 row(s) Type to filter

ID	SCREENNAME	TWEET	SOURCE	TRUNCATED	INREPLYTOST	INREPLYTOUSER	INREPLYTOSCREENNAME	
1	SketchableApp	RT @gregsedwards: Fir	<a href="http://twitter.cc	0	-1	-1	?	0
2	pandora19950824	RT @nash_reloaded: S	<a href="http://twitter.cc	0	-1	-1	?	0
3	iceonsenade	RT @nash_reloaded: S	<a href="http://twitter.cc	0	-1	-1	?	0
4	ann_k30	RT @nash_reloaded: S	<a href="http://twitter.cc	0	-1	-1	?	0
5	FavoriteAmazon	最近僕の周りでよく見	<a href="http://twitbot.r	0	-1	-1	?	0
6	kaisajussila	Tehokasta työntekoa, te	<a href="http://instagr	0	-1	-1	?	0
7	thisaintmyland	RT @L_manul: Anyone	<a href="http://twitter.cc	0	-1	-1	?	0
8	t_manul	Anyone who uses a #S	<a href="http://twitter.cc	0	-1	-1	?	0
9	magicaces	So the #surfacepro4 an	<a href="https://about.t	0	-1	-1	?	0
10	knidoor	surfacePro4は今すぐ買	<a href="http://twitter.cc	0	-1	-1	?	0
11	nobikkio	SurfacePro4もあるのか	<a href="http://twitter.cc	0	-1	-1	?	0
12	loo78	あとこれ非常に良いよ♪	<a href="http://twitter.cc	0	-1	-1	?	0
13	akirapt2	@midorinxx iPad Pro12	<a href="http://twitter.sc	0	847055878578565120	111315765	midorinxx	0
14	tatsuyai192904	パソコンSurfacePro3	<a href="http://twitter.cc	0	-1	-1	?	0
15	JariQatar	#Amazing #Bundle I #v	<a href="http://engagor	0	-1	-1	?	0

4:33:29 PM (Content Persistence) Could not restore tab since editor was not restorable
4:33:29 PM (Content Persistence) Could not restore tab since editor was not restorable
4:33:29 PM (Content Persistence) Could not restore tab since editor was not restorable
4:33:35 PM (Data Preview) Table actions are not supported for 'GBI_010'.SURFACEPRO4_010'; It just supports columns of some classification of data type as Character String, Numeric, Date and Time

Type here to search

4:44 PM 3/29/2017

IPad Pro

We will first list down the tweets which are desired or not. We are trying to find the tweets for **IPad Pro**.

Desired	Undesired
#IPadPro	#IPad
#ipadpro	IPad
#IPADPRO	#Pro
IPadPro	Pro
	AppleIPad

Right click on the Tweets under Search and click on New Virtual Function. Choose the name of virtual function as GetSearchTweetsIPad.

The screenshot shows the SAP HANA Web-based Development Workbench interface. The left sidebar displays 'Favorites', 'Catalog', and 'Provisioning' sections, with 'Remote Sources' expanded. Under 'Remote Sources', there is a 'Search' section containing items like 'Status', 'Streams', 'Refresh', 'RemoteSources_000', and 'RemoteSource_640'. A context menu is open over the 'Search' section, with the 'New Virtual Function' option highlighted by a red box. The main content area shows a table for the 'gbi-student-010:COUNTRY_CODE_DESC_010' column table, listing columns such as COUNTRY_CODE, COUNTRY_NAME, CURRENCY, CONVERSION_RATE, and LANGU. The bottom status bar shows system information including the date (3/29/2017) and time (3:07 PM).

The below given pop up will come.

SAP HANA Web-based Development Workbench: Catalog

v 1.120.14 | Help | GBI_010 | DB1 (hana2 02) | ○

Now viewing: VIRTUAL TABLE: GBI_010/Rate_Limit_Status_010

Table Name: Rate_Limit_Status_010 Schema: GBI_010 Type: VIRTUAL Source Name: GBI_10 Remote Object: Rate_Limit_Status@<NULL>,<NULL> Open Content...

Columns

Name	SQL Data Type	Dim	Column Store Data Ty...	Key	Not Null	Default	Comment
1 endpoint	VARCHAR	1024					
2 limit	INTEGER						
3 remaining	INTEGER						
4 resetTimeInSeconds							
5 secondsUntilReset							

Create Virtual Function

Input a function name and select a target schema
Function Name: GetSearchTweetIPad
Schema: GBI_010

OK Cancel

0:19:11 PM (Content Persistence) Could not restore tab since editor was not restorable
0:19:11 PM (Content Persistence) Could not restore tab since editor was not restorable
0:19:11 PM (Content Persistence) Could not restore tab since editor was not restorable
0:19:18 PM (Content Persistence) Table actions are not supported for 'GBI_010'.'SURFACEPRO4_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
0:19:18 PM (Content Persistence) Table actions are not supported for 'GBI_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
0:19:18 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

Type here to search

The success message will come on clicking OK.

SAP HANA Web-based Development Workbench: Catalog

v 1.120.14 | Help | GBI_010 | DB1 (hana2 02) | ○

Now editing: SQL FILE /gb1-student-010/IPADPRO_GETRESULT_010.sql - Current Schema: GBI_010

jdent-010: COU... x SURFACEPRO4_010 x GBI_10 x gbi-student-010.COOU... x SURFACEPRO4_010 x IPADPRO_010 sql x IPADPRO_GETRESU... x > > □

1 UPINSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweets"("#PadPro OR #ipadpro OR iPadPro #iPad -#Pad -#Pro -#AppleiPad", 1500, null, null, null, null)

0:48:16 PM (Content Persistence) Could not restore tab since editor was not restorable
0:48:16 PM (Content Persistence) Could not restore tab since editor was not restorable
0:48:16 PM (Content Persistence) Could not restore tab since editor was not restorable
0:48:16 PM (Content Persistence) Table actions are not supported for 'GBI_010'.'SURFACEPRO4_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
0:48:16 PM (Content Persistence) Table actions are not supported for 'GBI_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
0:48:45 PM (Data Preview) Table actions are not supported for 'GBI_010'.'SURFACEPRO4_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
3:00:11 PM (SQL File) File 'IPADPRO_010.sql' has been saved.
3:04:53 PM (SQL Editor) Statement 'CREATE COLUMN TABLE "GBI_010"."IPADPRO_010" (Id BIGINT PRIMARY KEY, ScreenName NVARCHAR(256), Tweet ...)' successfully executed in 14 ms.
3:12:49 PM (SQL File) File 'IPADPRO_GETRESULT_010.sql' has been saved.
3:23:14 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets_IPadPro"' successfully.
Error: (server) 2046 - column store error: search table error: [Z028] executor: plan operation failed, cannot execute remote function call.: executeCall, exception 161020: Attempt to access past end of file
3:23:14 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets_IPadPro"' successfully.

Type here to search

We will create the table for IPad Pro.

Now click on the SQL Icon.

SAP HANA Web-based Development Workbench: Catalog

Table Name Schema Type

gbi-student-010:COUNTRY_CODE_DESC_010 GBI_010 COLUMN Open Content

Columns	Name	SQL Data Type	Dim	Column Store Data Ty...	Key	Not Null	Default	Comment
1	COUNTRY_CODE	NVARCHAR	3	STRING	(X1)	X		
2	COUNTRY_NAME	NVARCHAR	20	STRING				
3	CURRENCY	NVARCHAR	3	STRING				
4	CONVERSION_RATE	DECIMAL	17,2	FIXED				
5	LANGU	NVARCHAR	1	STRING	(X2)	X		

3:16 PM (Content Persistence) Could not restore tab since editor was not restorable
3:16:30 PM (Content Persistence) Could not restore tab since editor was not restorable
3:16:30 PM (Content Persistence) Could not restore tab since editor was not restorable
3:19:24 PM (Catalog) Created new virtual function 'GBI_010'. 'GetSearchTweets' successfully

3:16 PM 3/29/2017

The SQL console will get open.

SAP HANA Web-based Development Workbench: Catalog

Now editing: SQL CONSOLE: untitled.sql - Current Schema: GBI_010

1

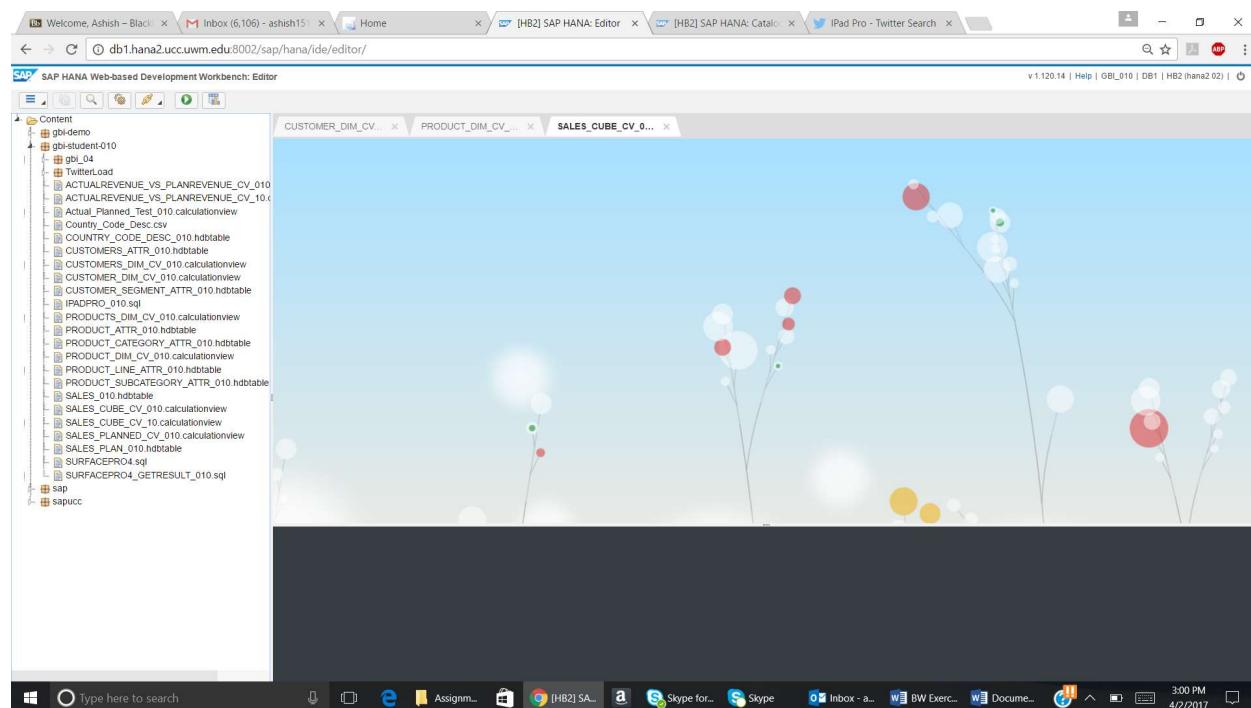
3:16 PM (Content Persistence) Could not restore tab since editor was not restorable
3:16:30 PM (Content Persistence) Could not restore tab since editor was not restorable
3:16:30 PM (Content Persistence) Could not restore tab since editor was not restorable
3:19:24 PM (Catalog) Created new virtual function 'GBI_010'. 'GetSearchTweets' successfully

3:17 PM 3/29/2017

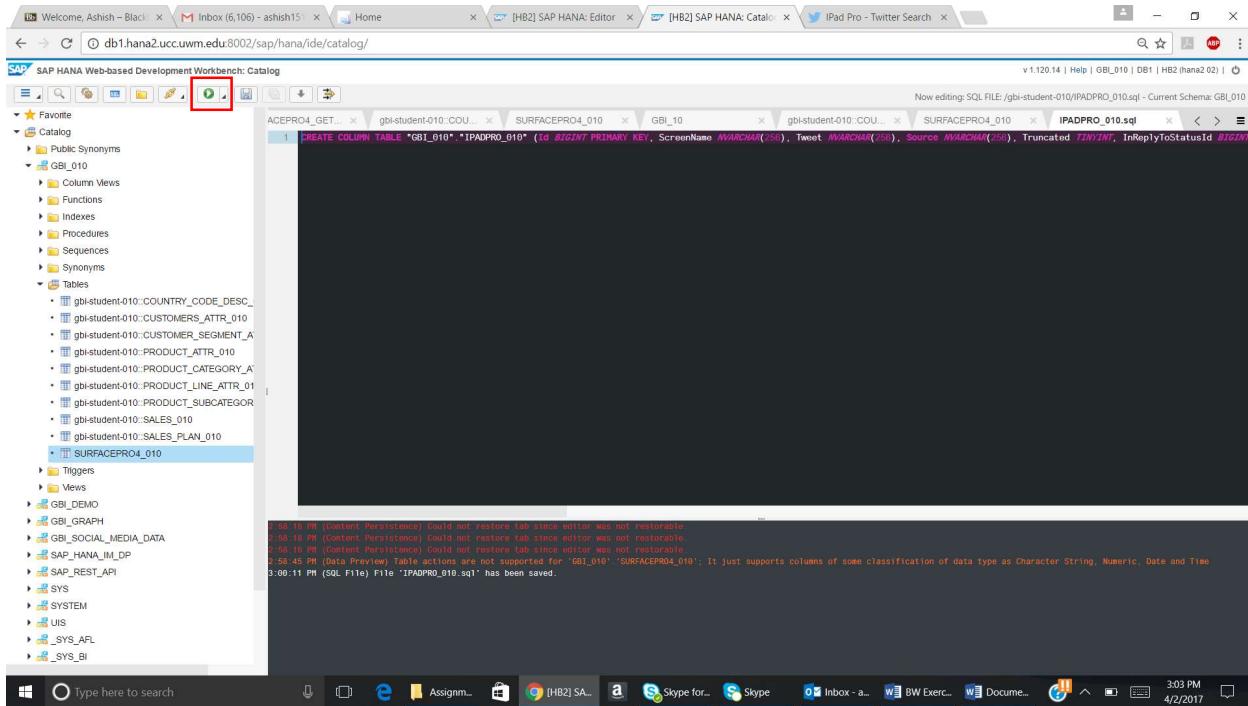
Copy paste the below given SQL query on the query console.

```
CREATE COLUMN TABLE "GBI_010"."IPADPRO_010" (Id BIGINT PRIMARY KEY, ScreenName NVARCHAR(256), Tweet NVARCHAR(256), Source NVARCHAR(256), Truncated TINYINT, InReplyToStatusId BIGINT, InReplyToUserId BIGINT, InReplyToScreenName NVARCHAR(256), Favorited TINYINT, Retweeted TINYINT, FavoriteCount INTEGER, Retweet TINYINT, RetweetCount INTEGER, RetweetedByMe TINYINT, CurrentUserRetweetId BIGINT, PossiblySensitive TINYINT, isoLanguageCode NVARCHAR(256), CreatedAt TIMESTAMP, Latitude DOUBLE, Longitude DOUBLE, Country NVARCHAR(256), Place_name NVARCHAR(256), Place_type NVARCHAR(256), UserId BIGINT, UserName NVARCHAR(256), UserUrl NVARCHAR(256));
```

Save the query under gbi-student-010 as given below. Name the query as IPADPRO_010.sql.



Click on the execute button.



The success message will come.

```
2:58:18 PM (Content Persistence) Could not restore tab since editor was not restorable.
2:58:18 PM (Content Persistence) Could not restore tab since editor was not restorable.
2:58:18 PM (Content Persistence) Could not restore tab since editor was not restorable.
2:58:45 PM (Data Preview) Table actions are not supported for 'GBI_010'. 'SURFACEPRO4_010'; It just supports columns of some classification of
3:00:11 PM (SQL File) File 'IPADPRO_010.sql' has been saved.
3:04:53 PM (SQL Editor) Statement 'CREATE COLUMN TABLE "GBI_010"."IPADPRO_010" (Id BIGINT PRIMARY KEY, ScreenName NVARCHAR(256), Tweet ...' successfully executed in 14 ms.
```

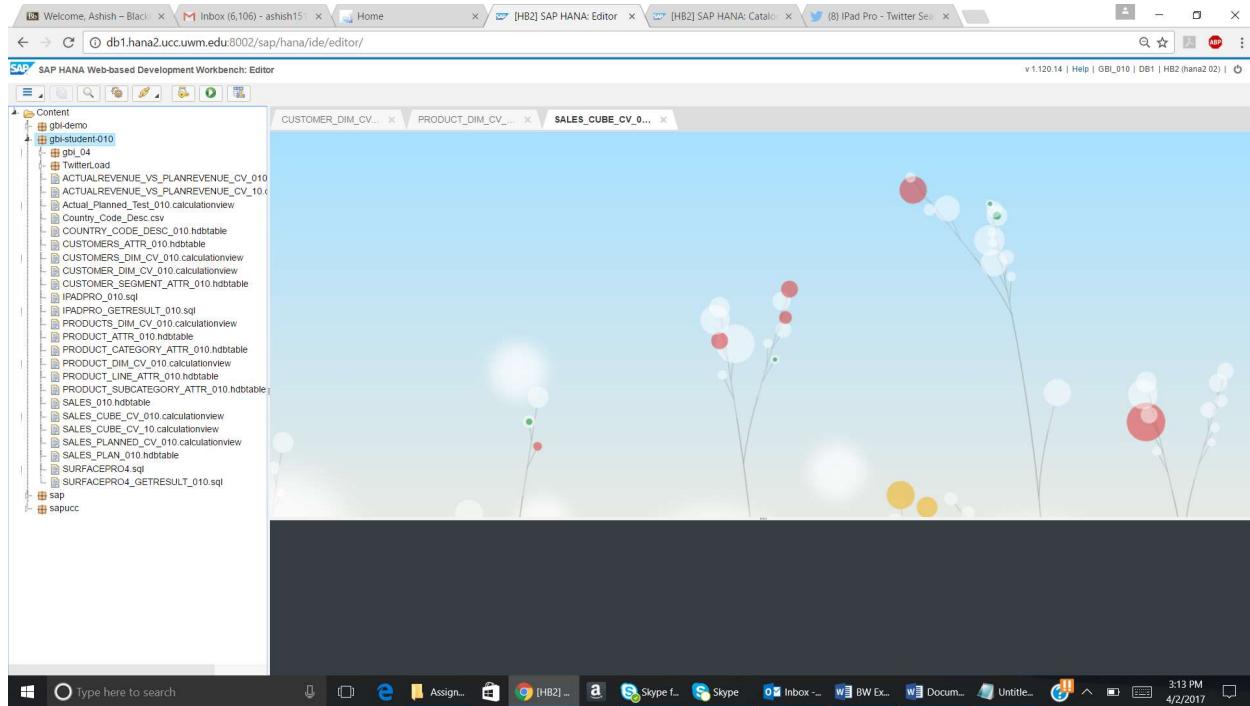
Now we need to get the search tweet into the IPADPRO_010 table from GetSearchTweetsIPad table.

For that we will create the query based on the Desired and Undesired tweets which we have listed down.

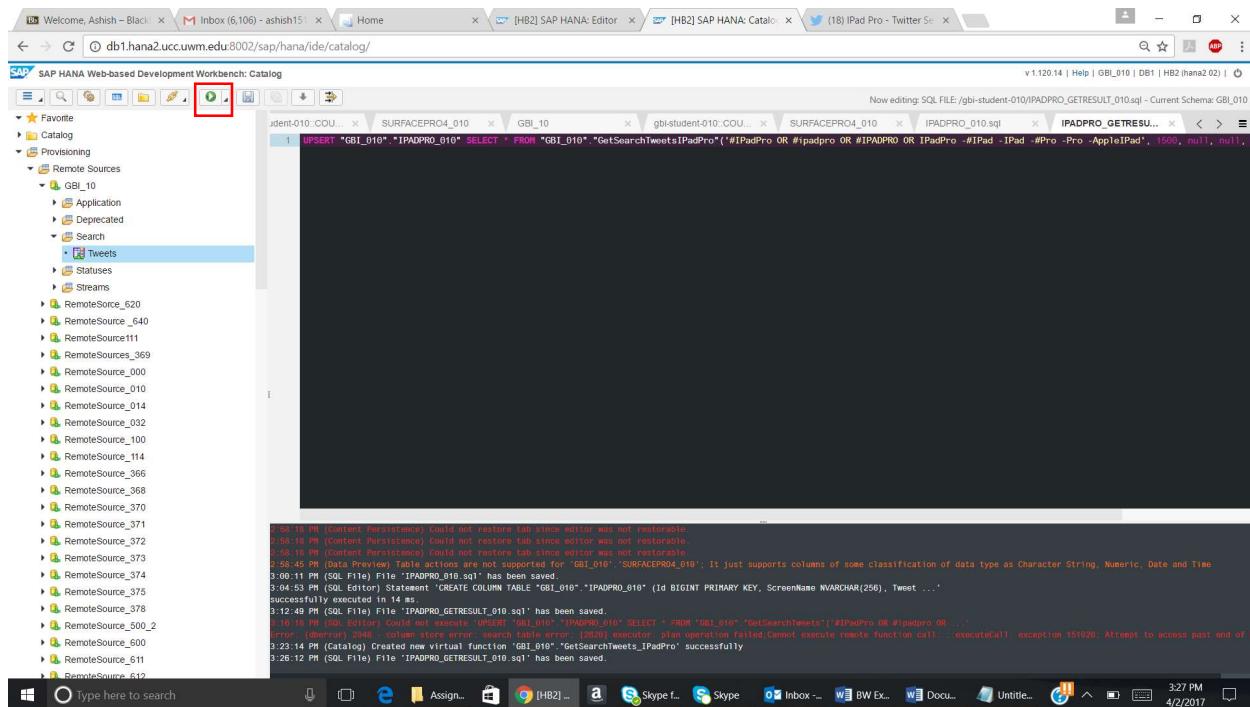
Please find below the query:

```
UPSERT      "GBI_010"."IPADPRO_010"      SELECT      *      FROM
"GBI_010"."GetSearchTweetsIPad"('#IPadPro OR #ipadpro OR #IPADPRO OR
IPadPro -#IPad -IPad -#Pro -Pro -AppleIPad', 1500, null, null, null, null, null,
null);
```

Now we will save this query. Save the query under gbi-student-010. Name of the query should be IPADPRO_GETRESULT_010.sql.



Now execute the query by clicking on Run button.



The success message will come.

```

1 010* SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null));

```

Now editing: SQL FILE /gbi-student-010/IPADPRO_GETRESULT_010.sql - Current Schema: GBI_010
v1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) | ○

10:16 PM (SQL Editor) Could not execute 'SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null))'; exception 151020: Attempt to access past end of statement (error) 2040: column store error. [Error 151020] executor: plan operation failed;Cannot execute remote function call.:-->executeCall: exception 151020: Attempt to access past end of statement (error) 2040: column store error. [Error 151020]
3:23:14 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets_IPadPro' successfully
3:26:12 PM (SQL File) File 'IPADPRO_GETRESULT_010.sql' has been saved.
3:29:07 PM (Catalog) Table 'Tweets' has been updated.
3:29:53 PM (Catalog) Could not execute 'UPDERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null))';
3:30:51 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweetsIPad' successfully
3:31:09 PM (SQL Editor) Statement 'UPDERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null))';
successfully executed in 6867 ms - Rows Affected: 1500

Right click on the table and select Open Content.

```

1 010* SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null));

```

Now editing: SQL FILE /gbi-student-010/IPADPRO_GETRESULT_010.sql - Current Schema: GBI_010
v1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) | ○

10:16 PM (SQL Editor) Could not execute 'SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null))'; exception 151020: Attempt to access past end of statement (error) 2040: column store error. [Error 151020] executor: plan operation failed;Cannot execute remote function call.:-->executeCall: exception 151020: Attempt to access past end of statement (error) 2040: column store error. [Error 151020]
3:23:14 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweets_IPadPro' successfully
3:26:12 PM (SQL File) File 'IPADPRO_GETRESULT_010.sql' has been saved.
3:29:07 PM (Catalog) Table 'Tweets' has been updated.
3:29:53 PM (Catalog) Could not execute 'UPDERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null))';
3:30:51 PM (Catalog) Created new virtual function 'GBI_010"."GetSearchTweetsIPad' successfully
3:31:09 PM (SQL Editor) Statement 'UPDERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#iPadPro OR #ipadpro OR #IPADPRO OR iPadPro -#iPad -IPad -#Pro -#Pro -ApplePad", (500, null, null, null, null, null, null, null))';
successfully executed in 6867 ms - Rows Affected: 1500

The below given table will come:

SAP HANA Web-based Development Workbench: Catalog

Now editing: GBL_010/IPADPRO_010

1000 row(s) |

ID	SCREENNAME	TWEET	SOURCE	TRUNCATED	INREPLYTOST_ID	INREPLYTOUSER_ID	INREPLYTOSCREENNAME_ID
1	848633671049510918	JosephG77381850	RT @sophiaDSwright1: Union (2) <a href="http://twitter.cc	0	-1	-1	?
2	848633500718780416	JosephG77381850	RT @sophiaDSwright1: Calendar <a href="http://twitter.cc	0	-1	-1	?
3	848631551428403200	MarvelDCFan15	RT @StudioNICE: I bought an iP <a href="http://twitter.cc	0	-1	-1	?
4	848625404770164736	BrandonJHall07	Millennium era sketch #godzilla i <a href="http://twitter.cc	0	-1	-1	?
5	848626135965380693	NEWFOCUSPHOTOS	Going to give #lightroommobile a <a href="http://instagram.cc	0	-1	-1	?
6	848619775970484226	LauraJayArt	Work in progress ❤️ #Procreate # <a href="http://twitter.cc	0	-1	-1	?
7	84861907964815458	NansunguzaJ	RT @artinge: RT @johnstonwade: <a href="http://twitter.cc	0	-1	-1	?
8	848617402728316928	almalMool	RT @raphaelacoste: Procreate f <a href="http://twitter.cc	0	-1	-1	?
9	848617172792295290	amys_ganupa	ipadpro 12インチのしめ持つてな <a href="http://twitter.cc	0	-1	-1	?
10	84861689466461184	ph3mando	Agora a poma ficou sério 🍎 #iph <a href="http://instagram.cc	0	-1	-1	?
11	84861367917388294	Jessieferatu	alien cats probably don't come in <a href="http://instagram.cc	0	-1	-1	?
12	848613550377639941	atfrage	RT @johnstonwade: More fun wi <a href="http://www.hor	0	-1	-1	?
13	8486126454045501958	Lammona_	Amo tu manzana #ivedrawing # <a href="http://instagram.cc	0	-1	-1	?
14	848612124125429761	Saturday_am	VOTING ENDS 5pm est! One #f <a href="http://twitter.cc	1	-1	-1	?
15	84860963326614272	nameconeco	RT @umekautugi: 今日はちよつ <a href="http://twitter.cc	0	-1	-1	?

3:23:14 PM (Catalog) Created new virtual function 'GBL_010'.'GetSearchTweets_IPadPro' successfully
3:26:12 PM (SQL File) File 'IPADPRO_GETRESULT_010.sql' has been saved
3:28:07 PM (SQL Editor) Could not execute statement 'GRANT EXECUTE ON 'GBL_010''.'IPADPRO_010' TO 'GetSearchTweetsIPadPro' ('#IPadPro OR ...')
3:29:53 PM (SQL Editor) Could not execute 'USESET 'GBL_010'.'IPADPRO_010' SELECT * FROM 'GBL_010'.'GetSearchTweetsIPadPro' ('#IPadPro OR ...')
error= (error) 328 - invalid name of function or procedure. GetSearchTweetsIPadPro: line 1 col 55 (at pos 56)
3:30:22 PM (Catalog) (error) 328 - cannot use duplicate name of function or procedure. GetSearchTweetsIPadPro: line 1 col 34 (at pos 34)
3:31:08 PM (Catalog) Creating new virtual function 'GBL_010'.'GetSearchTweetsIPad' successfully
3:31:08 PM (SQL Editor) Statement 'CREATESET 'GBL_010'.'IPADPRO_010' SELECT * FROM 'GBL_010'.'GetSearchTweetsIPad' ('#IPadPro OR #ipadpro ...') successfully executed in 6667 ms - Rows Affected: 1598
3:36:36 PM (Data Preview) Table actions are not supported for 'GBL_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
3:36:36 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

4) Rate Limit Status table

Loading data using the Virtual Table

Go to the Editor and open the Provisioning and then go to Application. Right click on Rate_Limit_Status table and then select New Virtual Table.

SAP HANA Web-based Development Workbench: Catalog

Now editing: GBI_010/IPADPRO_010

Type to filter

ID	SCREENNAME	TWEET	SOURCE	TRUNCATED	INREPLYTOST...	INREPL	
1	848633671049510918	JosephG77381850	RT @sophiaDSwright1: Union (2017) (and Detail) Digital composition or	http://twitter.cc	0	-1	-1
2	84863350071870416	JosephG77381850	RT @sophiaDSwright1: Calendar Girl... April (2017) (and Detail) by sopi	http://twitter.cc	0	-1	-1
3	848631551428403200	MarvelDCFan15	RT @StudioNICE: I bought an iPadPro for drawing on the go. Naturally.	http://twitter.cc	0	-1	-1
4	848626404770164736	BrandonJHall07	Millennium era sketch. #godzilla #ipadpro #applepencil https://t.co/9vgl	http://twitter.cc	0	-1	-1
5	848626135965380609	NEWFOCUSPHOTOS	Going to give #lightroommobile a while tonight #ipadpro #macbook #iph	http://instagra	0	-1	-1
6	84861975970484226	LauraJayArt	Work in progress #Procreate #ipadpro https://t.co/obfwf9238N	http://twitter.cc	0	-1	-1
7	848619079648915458	NansinguaJ	RT @artinge: RT @johnstoneade: More fun with #artage on a Friday ✨	http://twitter.cc	0	-1	-1
8	848617402728316928	almallMool	RT @raphaelacoste: Procreate fun #ipadpro #Procreate #illustration ht	http://twitter.cc	0	-1	-1
9	848617172792299520	ama_ganupa	ipadpro 12インチのしき持てないか引き継ぎましたところで持つ運び	http://twitter.cc	0	-1	-1
10	848616899466461184	ph3mandu	Agora a pena foco sénti ♡ #phemando #phemandununes #nauticatu	http://instagra	0	-1	-1
11	848613659717388294	Jesferatu	allen cats can't come in peace #ipadpro #cat #alien #doodie	http://instagra	0	-1	-1
12	848613550377639941	atrage	RT @johnstoneade: More fun with #artage on a Friday afternoon with	http://www.hor	0	-1	-1
13	848612645045501953	Lamronna_	Amo tu manzana #Widrawing #art #procreateapp #applepencil #digital	http://instagra	0	-1	-1
14	848612124125429761	Saturday_am	VOTING ENDS 5pm est! One #fanart will win #ipadpro courtesy of @cc	http://twitter.cc	1	-1	-1
15	84860963326614272	nameconeco	RT @umeakutagi: 今日はちょっと休憩って#ipadproと#procreateで漫画か	http://twitter.cc	0	-1	-1

3:23:14 PM (Catalog) Created new virtual function 'GBI_010'.'GetSearchTweets_IPadPro' successfully
3:26:12 PM (SQL File) File 'IPADPRO_GETRESULT_010.sql' has been saved

3:28:07 PM (SQL Editor) Could not execute 'INSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro" ("#iPadPro OR ...'

3:29:53 PM (SQL Editor) Could not execute 'UPDATE "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro" ("#iPadPro OR ...'

3:30:22 PM (Catalog) (error) 328 - invalid name of function or procedure. GetSearchTweetsIPadPro: line 1 col 55 (at pos 95)

3:31:09 PM (SQL File) Statement 'IPADPRO_GETRESULT_010.sql' has been saved

3:31:09 PM (SQL Editor) Statement 'IPADPRO_010'.'GetSearchTweetsIPad' successfully executed in 6567 ms - Rows Affected: 1500

3:36:35 PM (Data Preview) Table actions are not supported for 'GBI_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time

3:36:36 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

805 PM 4/2/2017

Click on New Virtual Table, the pop up will come.

Choose the table name as Rate_Limit_Status_010.

SAP HANA Web-based Development Workbench: Catalog

Now editing: GBI_010/IPADPRO_010

Type to filter

ID	SCREENNAME	TWEET	SOURCE	TRUNCATED	INREPLYTOST...	INREPL	
1	848633671049510918	JosephG77381850	RT @sophiaDSwright1: Union (2017) (and Detail) Digital composition or	http://twitter.cc	0	-1	-1
2	84863350071870416	JosephG77381850	RT @sophiaDSwright1: Calendar Girl... April (2017) (and Detail) by sopi	http://twitter.cc	0	-1	-1
3	848631551428403200	MarvelDCFan15	RT @StudioNICE: I bought an iPadPro for drawing on the go. Naturally.	http://twitter.cc	0	-1	-1
4	848626404770164736	BrandonJHall07	Millennium era sketch. #godzilla #ipadpro #applepencil https://t.co/9vgl	http://twitter.cc	0	-1	-1
5	848626135965380609	NEWFOCUSPHOTOS	Going to give #lightroommobile a while tonight #ipadpro #macbook #iph	http://instagra	0	-1	-1
6	84861975970484226	LauraJayArt	Work in progress #Procreate #ipadpro https://t.co/obfwf9238N	http://twitter.cc	0	-1	-1
7	848619079648915458	NansinguaJ	RT @artinge: RT @johnstoneade: More fun with #artage on a Friday ✨	http://twitter.cc	0	-1	-1
8	848617402728316928	almallMool	RT @raphaelacoste: Procreate fun #ipadpro #Procreate #illustration ht	http://twitter.cc	0	-1	-1
9	848617172792299520	ama_ganupa	ipadpro 12インチのしき持てないか引き継ぎましたところで持つ運び	http://twitter.cc	0	-1	-1
10	848616899466461184	ph3mandu	Agora a pena foco sénti ♡ #phemando #phemandununes #nauticatu	http://instagra	0	-1	-1
11	848613659717388294	Jesferatu	allen cats can't come in peace #ipadpro #cat #alien #doodie	http://instagra	0	-1	-1
12	848613550377639941	atrage	RT @johnstoneade: More fun with #artage on a Friday afternoon with	http://www.hor	0	-1	-1
13	848612645045501953	Lamronna_	Amo tu manzana #Widrawing #art #procreateapp #applepencil #digital	http://instagra	0	-1	-1
14	848612124125429761	Saturday_am	VOTING ENDS 5pm est! One #fanart will win #ipadpro courtesy of @cc	http://twitter.cc	1	-1	-1
15	84860963326614272	nameconeco	RT @umeakutagi: 今日はちょっと休憩って#ipadproと#procreateで漫画か	http://twitter.cc	0	-1	-1

3:23:14 PM (Catalog) Created new virtual function 'GBI_010'.'GetSearchTweets_IPadPro' successfully
3:26:12 PM (SQL File) File 'IPADPRO_GETRESULT_010.sql' has been saved

3:28:07 PM (SQL Editor) Could not execute 'INSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro" ("#iPadPro OR ...'

3:29:53 PM (SQL Editor) Could not execute 'UPDATE "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro" ("#iPadPro OR ...'

3:30:22 PM (Catalog) (error) 328 - invalid name of function or procedure. GetSearchTweetsIPadPro: line 1 col 55 (at pos 95)

3:31:09 PM (SQL File) Statement 'IPADPRO_GETRESULT_010.sql' has been saved

3:31:09 PM (SQL Editor) Statement 'IPADPRO_010'.'GetSearchTweetsIPad' successfully executed in 6567 ms - Rows Affected: 1500

3:36:35 PM (Data Preview) Table actions are not supported for 'GBI_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time

3:36:36 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

807 PM 4/2/2017

The table will get created. Please find the screenshot below:

Table Name: Rate_Limit_Status_010 Schema: GBI_010 Type: VIRTUAL Source Name: GBI_10 Remote Object: Rate_Limit_Status_010

Name	SQL Data Type	Dim	Column Store Data Ty...	Key	Not Null	Default	Comment
1 endpoint	VARCHAR	1024					
2 limit	INTEGER						
3 remaining	INTEGER						
4 resetTimeInSeconds	INTEGER						
5 secondsUntilReset	INTEGER						

3:26:12 PM [SQL File] File "IPADPRO_GETRESULT_010.sql" has been saved.
3:28:07 PM [SQL Editor] Could not execute "INSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro"("#PadPro OR ..."
3:28:07 PM [SQL Editor] Create or replace function or procedure "GetSearchTweetsIPadPro"("#PadPro OR #10" pos 55 at pos 55)
3:28:07 PM [SQL Editor] Create or replace function or procedure "GetSearchTweetsIPadPro"("#PadPro OR #10" pos 55 at pos 55)
3:28:07 PM [SQL Editor] 320 - Invalid name of function or procedure "GetSearchTweetsIPadPro"("#PadPro OR ..."
3:29:53 PM [SQL Editor] Create or replace function or procedure "GetSearchTweetsIPadPro"("#PadPro OR #10" pos 55 at pos 55)
3:30:51 PM [Catalog] Created new virtual function "GBI_010"."GetSearchTweetsIPad" successfully
3:31:00 PM [SQL Editor] Statement "INSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#PadPro OR #ipadpro ..."
3:31:00 PM [SQL Editor] Successfully executed in 6567 ms - Rows Affected: 1500
3:36:35 PM [Data Preview] Table actions are not supported for "GBI_010"."IPADPRO_010". It just supports columns of some classification of data type as Character String, Numeric, Date and Time
3:36:36 PM [Data Preview] Result limited to 1000 row(s) due to value configured in the Catalog settings
3:37:51 PM [Catalog] Create new virtual table "GBI_010"."Rate_Limit_Status_010" successfully

Right click on the table and click Open Content.

Table Name: Rate_Limit_Status_010 Schema: GBI_010 Type: VIRTUAL Source Name: GBI_10 Remote Object: Rate_Limit_Status_010

Name	SQL Data Type	Dim	Column Store Data Ty...	Key	Not Null	Default	Comment
1 endpoint	VARCHAR	1024					
2 limit	INTEGER						
3 remaining	INTEGER						
4 resetTimeInSeconds	INTEGER						
5 secondsUntilReset	INTEGER						

3:26:12 PM [SQL File] File "IPADPRO_GETRESULT_010.sql" has been saved.
3:28:07 PM [SQL Editor] Could not execute "INSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPadPro"("#PadPro OR ..."
3:28:07 PM [SQL Editor] Create or replace function or procedure "GetSearchTweetsIPadPro"("#PadPro OR #10" pos 55 at pos 55)
3:28:07 PM [SQL Editor] Create or replace function or procedure "GetSearchTweetsIPadPro"("#PadPro OR #10" pos 55 at pos 55)
3:28:07 PM [SQL Editor] 320 - Invalid name of function or procedure "GetSearchTweetsIPadPro"("#PadPro OR ..."
3:29:53 PM [SQL Editor] Create or replace function or procedure "GetSearchTweetsIPadPro"("#PadPro OR #10" pos 55 at pos 55)
3:30:51 PM [Catalog] Created new virtual function "GBI_010"."GetSearchTweetsIPad" successfully
3:31:00 PM [SQL Editor] Statement "INSERT "GBI_010"."IPADPRO_010" SELECT * FROM "GBI_010"."GetSearchTweetsIPad"("#PadPro OR #ipadpro ..."
3:31:00 PM [SQL Editor] Successfully executed in 6567 ms - Rows Affected: 1500
3:36:35 PM [Data Preview] Table actions are not supported for "GBI_010"."IPADPRO_010". It just supports columns of some classification of data type as Character String, Numeric, Date and Time
3:36:36 PM [Data Preview] Result limited to 1000 row(s) due to value configured in the Catalog settings
3:37:51 PM [Catalog] Create new virtual table "GBI_010"."Rate_Limit_Status_010" successfully

The table will come as given below:

The screenshot shows the SAP HANA Web-based Development Workbench interface. The left sidebar displays a catalog structure with various schema and table entries. The main area shows a table named 'IPADPRO_010' with the following data:

endpoint	limit	remaining	resetTimeInSeconds	secondsUntilReset
/application/rate_limit_status	180	179	1491183189	899
/account/settings	15	15	1491183189	899
/search/tweets	180	180	1491183189	899
/statuses/home_timeline	15	15	1491183189	899
/statuses/user_timeline	900	900	1491183189	899

A message at the bottom of the screen indicates that the file 'IPADPRO_GETRESULT_010.sql' has been saved. The command history shows several SQL statements being executed, including the creation of the virtual function 'GetSearchTweetsIPad' and the table 'Rate_Limit_Status_010'.

In the result table you can see various rate limits. The column "endpoint" contains the type of data for that you call the Twitter API. The column "limit" contains the number of calls you are allowed to do for that type. The column "remaining" contains the number of remaining calls you have. The column "secondsUntilReset" contains the time in seconds until your remaining calls are reset to the rate limit.

In this case you can see that you have just called the function "application/rate_limit_status" once, when opening this table to look up your rate limit.

Now right click on IPADPRO_010 table and choose open content again.

SAP HANA Web-based Development Workbench: Catalog

Now viewing: COLUMN TABLE: GBL_010/IPADPRO_010

Table Name: IPADPRO_010 Schema: GBL_010 Type: COLUMN Open Center

Columns

	Name	SQL Data Type	Dim	Column Store Data T...	Key	Not Null	Default	Comment
1	ID	BIGINT		FIXED	(X1)	X		
2	SCREENNAME	NVARCHAR	256	STRING				
3	TWEET	NVARCHAR	256	STRING				
4	SOURCE	NVARCHAR	256	STRING				
5	TRUNCATED	TINYINT		INT				
6	INREPLYTOSTATUSID	BIGINT		FIXED				
7	INREPLYTOUSERID	BIGINT		FIXED				
8	INREPLYTOSCREENNAME	NVARCHAR	256	STRING				
9	FAVORITED	TINYINT		INT				
10	RETWEETED	TINYINT		INT				
11	FAVORITECOUNT	INTEGER		INT				
12	RETWEET	TINYINT		INT				
13	RETWEETCOUNT	INTEGER		INT				
14	RETWEETEDBYME	TINYINT		INT				

Error: (Driver) 220 - Invalid name of function or procedure. GetSearchTweetsPadPro. Time 1 col 59 (at pos 59)
 1:29:53 PM (SQL Editor) Could not execute: UPDATER "GBL_010"."IPADPRO_010" SELECT * FROM "GBL_010"."GetSearchTweetsPadPro"("#iPadPro_0R ..."'.
 Error: (Driver) 320 - Invalid name of function or procedure. GetSearchTweetsPadPro. Time 1 col 59 (at pos 59)
 3:30:22 PM (Catalog) (driver) 320 - cannot use duplicate name of function or procedure. GetSearchTweets. Time 1 col 34 (at pos 34)
 3:30:51 PM (Catalog) Created new virtual function "GBL_010".GetSearchTweetsPadPro successfully
 3:31:09 PM (SQL File) F110 "IPADPRO_GETRESULT_010.sql" has been saved.
 3:31:10 PM (Catalog) Statement "IPADPRO_010" successfully executed in 6567 ms - Rows Affected: 1598
 3:31:36 PM (Data Preview) Table actions are not supported for 'GBL_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
 3:36:36 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings
 3:37:51 PM (Catalog) Create new virtual table "GBL_010"."Rate_Limit_Status_010" successfully
 3:31:15 PM (Data Preview) Table actions are not supported for 'GBL_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
 3:31:16 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

8:32 PM 4/2/2017

The content will open as given below:

SAP HANA Web-based Development Workbench: Catalog

Now editing: GBL_010/IPADPRO_010

Type to filter

ID	SCREENNAME	TWEET	SOURCE	TRUNCATED	INREPLYTOSTATUSID	INREPLYTOUSERID	INREPLYTOSCREENNAME	FAVORITED	RETWEETED	FAVORITECOUNT	RETWEET	RETWEETCOUNT	RETWEETEDBYME	
1	848633671049510918	JosephG77381850	RT @sophiaDSwiftt: <a href="http://twitter.cc	0	-1	-1				?	0			
2	848633300718780416	JosephG77381850	RT @sophiaDSwiftt: <a href="http://twitter.cc	0	-1	-1				?	0			
3	848631551428403200	MarvelDCFan15	RT @StudioNICE : I bo	0	-1	-1				?	0			
4	848626404770164736	BrandonHall07	Millennium era sketch : <a href="http://twitter.cc	0	-1	-1				?	0			
5	848626135965380609	NEWMFOCUSPHOTOS	Going to give #lightroo	<a href="http://instagr	0	-1	-1			?	0			
6	848619775970484226	LauraJayArt	Work in progress ❤️#P	<a href="http://twitter.cc	0	-1	-1			?	0			
7	848619079648915458	NansinguzaJ	RT @airage: RT @joh	<a href="http://twitter.cc	0	-1	-1			?	0			
8	848617402728316928	almallMool	RT @raphaelacoste : P	<a href="http://twitter.cc	0	-1	-1			?	0			
9	84861712792299520	ama_ganupa	ipadpro 12 インチのしか	<a href="http://twitter.cc	0	-1	-1			?	0			
10	848616599465461184	ph3mandu	Agora a poma ficou séri	<a href="http://instagr	0	-1	-1			?	0			
11	848613679717388294	Jessferatu	alien cats probably don	<a href="http://instagr	0	-1	-1			?	0			
12	848613550377639941	artrage	RT @johnstoneade: M	<a href="http://www.ho	0	-1	-1			?	0			
13	848612645045051953	Lamtron...	Amo tu manzana #lived	<a href="http://instagr	0	-1	-1			?	0			
14	84861217425429761	Saturday_am	VOTING ENDS 5pm es	<a href="http://twitter.cc	1	-1	-1			?	0			
15	84860963266614272	nameconeco	RT @umekaiupu: 今日	<a href="http://twitter.cc	0	-1	-1			?	0			

Error: (Driver) 220 - Invalid name of function or procedure. GetSearchTweetsPadPro. Time 1 col 59 (at pos 59)
 1:29:53 PM (SQL Editor) Could not execute: UPDATER "GBL_010"."IPADPRO_010" SELECT * FROM "GBL_010"."GetSearchTweetsPadPro"("#iPadPro_0R ..."'.
 Error: (Driver) 320 - Invalid name of function or procedure. GetSearchTweetsPadPro. Time 1 col 59 (at pos 59)
 3:30:22 PM (Catalog) (driver) 320 - cannot use duplicate name of function or procedure. GetSearchTweets. Time 1 col 34 (at pos 34)
 3:30:51 PM (Catalog) Created new virtual function "GBL_010".GetSearchTweetsPadPro successfully
 3:31:09 PM (SQL File) F110 "IPADPRO_GETRESULT_010.sql" has been saved.
 3:31:36 PM (Data Preview) Table actions are not supported for 'GBL_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
 3:37:51 PM (Catalog) Create new virtual table "GBL_010"."Rate_Limit_Status_010" successfully
 3:31:15 PM (Data Preview) Table actions are not supported for 'GBL_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character String, Numeric, Date and Time
 3:31:16 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

8:33 PM 4/2/2017

Please open again the content of Rate_Limit_Status table. You will notice that the remaining call value is reduced to 178.

endpoint	limit	remaining	resetTimeInSeconds	secondsUntilReset
/application/rate_limit_status	180	178	1491183189	103
/account/settings	15	15	1491183965	899
/search/tweets	180	180	1491183965	899
/statuses/home_timeline	15	15	1491183965	899
/statuses/user_timeline	900	900	1491183965	899

Similarly, we will create a table for **Samsung Galaxy S 8**.

The create command will be:

```
CREATE COLUMN TABLE "GBI_010"."GALAXYS8_010" (Id BIGINT PRIMARY KEY,
ScreenName NVARCHAR(256), Tweet NVARCHAR(256), Source NVARCHAR(256),
Truncated TINYINT, InReplyToStatusId BIGINT, InReplyToUserId BIGINT,
InReplyToScreenName NVARCHAR(256), Favorited TINYINT, Retweeted TINYINT,
FavoriteCount INTEGER, Retweet TINYINT, RetweetCount INTEGER,
RetweetedByMe TINYINT, CurrentUserRetweetId BIGINT, PossiblySensitive
TINYINT, isoLanguageCode NVARCHAR(256), CreatedAt TIMESTAMP, Latitude
DOUBLE, Longitude DOUBLE, Country NVARCHAR(256), Place_name
NVARCHAR(256), Place_type NVARCHAR(256), UserId BIGINT, UserName
NVARCHAR(256), UserUrl NVARCHAR(256));
```

We will upload the data into this table with the help of **GetSearchTweets** virtual function which we have used to upload the Surface Pro 4 table.

Please find below the command to upload the data into Samsung Galaxy S 8 table:

```
UPSERT "GBI_010"."SURFACEPRO4_010" SELECT * FROM
"GBI_010"."GetSearchTweets"('#GalaxyS8 OR #galaxys84 OR #GALAXYS8 OR
```

GalaxyS8 -#Galaxy -#S8 -Galaxy -S8 -GalaxyS -#GalaxyS', 1500, null, null, null, null, null, null);

We will get the success message:

```
1:48:25 AM (SQL Editor) Statement 'UPSERT "GBI_010"."SURFACEPRO4_010" SELECT * FROM "GBI_010"."GetSearchTweets"("#GalaxyS8 OR ...' successfully executed in 5474 ms - Rows Affected: 1495
```

We will check the Rate_Limit_Status table. Please find below the screenshot:

	endpoint	limit	remaining	resetTimeInSeconds	secondsUntilReset
1	/application/rate_limit_status	180	179	1491203032	898
2	/account/settings	15	15	1491203032	898
3	/search/tweets	180	165	1491203000	866
4	/statuses/home_timeline	15	15	1491203032	898
5	/statuses/user_timeline	900	900	1491203032	898

You can see that the remaining calls for the endpoint “/search/tweets”, i.e. the Search API, are now set to 165. That means that the call you did to the Search API has consumed 15 calls. You can do 180 calls per 15 minutes to the Search API. If you wait for 878 seconds, your remaining limit will be reset to 180 again.

Please note: It is possible that the remaining calls are set to a different value in your case (e.g. 170).

5) Fulltext Index

Objective

Get familiar with the creation of fulltext indexes and preparation of Twitter data for further analysis.

We will create a Fulltext Index on the tables that have been filled with Twitter Data in the previous exercise. Then we will have a look at the analysis results that have been created with the fulltext index.

To create a fulltext index you need to execute a SQL statement. This creates a table containing the Sentiment Analysis results.

Open the Catalog of your system in a browser using the Web IDE.

<http://db1.hana2.ucc.uwm.edu:8002/sap/hana/ide/catalog/>

Open a SQL console and enter the following statement (replace 010 with your student id).

```
CREATE FULLTEXT INDEX "GBI_010"."IPadPro_Sentiment_010" ON "GBI_010"."IPADPRO_010" (TWEET)
TEXT ANALYSIS ON LANGUAGE COLUMN "ISOLANGUAGECODE"
LANGUAGE DETECTION ('EN', 'FR', 'DE', 'ES', 'ZH')
CONFIGURATION 'EXTRACTION_CORE_VOICEOFCUSTOMER';
```

This statement creates a fulltext index for column “Tweet” for the table GBI_010.IPADPRO_010. Because of the keywords “TEXT ANALYSIS ON” the system recognizes that you want to do text analysis.

After the keyword “CONFIGURATION” you can add different configuration options. As we want to analyze customers’ opinion about the iPad Pro and the Surface Pro 4, we add the option “EXTRACTION_CORE_VOICEOFCUSTOMER”.

The keyword “LANGUAGE COLUMN” identifies the column which holds a language indicator if available. If you use this addition the SAP HANA database can analyze data in various languages (e.g. English, German, Portuguese, Japanese and much more).

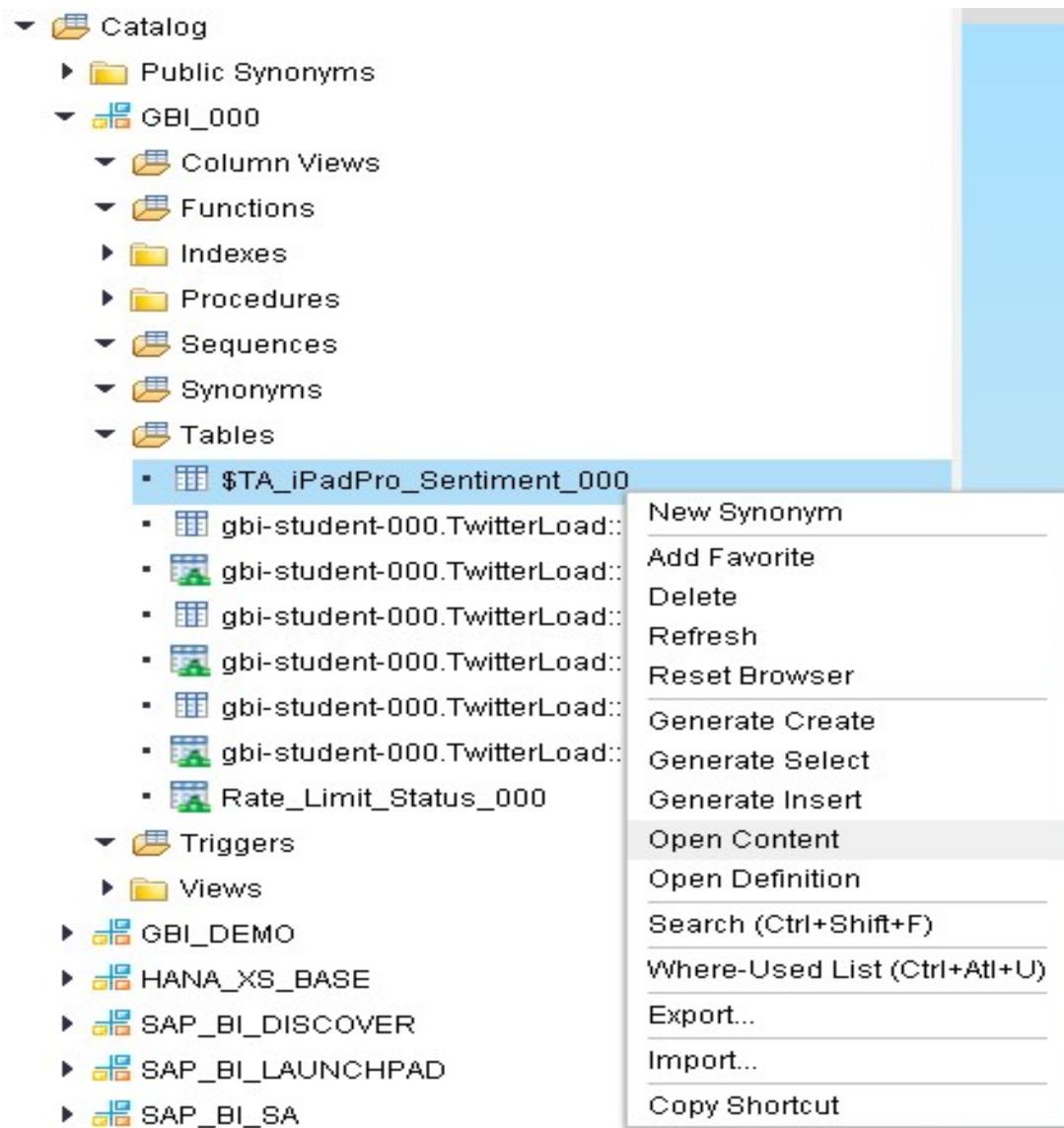
The keyword “LANGUAGE DETECTION” tells the preprocessor server to use the given languages for the analysis.

When executing the statement, the preprocessor server of the SAP HANA system searches for different keywords that identify to which sentiment a Tweet belongs.

Open the following path:

Catalog ▶ GBI_010 ▶ Tables

You can see that a new table with the name “\$TA_iPadPro_Sentiment_010” was created. The beginning “TA” stands for Text Analysis. The table itself contains the analysis results. Right click on the table and choose **Open Content**.



- New Synonym
Add Favorite
Delete
Refresh
Reset Browser
Generate Create
Generate Select
Generate Insert
Open Content
Open Definition
Search (Ctrl+Shift+F)
Where-Used List (Ctrl+Alt+U)
Export...
Import...
Copy Shortcut

The table contains a lot of different columns with different information that was found during analysis:

TA_COUNTER: This counter counts all tokens in a document. In our case a “document” is one row in the database because each row represents one Tweet.

TA_TOKEN: Represents the token that was identified. That can be only one word or more and depends on the type that was identified.

TA_LANGUAGE: Is the language code for the document, i.e. the language of the Tweet that was taken out of the original database table.

TA_TYPE: Contains the linguistic or semantic type of the token. The types of interest for us are for example “WeakPositiveSentiment”, “PositiveSentiment”, “NegativeSentiment” or “MinorProblem” because these types tell us that the identified token is a sentiment, i.e. the opinions of the user who send the Tweet.

TA_CREATED_AT: Is the creation time of the index and only used for administrative tasks, e.g. database reorganization.

TA_OFFSET: Stores the offset of characters relative to the beginning of the document.

TA_PARENT: Stores the TA_COUNTER of the parent token. If it has no parent token the value is null. If, for example, a token that was identified includes two words, there can be two additional rows with the single words.

The screenshot shows the SAP HANA Web-based Development Workbench interface. On the left, the Catalog tree is visible, showing various schema objects like Public Synonyms, GBL_010, and tables such as STA_IpadPro_Sentiment_010. The main area displays a table editor for the STA_IpadPro_Sentiment_010 table. The table has columns: ID, TA_RULE, TA_COUNTER, TA_TOKEN, TA_LANGUAGE, TA_TYPE, TA_NORMALIZED, and TA_STEM. The data shows 15 rows of sentiment analysis results for the term "iPad Pro". The bottom pane shows the SQL command used to create the fulltext index and its execution log.

ID	TA_RULE	TA_COUNTER	TA_TOKEN	TA_LANGUAGE	TA_TYPE	TA_NORMALIZED	TA_STEM
1	Entity Extraction	1	@hi_tu_	ja	SOCIAL_MEDIAID_TV	?	?
2	Entity Extraction	2	to	ja	NOUN_GROUP	?	?
3	Entity Extraction	1	@umekautugi	ja	SOCIAL_MEDIAID_TV	?	?
4	Entity Extraction	2	https://t.co/P7UTBUVPr	ja	URI/URL	?	?
5	Entity Extraction	1	dynabook	ja	PRODUCT	?	?
6	Entity Extraction	2	4日お知らせ	ja	NOUN_GROUP	?	?
7	Entity Extraction	3	https://t.co/WYUmuoq	ja	URI/URL	?	?
8	Entity Extraction	1	#ipadpro	ja	SOCIAL_MEDIA/TOPIC	?	?
9	Entity Extraction	2	ApplePencil	ja	SOCIAL_MEDIA/TOPIC	?	?
10	Entity Extraction	3	precreate	ja	SOCIAL_MEDIA/TOPIC	?	?
11	Entity Extraction	4	https://t.co/aTuNa3JQs	ja	URI/URL	?	?
12	Entity Extraction	1	@umekautugi	ja	SOCIAL_MEDIAID_TV	?	?
13	Entity Extraction	2	https://t.co/P7UTBUVPr	ja	URI/URL	?	?
14	Entity Extraction	1	@umekautugi	ja	SOCIAL_MEDIAID_TV	?	?
15	Entity Extraction	2	https://t.co/P7UTBUVPr	ja	URI/URL	?	?

```

11:26:37 PM (Content Persistence) Could not restore tab since editor was not restorable.
11:26:37 PM (Content Persistence) Could not restore tab since editor was not restorable.
11:26:37 PM (Content Persistence) Could not restore tab since editor was not restorable.
11:26:54 PM (Data Preview) Table actions are not supported for 'GBL_010'.'SURFACEPRO4_010'. It just supports columns of some classification of data type as Character, Numeric, Date and Time.
11:26:56 PM (Data Preview) Table actions are not supported for 'GBL_010'.'IPADPRO_010'. It just supports columns of some classification of data type as Character, Numeric, Date and Time.
11:26:56 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings
11:26:47 PM (SQL File) File 'FULLTEXTIPADPRO.sql' has been saved.
11:28:16 PM (SQL Editor) Statement 'CREATE FULLTEXT INDEX 'GBL_010'.'IPADPRO_010' ('TWEET') TEXT ...' successfully executed in 1 s.
11:30:46 PM (Data Preview) Table actions are not supported for 'GBL_010'.'STA_IpadPro_Sentiment_010'. It just supports columns of some classification of data type as Character, Numeric, Date and Time.
11:30:46 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

```

If you have a deeper look into the data, you will recognize that the term “Pro” is sometimes recognized as a weak positive sentiment. Actually this is not a sentiment, but the second word of the term “iPad Pro”.

That means we have to find a way how to tell the SAP HANA database, that “iPad Pro” is the name of a product.

Now, repeat the aforementioned steps to create a Fulltext index for **Surface Pro 4**.

ID	TA_RULE	TA_COUNTER	TA_TOKEN	TA_LANGUAGE	TA_TYPE	TA_NORMALIZ.	TA_STEM
1	846986183880196096	Entity Extraction	1	@Gletscher_Wings	ja	SOCIAL_MEDIA/ID_TV	?
2	847136647770755074	Entity Extraction	1	RT	en	ORGANIZATION/MEDI	?
3	847136647770755074	Entity Extraction	2	gregsedwards	en	SOCIAL_MEDIA/ID_TV	?
4	847136647770755074	Entity Extraction	3	#Sketchable	en	SOCIAL_MEDIA/TOPIC	?
5	847136647770755074	Entity Extraction	4	#SurfacePro4	en	SOCIAL_MEDIA/TOPIC	?
6	847136647770755074	Entity Extraction	5	Beast	en	SOCIAL_MEDIA/TOPIC	?
7	847136647770755074	Entity Extraction	6	https://t.co/solvEH5oV	en	URI/URL	?
8	847136647770755074	Entity Extraction	7	https://t.co/jZB9OVAg	en	URI/URL	?
9	847114096298278912	Entity Extraction	1	@nash_reloaded	ja	SOCIAL_MEDIA/ID_TV	?
10	847114096298278912	Entity Extraction	2	#五月雨	ja	SOCIAL_MEDIA/TOPIC	?
11	847114096298278912	Entity Extraction	3	桜これ	ja	SOCIAL_MEDIA/TOPIC	?
12	847114096298278912	Entity Extraction	4	SurfacePro4	ja	SOCIAL_MEDIA/TOPIC	?
13	847114096298278912	Entity Extraction	5	https://t.co/UfjoaAK3f	ja	URI/URL	?
14	847113052763799552	Entity Extraction	1	@nash_reloaded	ja	SOCIAL_MEDIA/ID_TV	?
15	847113052763799552	Entity Extraction	2	#五月雨	ja	SOCIAL_MEDIA/TOPIC	?

(Data Preview) Table actions are not supported for 'GBI_010'."\$TA_SurfacePro4_Sentiment_010". It just supports columns of some classification of data type as Character String, Numeric, Date and Time. (Data Preview) Table actions are not supported for 'GBI_010'."IPADPRO_010". It just supports columns of some classification of data type as Character String, Numeric, Date and Time
11:26:56 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings
11:26:47 PM (SQL Editor) File 'FULLTEXTINDEXP04.sql' has been saved.
11:28:16 PM (SQL Editor) Statement 'CREATE FULLTEXT INDEX "GBI_010"."IPadPro_Sentiment_010" ON "GBI_010"."IPADPRO_010" (TWEET) TEXT ...' successfully executed in 21 ms.
11:30:40 PM (Data Preview) Table actions are not supported for 'GBI_010'."\$TA_IPadPro_Sentiment_010"; It just supports columns of some classification of data type as Character String, Numeric, Date and Time. (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings
11:32:04 PM (SQL Editor) File 'ST1_FullTextSurfacePro4.sql' has been saved.
11:35:11 PM (SQL Editor) Statement 'CREATE FULLTEXT INDEX "GBI_010"."SurfacePro4_Sentiment_010" ON "GBI_010"."SURFACEPRO4_010" (TWEET) ...' successfully executed in 26 ms.
11:35:29 PM (Data Preview) Table actions are not supported for 'GBI_010'."\$TA_SurfacePro4_Sentiment_010"; It just supports columns of some classification of data type as Character String, Numeric, Date and Time. (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings
11:35:30 PM (Data Preview) Result limited to 1000 row(s) due to value configured in the Catalog settings

If you carefully study the data, you will recognize that the term “Surface Pro” or “Surface Pro 4” is recognized as a topic but should be recognized as a product.

That means we have to find a way how to tell the SAP HANA database, that “Surface Pro 4” is the name of a product.

Custom Dictionary

The iPad Pro and the Surface Pro 4 are not reliably identified as products. We have to find a solution for that problem. We can resolve that issue by adding a custom dictionary for unknown terms in the SAP HANA system.

Open the Editor of your system in a browser using the Web IDE.

<http://db1.hana2.ucc.uwm.edu:8002/sap/hana/ide/editor/>

To create a custom dictionary, you need a folder to store all necessary configuration files.

Right click on your package “gbi-student-010” and create a new package with the name “CustomDictionaries”.

Create Package

Package name:	CustomDictionaries
Description:	
Responsible:	
Original Language:	

Create **Cancel**

Now right click on the new package and choose

New ► File

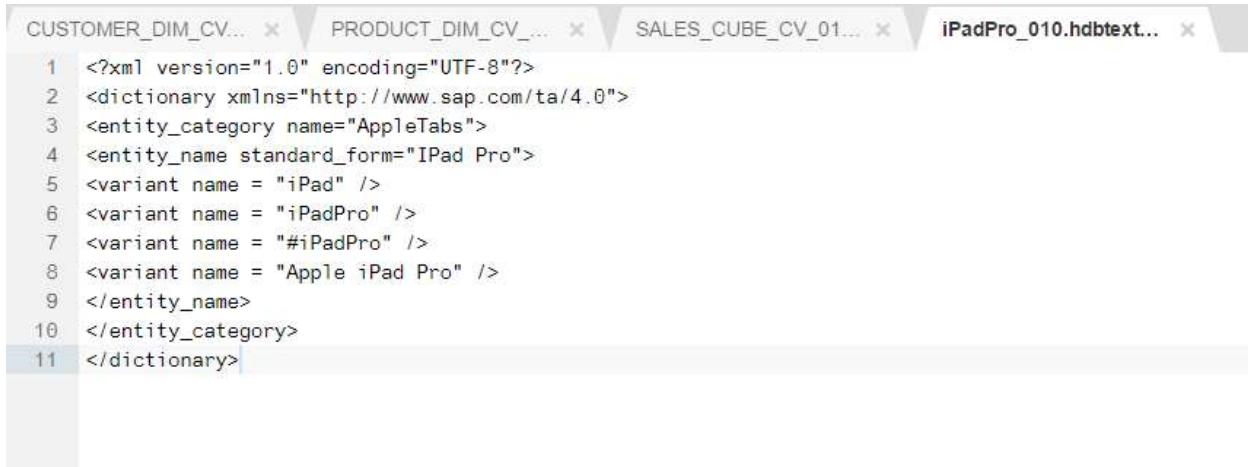
As a file extension for custom dictionaries, you generally enter ".hdbtextdict". Furthermore, a convention is to add the language of the dictionary in the beginning of the file name, separated by a hyphen. If you don't add any language, the file will be used for all languages. First we want to create a custom dictionary for the iPad Pro. Name the file "iPadPro_010.hdbtextdict".

Create File

File name:	iPadPro_000.hdbtextd
------------	----------------------

Create **Cancel**

The editor for the file will open. Write the following code into the editor:



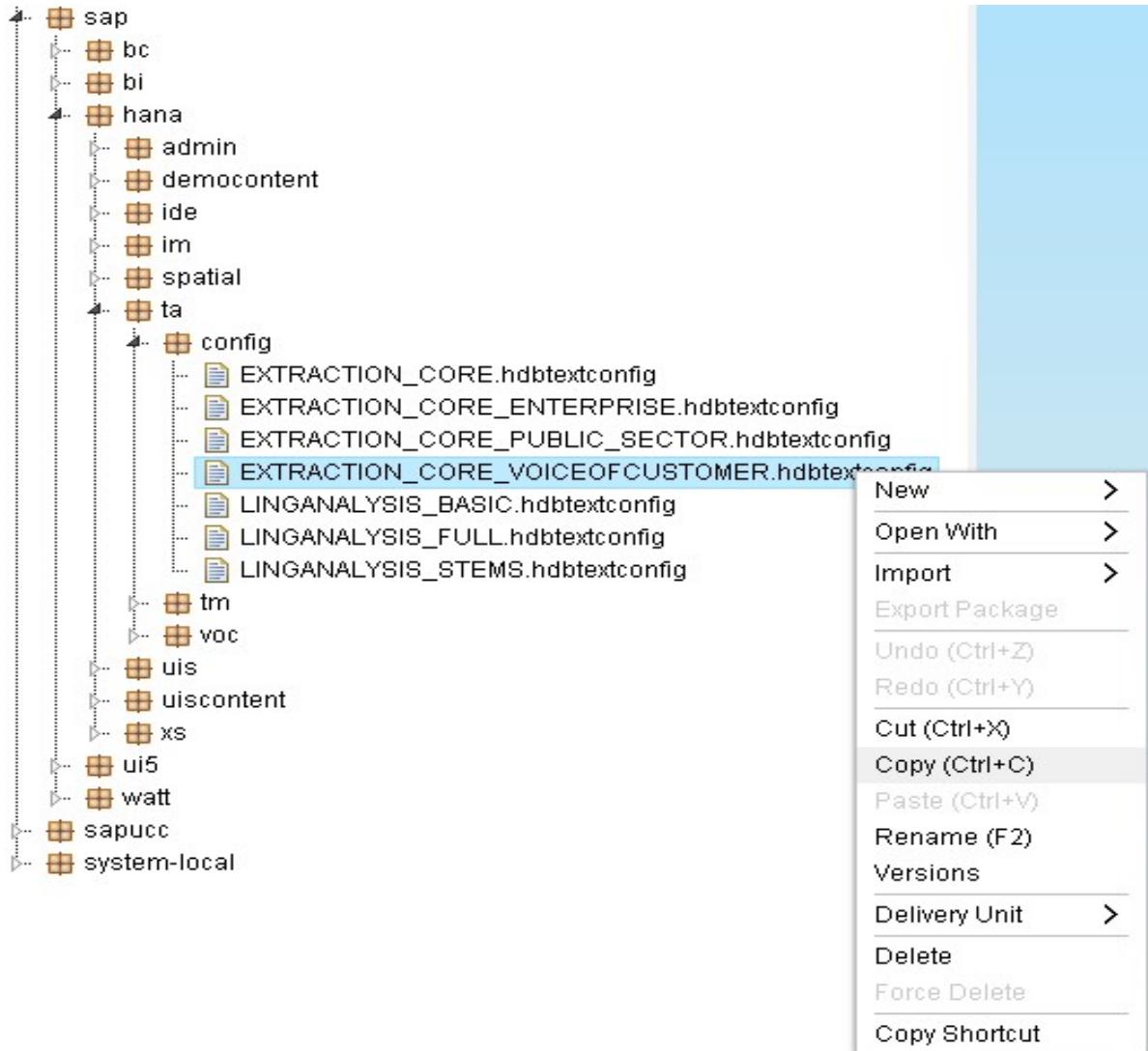
```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <dictionary xmlns="http://www.sap.com/ta/4.0">
3 <entity_category name="AppleTabs">
4 <entity_name standard_form="iPad Pro">
5 <variant name = "iPad" />
6 <variant name = "iPadPro" />
7 <variant name = "#iPadPro" />
8 <variant name = "Apple iPad Pro" />
9 </entity_name>
10 </entity_category>
11 </dictionary>
```

Save the file. It will be saved and activated on the server.

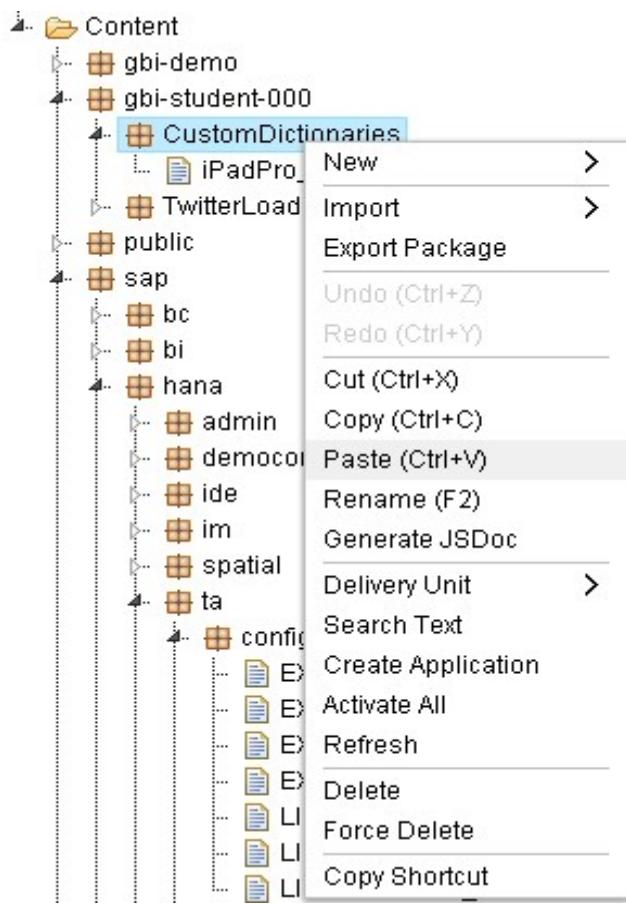
The next step is to create a configuration file for the analysis. The easiest way to do this is to copy a pre-delivered configuration. All configuration files that are pre-delivered when installing a SAP HANA system are stored under:

Content ► sap ► hana ► ta ► config

As we want to implement Sentiment Analysis, we choose the configuration file "EXTRACTION_CORE_VOICEOFCUSTOMER.hdbtextconfig". Right click on this file and choose Copy.

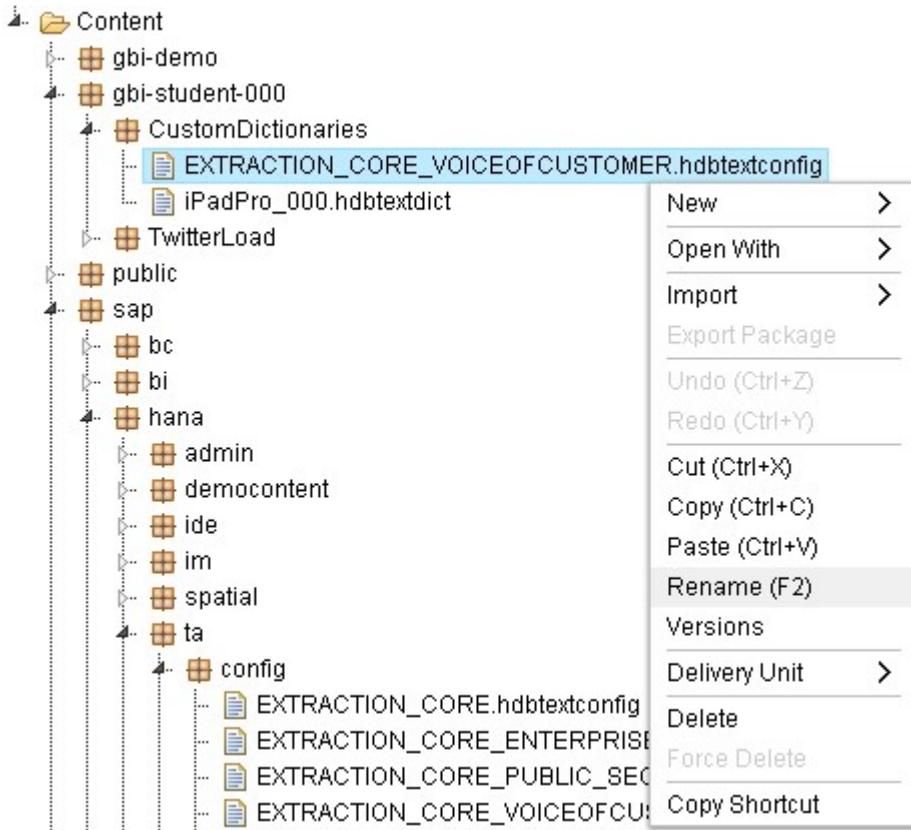


Right click on your package "CustomDictionaries" and click on Paste.



Now you have a copy of the configuration file to which you can add your custom dictionary, but first we want to give the new file a sensible name.

Right click on the file "EXTRACTION_CORE_VOICEOFCUSTOMER.hdbtextconfig" and choose Rename.



As we want to use the configuration for both analysis, name it "CustomConfig_010.hdbtextconfig".



Open this file and scroll down to the line with the dictionaries (that should be around line 135).

EXTRACTION_CORE_... ×

```
137
138 <!-- List of Text Analysis extraction dictionaries for Sentiment Analysis. -->
139 <property name="Dictionaries" type="string-list">
140   <string-list-value>english-tf-voc-AmbigProfanity.nc</string-list-value>
141   <string-list-value>english-tf-voc-UnambigProfanity.nc</string-list-value>
142   <string-list-value>french-tf-voc-AmbigProfanity.nc</string-list-value>
143   <string-list-value>french-tf-voc-UnambigProfanity.nc</string-list-value>
144   <string-list-value>german-tf-voc-AmbigProfanity.nc</string-list-value>
145   <string-list-value>german-tf-voc-UnambigProfanity.nc</string-list-value>
146   <string-list-value>italian-tf-voc-AmbigProfanity.nc</string-list-value>
147   <string-list-value>italian-tf-voc-UnambigProfanity.nc</string-list-value>
148   <string-list-value>portuguese-tf-voc-AmbigProfanity.nc</string-list-value>
149   <string-list-value>portuguese-tf-voc-UnambigProfanity.nc</string-list-value>
150   <string-list-value>russian-tf-voc-AmbigProfanity.nc</string-list-value>
151   <string-list-value>russian-tf-voc-UnambigProfanity.nc</string-list-value>
152   <string-list-value>simplified-chinese-tf-voc-AmbigProfanity.nc</string-list-value>
153   <string-list-value>simplified-chinese-tf-voc-UnambigProfanity.nc</string-list-value>
154   <string-list-value>spanish-tf-voc-AmbigProfanity.nc</string-list-value>
155   <string-list-value>spanish-tf-voc-UnambigProfanity.nc</string-list-value>
156   <string-list-value>traditional-chinese-tf-voc-AmbigProfanity.nc</string-list-value>
157   <string-list-value>traditional-chinese-tf-voc-UnambigProfanity.nc</string-list-value>
158   <string-list-value>sap.hana.ta.voc::english-tf-voc-thesaurus.hdbtextdict</string-list-value>
159   <string-list-value>sap.hana.ta.voc::french-tf-voc-thesaurus.hdbtextdict</string-list-value>
160   <string-list-value>sap.hana.ta.voc::german-tf-voc-thesaurus.hdbtextdict</string-list-value>
161   <string-list-value>sap.hana.ta.voc::italian-tf-voc-thesaurus.hdbtextdict</string-list-value>
162   <string-list-value>sap.hana.ta.voc::portuguese-tf-voc-thesaurus.hdbtextdict</string-list-value>
163   <string-list-value>sap.hana.ta.voc::russian-tf-voc-thesaurus.hdbtextdict</string-list-value>
164   <string-list-value>sap.hana.ta.voc::simplified-chinese-tf-voc-thesaurus.hdbtextdict</string-list-value>
165   <string-list-value>sap.hana.ta.voc::spanish-tf-voc-thesaurus.hdbtextdict</string-list-value>
166   <string-list-value>sap.hana.ta.voc::traditional-chinese-tf-voc-thesaurus.hdbtextdict</string-list-value>
167 </property>
168 </configuration>
169
170 </tasdk-configuration>
171
```

Now, write the following code above the line "</property>":

```
<string-list-value>gbi-student-
# ##.CustomDictionaries:::iPadPro_##.hdbtextdict</string-
list-value>
```

```

*CustomConfig_000.h... ✘

137
138    <!-- List of Text Analysis extraction dictionaries for Sentiment Analysis. -->
139    <property name="Dictionaries" type="string-list">
140        <string-list-value>english-tf-voc-AmbigProfanity.nc</string-list-value>
141        <string-list-value>english-tf-voc-UnambigProfanity.nc</string-list-value>
142        <string-list-value>french-tf-voc-AmbigProfanity.nc</string-list-value>
143        <string-list-value>french-tf-voc-UnambigProfanity.nc</string-list-value>
144        <string-list-value>german-tf-voc-AmbigProfanity.nc</string-list-value>
145        <string-list-value>german-tf-voc-UnambigProfanity.nc</string-list-value>
146        <string-list-value>italian-tf-voc-AmbigProfanity.nc</string-list-value>
147        <string-list-value>italian-tf-voc-UnambigProfanity.nc</string-list-value>
148        <string-list-value>portuguese-tf-voc-AmbigProfanity.nc</string-list-value>
149        <string-list-value>portuguese-tf-voc-UnambigProfanity.nc</string-list-value>
150        <string-list-value>russian-tf-voc-AmbigProfanity.nc</string-list-value>
151        <string-list-value>russian-tf-voc-UnambigProfanity.nc</string-list-value>
152        <string-list-value>simplified-chinese-tf-voc-AmbigProfanity.nc</string-list-value>
153        <string-list-value>simplified-chinese-tf-voc-UnambigProfanity.nc</string-list-value>
154        <string-list-value>spanish-tf-voc-AmbigProfanity.nc</string-list-value>
155        <string-list-value>spanish-tf-voc-UnambigProfanity.nc</string-list-value>
156        <string-list-value>traditional-chinese-tf-voc-AmbigProfanity.nc</string-list-value>
157        <string-list-value>traditional-chinese-tf-voc-UnambigProfanity.nc</string-list-value>
158        <string-list-value>sap.hana.ta.voc::english-tf-voc-thesaurus.hdbtextdict</string-list-value>
159        <string-list-value>sap.hana.ta.voc::french-tf-voc-thesaurus.hdbtextdict</string-list-value>
160        <string-list-value>sap.hana.ta.voc::german-tf-voc-thesaurus.hdbtextdict</string-list-value>
161        <string-list-value>sap.hana.ta.voc::italian-tf-voc-thesaurus.hdbtextdict</string-list-value>
162        <string-list-value>sap.hana.ta.voc::portuguese-tf-voc-thesaurus.hdbtextdict</string-list-value>
163        <string-list-value>sap.hana.ta.voc::russian-tf-voc-thesaurus.hdbtextdict</string-list-value>
164        <string-list-value>sap.hana.ta.voc::simplified-chinese-tf-voc-thesaurus.hdbtextdict</string-list-value>
165        <string-list-value>sap.hana.ta.voc::spanish-tf-voc-thesaurus.hdbtextdict</string-list-value>
166        <string-list-value>sap.hana.ta.voc::traditional-chinese-tf-voc-thesaurus.hdbtextdict</string-list-value>
167        <string-list-value>gbi-student-000.CustomDictionaries::iPadPro_000.hdbtextdict</string-list-value>
168    </property>
169 </configuration>
170
171 </tasdk-configuration>

```

This adds your custom dictionary to the configuration. Save the file.

Now, repeat the aforementioned steps to create a custom dictionary for Surface Pro 4.

Save the file. It will be checked for any syntax errors and afterwards it will be activated on the SAP HANA system.

```
[17:07:59] File /gbi-student-000/CustomDictionaries/CustomConfig_000.hdbtextconfig saved & activated successfully.
```

Now you can use the configuration file to do an improved analysis on your twitter data.

To create the tables “\$TA_iPadPro_Sentiment_010” and “\$TA_SurfacePro4_Sentiment_010” you have to drop the fulltext index on the original tables first. To do this, go to the Catalog in the WebIDE of your SAP HANA system:

<http://db1.hana2.ucc.uwm.edu:8002/sap/hana/ide/catalog/>

Open a SQL console and execute the following statements. Make sure to replace 010 with your student id.

```
drop fulltext index "IPadPro_Sentiment_010";
drop fulltext index "SurfacePro4_Sentiment_010";
```

Then recreate the fulltext indexes with the following statements:

```
CREATE FULLTEXT INDEX "GBI_010"."IPadPro_Sentiment_010" ON "GBI_010"."IPADPRO_010" (TWEET)
TEXT ANALYSIS ON LANGUAGE COLUMN "ISOLANGUAGECODE"
LANGUAGE DETECTION ('EN', 'FR', 'DE', 'ES', 'ZH')
CONFIGURATION 'gbi-student-010.CustomDictionaries::CustomConfig_010';
```

```
CREATE FULLTEXT INDEX "GBI_010"."SurfacePro4_Sentiment_010" ON "GBI_010"."SURFACEPR04_010" (TWEET)
TEXT ANALYSIS ON LANGUAGE COLUMN "ISOLANGUAGECODE"
LANGUAGE DETECTION ('EN', 'FR', 'DE', 'ES', 'ZH')
CONFIGURATION 'gbi-student-010.CustomDictionaries::CustomConfig_010';
```

Data Cleaning

Delete terms from the result tables that are recognized as a sentiment, but are, in fact, a part of a product. These terms can, for example, contain the following expressions: "Pro:", "Pro –" or "Pro –".

Now the sentiments have been analyzed by the search engine. If you have a deeper look into the tables "\$TA_iPadPro_Sentiment_010" and "\$TA_iPadPro_Sentiment_010", you will recognize that the term "Pro" followed by signs like "-" or ":" is still categorized as "asSentiment". That is why we need to do some data cleansing to filter out wrong sentiments.

Open the Catalog of your system in a browser using the Web IDE.

<http://db1.hana2.ucc.uwm.edu:8002/sap/hana/ide/catalog/>

Go to Catalog ► GBI_010 ► Tables

and right click on the table "\$TA_iPadPro_Sentiment_010". Choose **Open Content**.

Click on the column "TA_TYPE" and enter "Weak" into the filter field. Press Enter.

The screenshot shows a search interface with two main columns: 'TA_TYPE' and 'TA_NORMAL'. Below each column is a dropdown menu with options: 'Sort Ascending', 'Sort Descending', and a 'Filter' field containing the value 'Weak'. A 'Columns' button is located at the bottom right of the interface.

The screenshot shows a database table with the following columns: ID, TA_RULE, TA_COUNTER, TA_TOKEN, TA_LANGUAGE, and TA_TYPE. The TA_TYPE column is highlighted with a red border. The data in the TA_TYPE column consists entirely of the value 'WeakPositiveSentiment'. The table has 8 rows, indexed from 793 to 972.

	ID	TA_RULE	TA_COUNTER	TA_TOKEN	TA_LANGUAGE	TA_TYPE
	793	Entity Extraction	7	fun	en	WeakPositiveSentiment
	805	Entity Extraction	7	fun	en	WeakPositiveSentiment
	828	Entity Extraction	7	fun	en	WeakPositiveSentiment
	846	Entity Extraction	7	fun	en	WeakPositiveSentiment
	923	Entity Extraction	5	fun	en	WeakPositiveSentiment
	947	Entity Extraction	8	fun	en	WeakPositiveSentiment
	955	Entity Extraction	7	fun	en	WeakPositiveSentiment
	972	Entity Extraction	7	fun	en	WeakPositiveSentiment

Open a SQL console and copy and paste the following statement. Make sure to replace 010 with your student id.

```
delete from "GBI_010"."$TA_IPadPro_Sentiment_010" where "TA_TOKEN" = 'fun' AND "TA_TYPE" = 'WeakPositiveSentiment';
```

If you now refresh the content view in the WebIDE, you will receive the information that there are no rows in the table containing TA_TOKEN as 'fun' and TA_TYPE as 'WeakPositiveSentiment'.

Sen... \$TA_SurfacePro4_Sentiment_010 \$TA_IPadPro_Sentiment_010 DROPUFULLTEXT.sql IPADPROFULLTEXTA... SURFACEPRO4FULL... \$TA_IPadPro_Sentiment_010 < >

Type to filter

	ID	TA_RULE	TA_COUNTER	TA_TOKEN	TA_LANGUAGE	TA_TYPE	TA_NORMALIZ...	TA_STEM
No data								

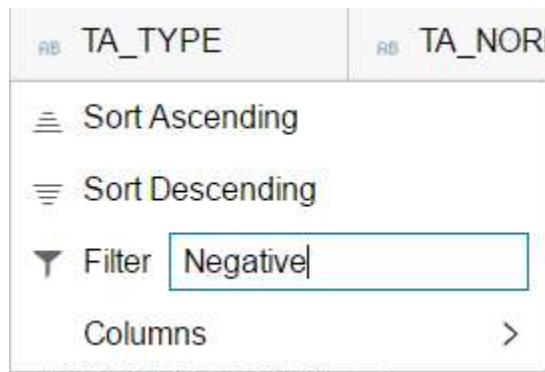
1:29:16 AM (SQL File) File "DELETESURFACEPRO4.sql" has been saved
1:29:20 AM (SQL Editor) Statement 'delete from "GBI_010"."\$TA_SurfacePro4_Sentiment_010" where ("TA_TOKEN" = 'terrible' OR "TA_TOKEN" ...'

Go to

Catalog ► GBI_000 ► Tables

and right click on the table "\$TA_SurfacePro4_Sentiment_010". Choose Open Content.

Click on the column "TA_TYPE" and enter "Weak" into the filter field. Press Enter.



The result will be:

	ID	TA_RULE	TA_COUNTER	TA_TOKEN	TA_LANGUAGE	TA_TYPE
455	846038035686936576	Entity Extraction	6	terrible	en	StrongNegativeSentiment
886	846861225317220352	Entity Extraction	2	wtf	en	StrongNegativeSentiment
905	846610439475650561	Entity Extraction	6	better	en	WeakNegativeSentiment

Open a SQL console and copy and paste the following statement. Make sure to replace 010 with your student id.

```
delete from "GBI_010"."$TA_SurfacePro4_Sentiment_010" where ("TA_TOKEN" = 'terrible' OR "TA_TOKEN" = 'wtf' OR "TA_TOKEN" = 'better')  
AND "TA_TYPE" IN ('WeakNegativeSentiment','StrongNegativeSentiment');
```

If you now refresh the content view in the WebIDE, you will receive the information that there are no rows in the table containing TA_TYPE as 'WeakNegativeSentiment' and 'StrongNegativeSentiment'.

Data Visualization Using SAP Lumira Server

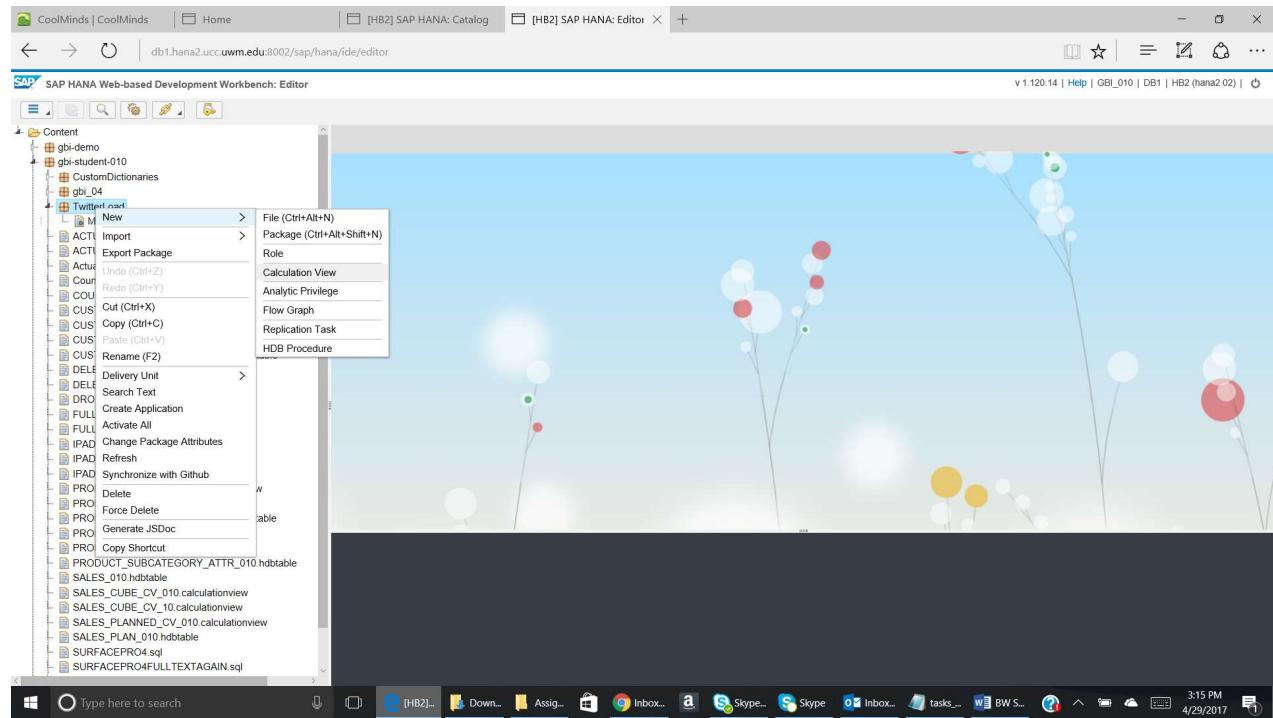
Objective

Get familiar with the data visualization capabilities of SAP Lumira Server.

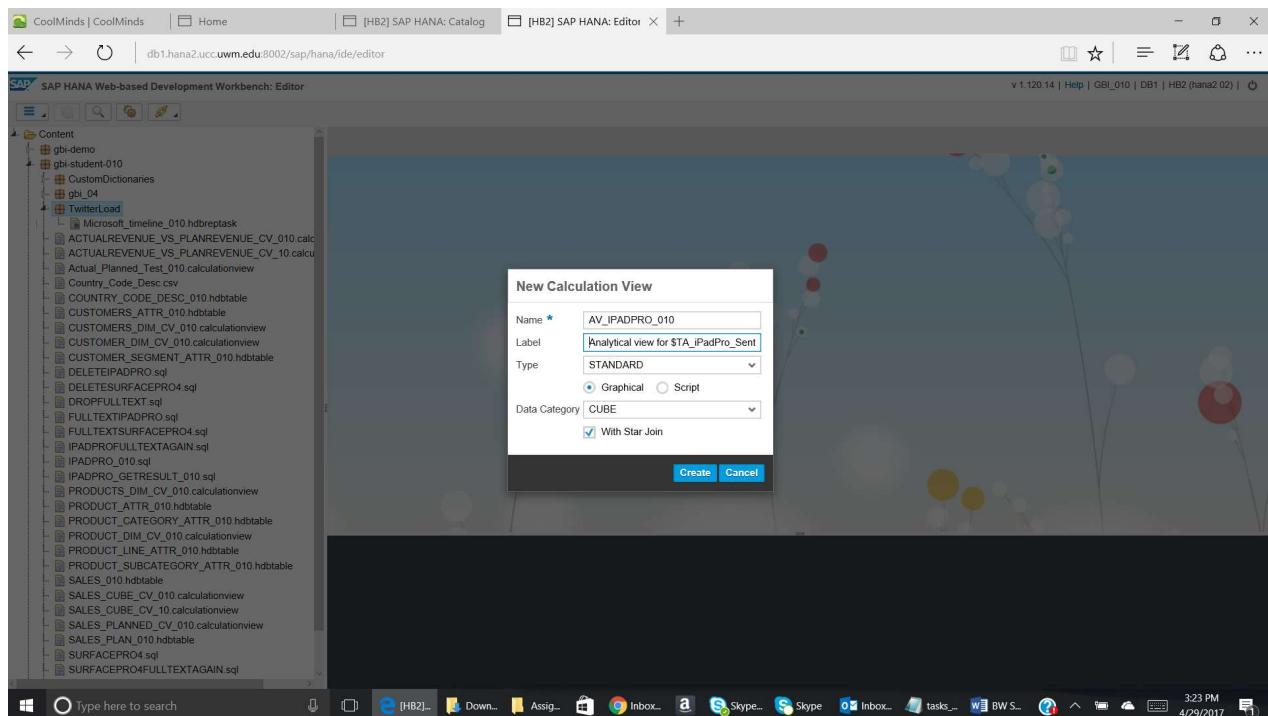
After having the Twitter data loaded and prepared for the Sentiment Analysis, production planner wants to present his findings to vice president operations. Production Planner knows that “a picture is worth a thousand words”, i.e. the best way to explain the findings is to present them graphically. Always striving for the best performance and newest technologies, he decides to use SAP Lumira Server for the visualization of the acquired data. As it provides multifarious possibilities to analyze and represent the data in an easy way.

1) Create an Analytic View

Go to the Editor and right click on TwitterLoad package.

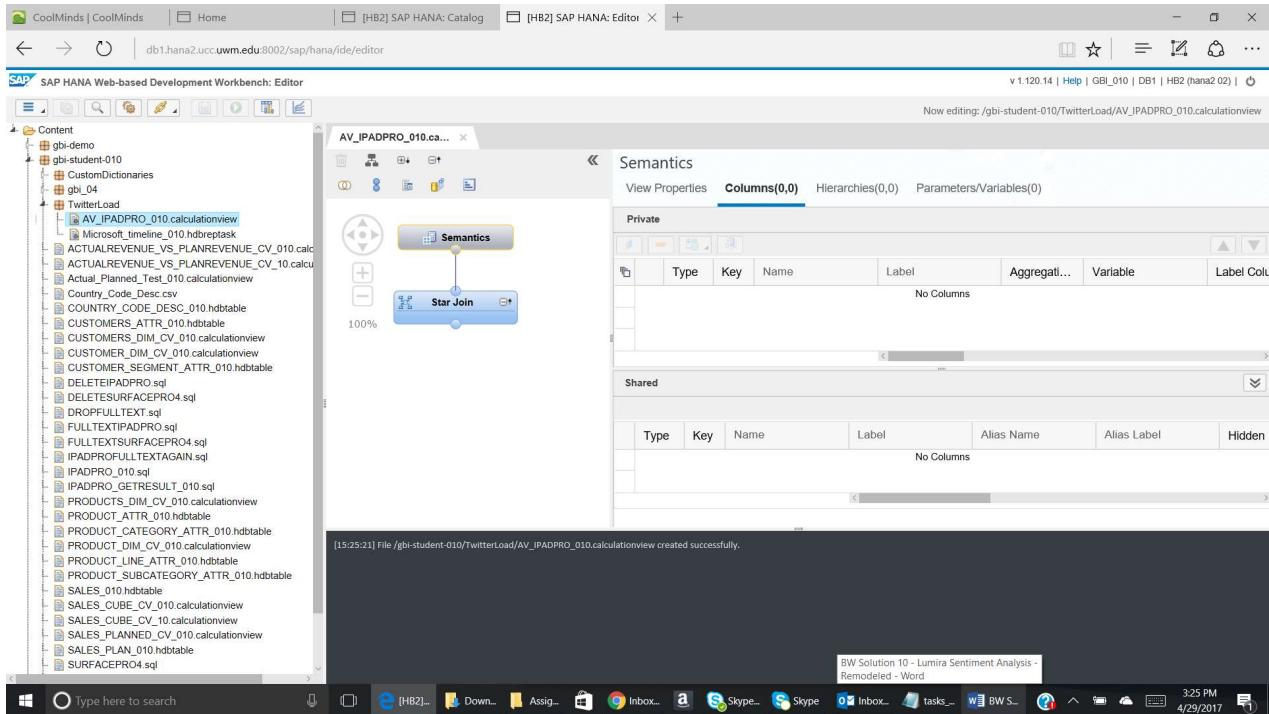


Choose New and then select Calculation View.

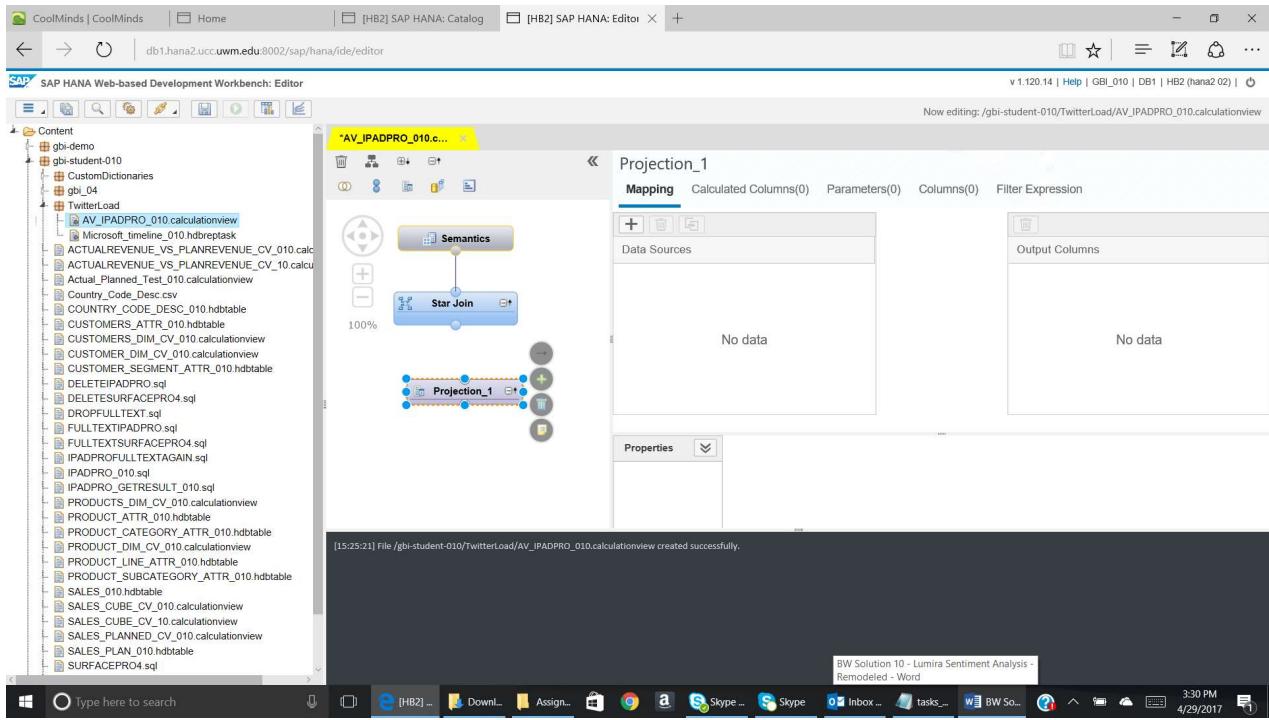


Enter the details in the pop up as given above. The name of the analytical view should be **AV_IPADPRO_010**. Click on Create.

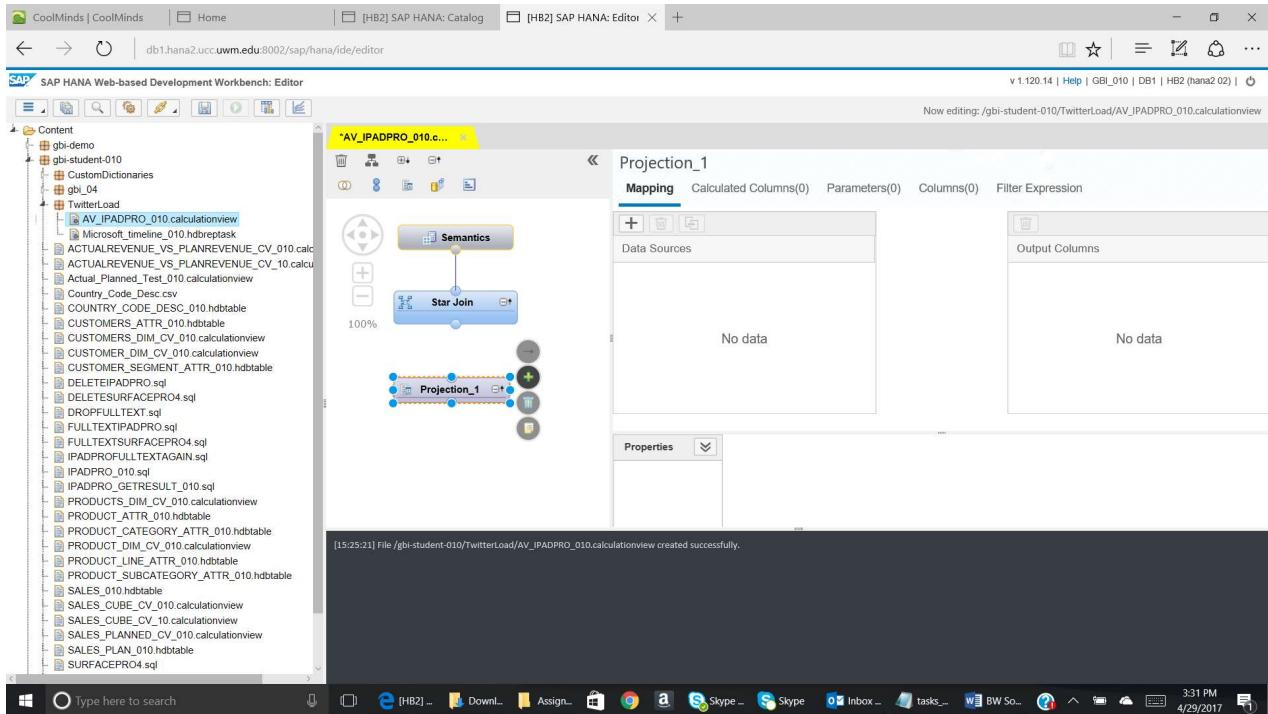
The analytical view will get created.



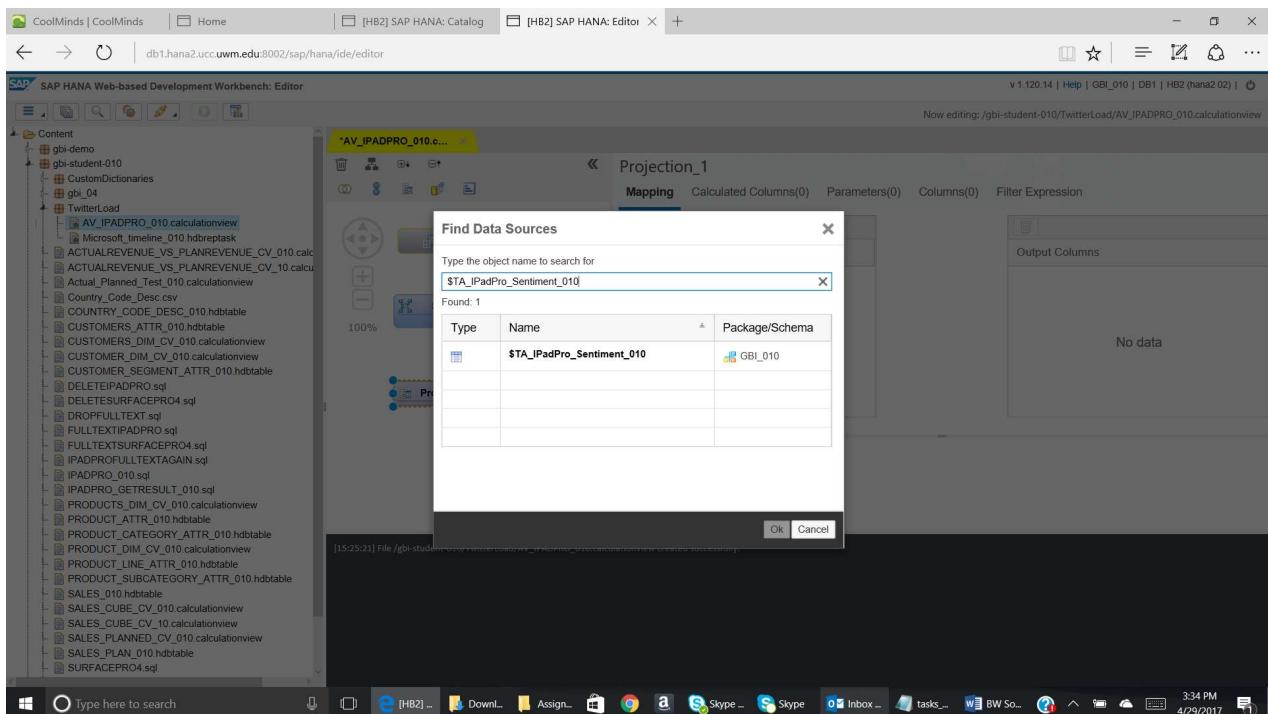
Drag the projection on to the canvas.



Click on the + sign on the projection.

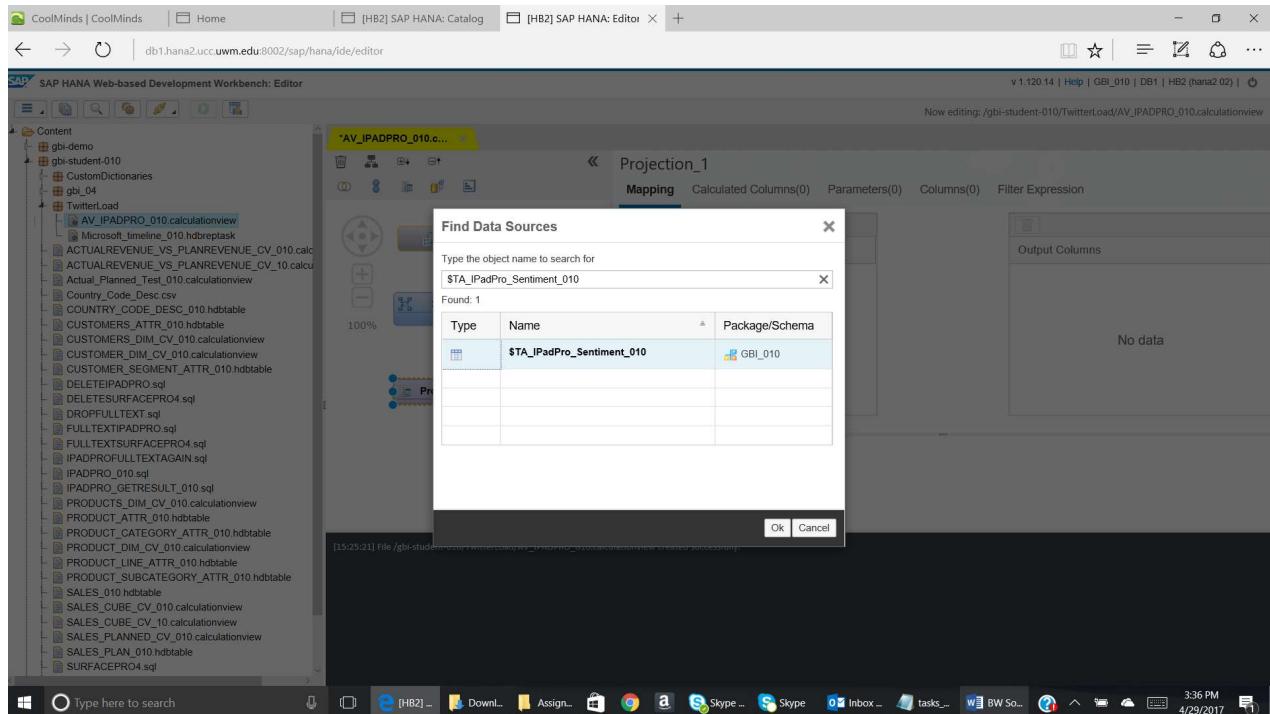


The below given popup will come:

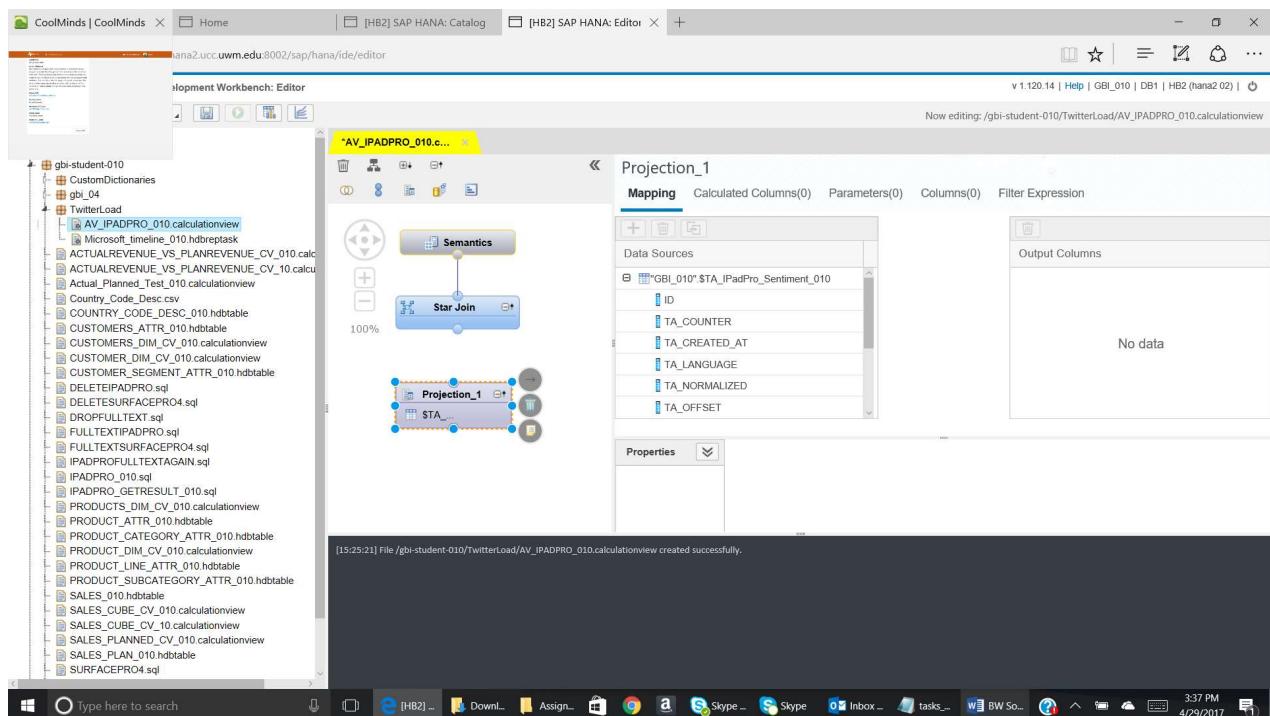


Search for the table - **\$TA_IPadPro_Sentiment_010** which we have created in Assignment 9.

Select the table and click on OK.



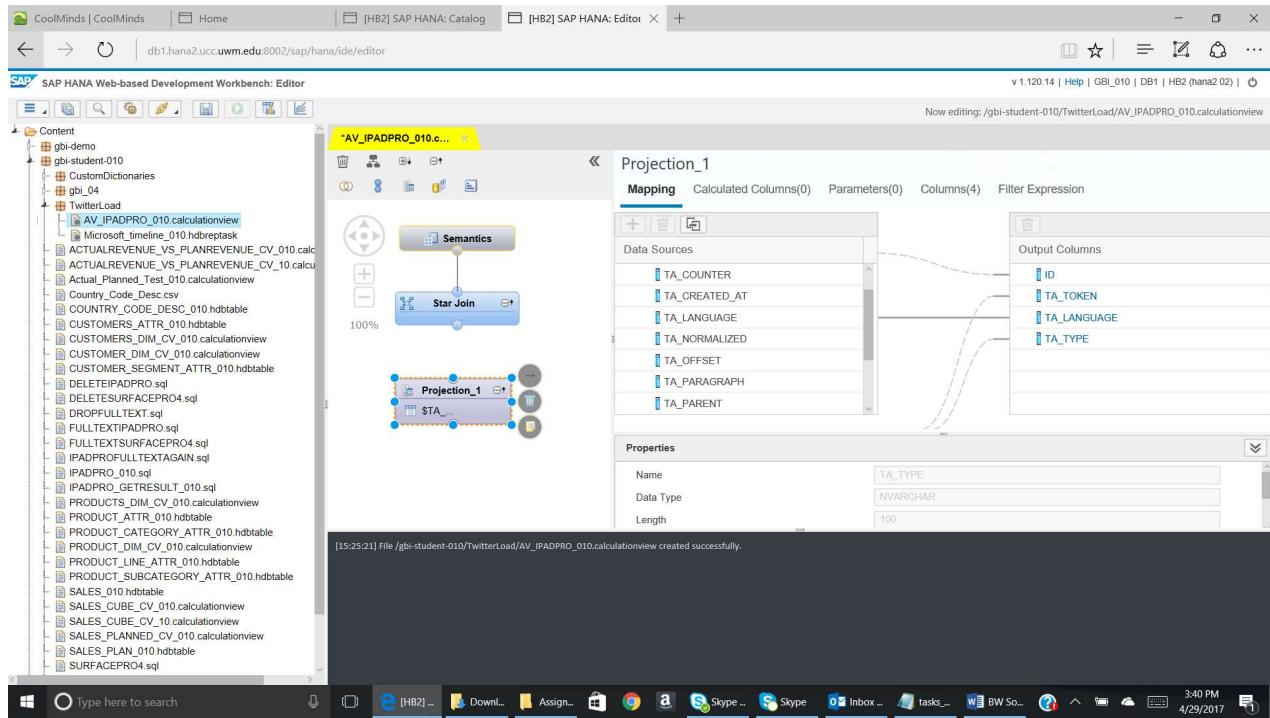
The below given pop up will come:



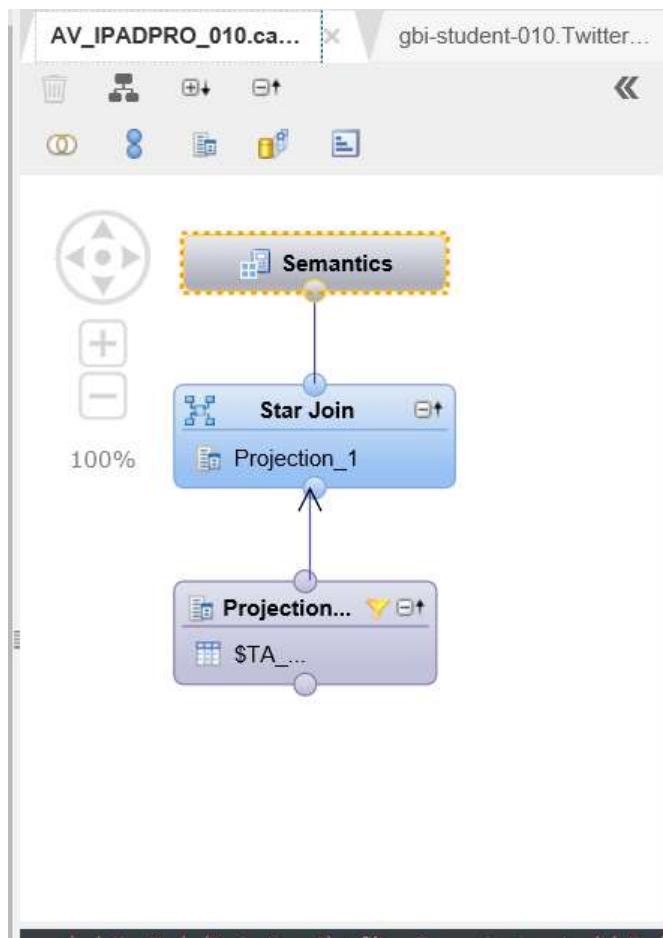
Add the following columns to the output:

- Id

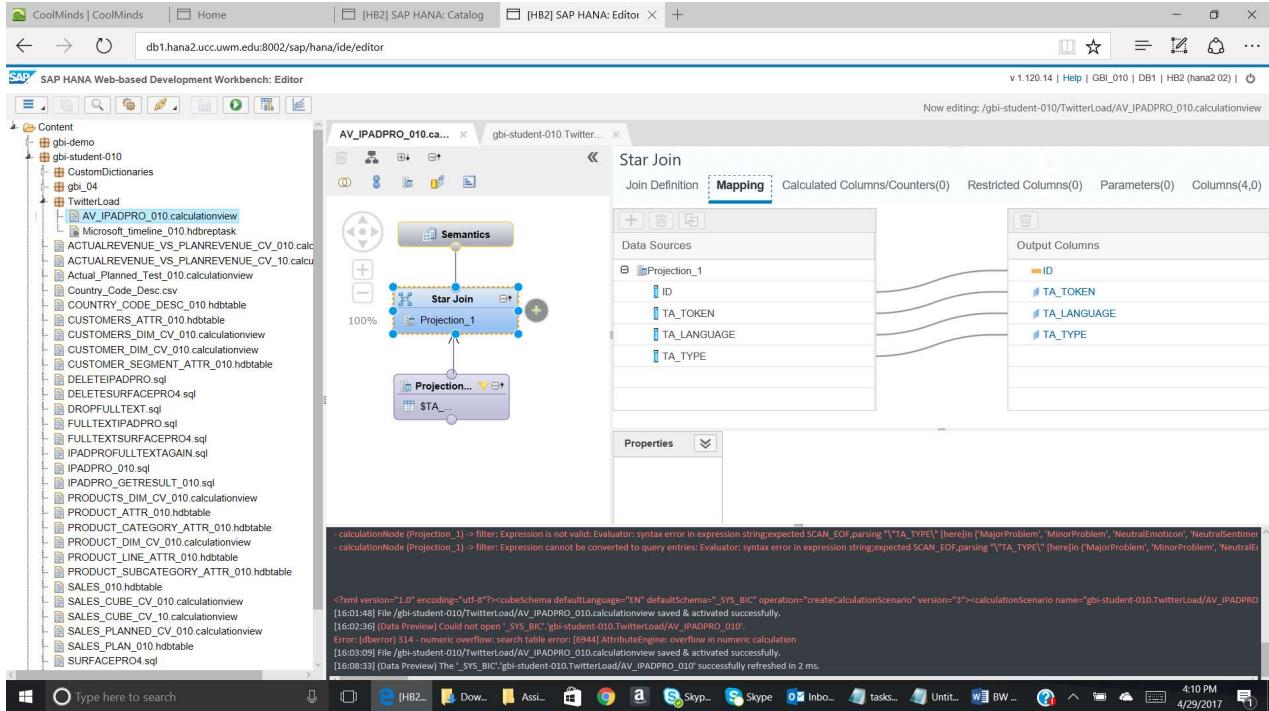
- TA_TOKEN
- TA_LANGUAGE
- TA_TYPE



Join the Projection 1 to the Star Join



Click on the Star Join and then go to mapping. Perform the mapping as given below:

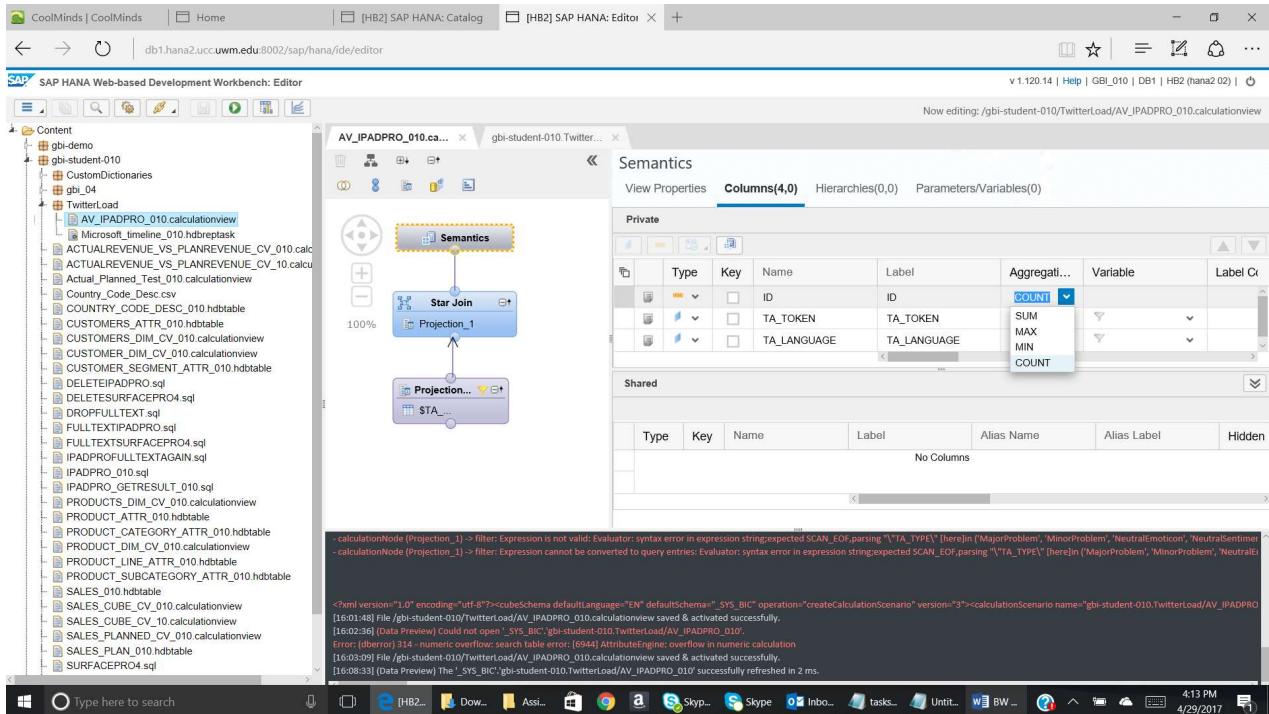


Click on the **Projection_1** and then go to filter expression.

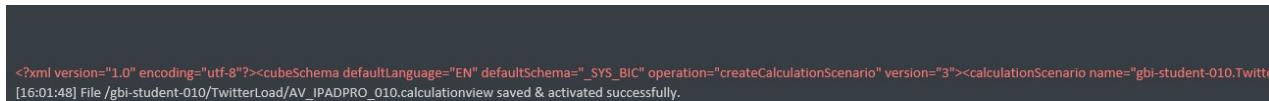
Type the below given filter expression:

```
"TA_TYPE" = 'MajorProblem' or "TA_TYPE" = 'MinorProblem' or "TA_TYPE"
= 'NeutralEmoticon' or "TA_TYPE" = 'NeutralSentiment' or "TA_TYPE"
= 'StrongNegativeEmoticon' or "TA_TYPE" = 'StrongNegativeSentiment' or "TA_TYPE"
= 'StrongPositiveEmoticon' or "TA_TYPE" = 'StrongPositiveSentiment' or "TA_TYPE"
= 'WeakNegativeEmoticon' or "TA_TYPE" = 'WeakNegativeSentiment' or "TA_TYPE"
= 'WeakPositiveEmoticon' or "TA_TYPE" = 'WeakPositiveSentiment'
```

Now go to the Semantics and then change the Aggregation from Sum to Count.



Now Save the Analytical View. The below given message will come



Now click on the execute button as given below:

SAP HANA Web-based Development Workbench: Editor

Now editing: /gbi-student-010/TwitterLoad/AV_IPADPRO_010.calculationview

v 1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) |

Semantics

View Properties Columns(4,0) Hierarchies(0,0) Parameters/Variables(0)

Private

Type	Key	Name	Label	Aggregat...	Variable	Label Cr...
SUM	ID	ID		COUNT		
MAX	TA_TOKEN	TA_TOKEN				
MIN	TA_LANGUAGE	TA_LANGUAGE				

Shared

Type	Key	Name	Label	Alias Name	Alias Label	Hidden
No Columns						

Projection_1

```

graph TD
    StarJoin[Star Join] --> Projection1[Projection_1]
    Projection1 --> Projection2[Projection_2]
    Projection2 --> STA[STA...]
  
```

Projection_1

Projection_2

STA...

Log

```

<xml version="1.0" encoding="utf-8"?><cubSchema defaultLanguage="EN" defaultSchema="_SYS_BIC" operation="createCalculationScenario" version="3"><calculationScenario name="gbi-student-010.TwitterLoad/AV_IPADPRO_010">
<!-- File /gbi-student-010/TwitterLoad/AV_IPADPRO_010.calculationview saved & activated successfully. -->
<!-- File Preview Could not open '_SYS_BIC' gbi-student-010.TwitterLoad/AV_IPADPRO_010 -->
Error: [dberror] 314 - numeric overflow: search table error: [6944] attribute error: overflow in numeric calculation
<!-- File /gbi-student-010/TwitterLoad/AV_IPADPRO_010.calculationview saved & activated successfully. -->
<!-- File Preview The '_SYS_BIC' gbi-student-010.TwitterLoad/AV_IPADPRO_010 successfully refreshed in 2 ms. -->

```

The output will be displayed:

SAP HANA Web-based Development Workbench: Editor

v 1.120.14 | Help | GBI_010 | DB1 | HB2 (hana2 02) |

AV_IPADPRO_010.cal... **gbi-student-010.TwitterLoad/AV_IPADPRO_010.calculationview**

ID	TA_LANGUAGE	TA_TOKEN	TA_TYPE
1	en	fun	WeakPositiveSentiment
2	en	appreciated	StrongPositiveSentiment
3	pt	caro	WeakNegativeSentiment
4	pt	porra	StrongNegativeSentiment
5	es	Amo	StrongPositiveSentiment
6	fr	😊	StrongPositiveEmotion
7	en	best	StrongPositiveSentiment
8	en	favorite	StrongPositiveSentiment
9	en	Scars	MajorProblem
10	en	Beautiful	WeakPositiveSentiment
11	en	Welcome	WeakPositiveSentiment
12	en	courtesy	WeakPositiveSentiment
13	en	:)	WeakPositiveEmotion

Log

```

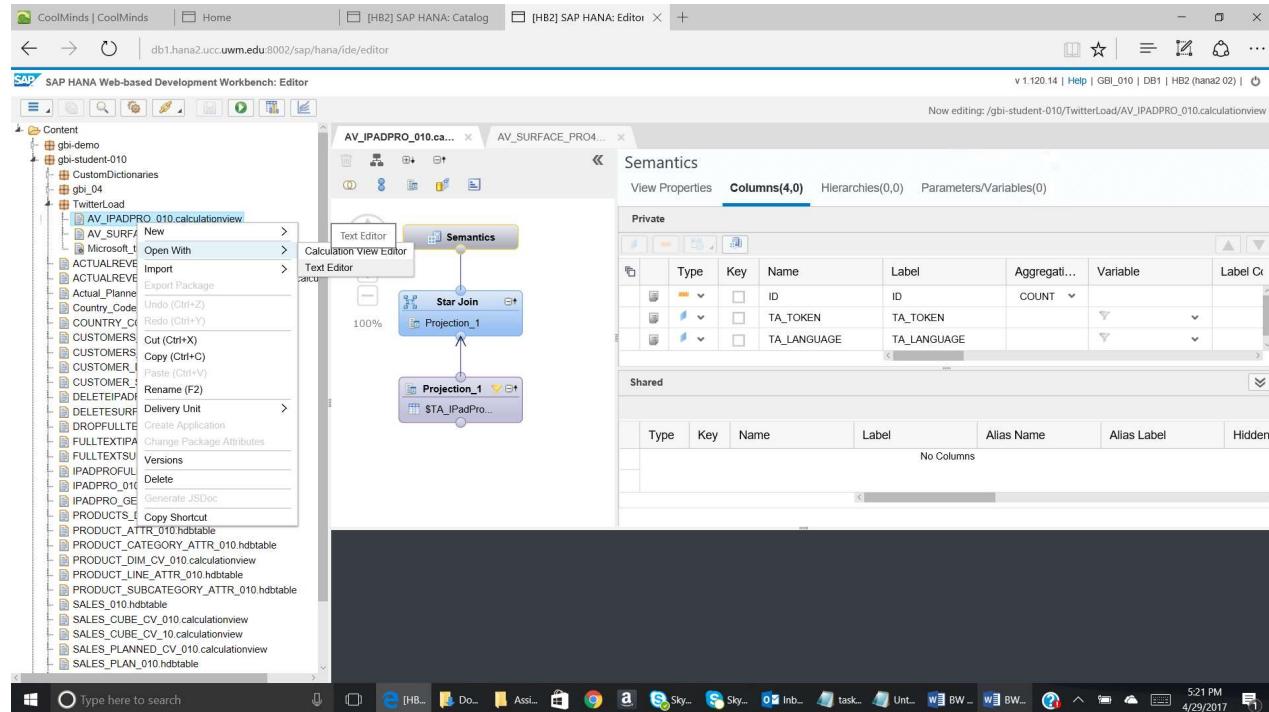
<xml version="1.0" encoding="utf-8"?><cubSchema defaultLanguage="EN" defaultSchema="_SYS_BIC" operation="createCalculationScenario" version="3"><calculationScenario name="gbi-student-010.TwitterLoad/AV_IPADPRO_010">
<!-- File /gbi-student-010/TwitterLoad/AV_IPADPRO_010.calculationview saved & activated successfully. -->
<!-- File Preview Could not open '_SYS_BIC' gbi-student-010.TwitterLoad/AV_IPADPRO_010 -->
Error: [dberror] 314 - numeric overflow: search table error: [6944] attribute error: overflow in numeric calculation
<!-- File /gbi-student-010/TwitterLoad/AV_IPADPRO_010.calculationview saved & activated successfully. -->
<!-- File Preview The '_SYS_BIC' gbi-student-010.TwitterLoad/AV_IPADPRO_010 successfully refreshed in 2 ms. -->

```

Repeat the steps from this scenario for the table **\$STA_SurfacePro4_Sentiment_010**. Name the analytic view **AV_SURFACE_PRO4_010**.

We need to make work around here. This workaround is for the current version of SAP HANA. In the future, this step may not be required.

Right click on the cube created and then open with Text Editor.



Go to second line and delete the expression dimensionType="STANDARD"

```
AV_IPADPRO_010.ca... x AV_SURFACE_PRO4... x
ability="reportingEnabled" defaultClient="$$client$$" schemaVersion="2.3" dimensionType="STANDARD" dataCategory="CUBE" appl
```

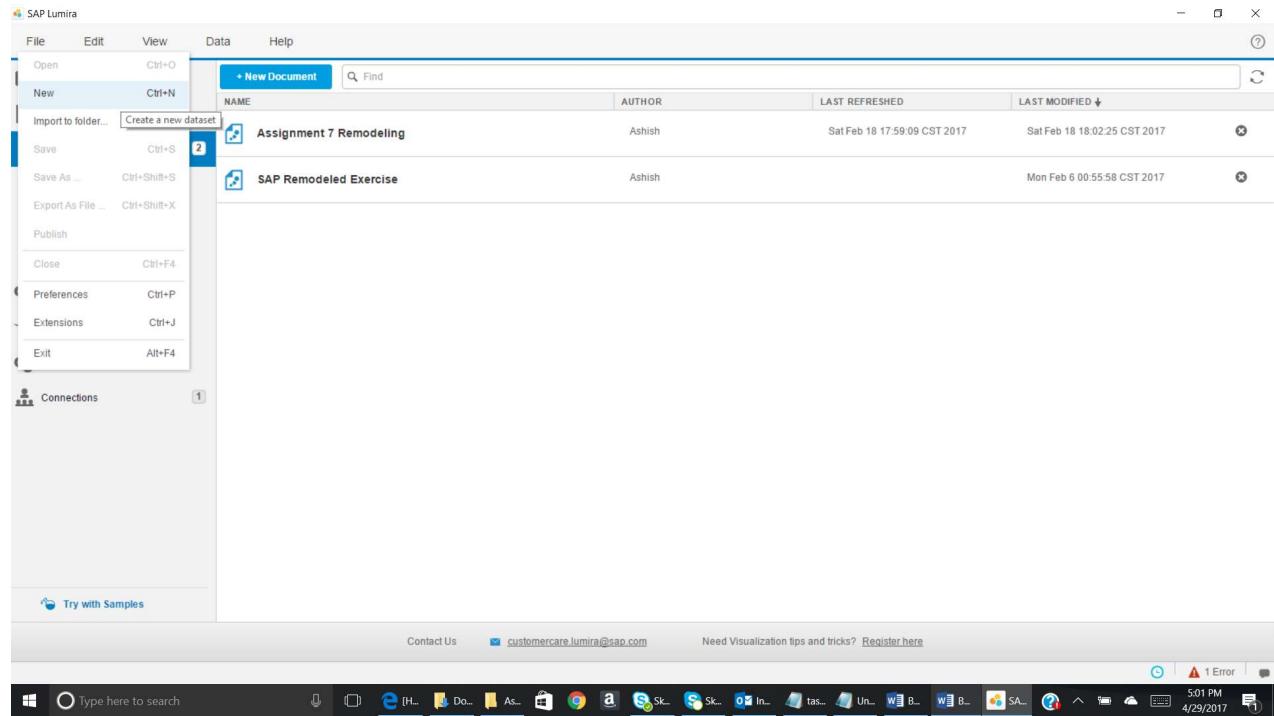
Save the view.

Similarly repeat the steps for Analytical view created for Surface Pro4.

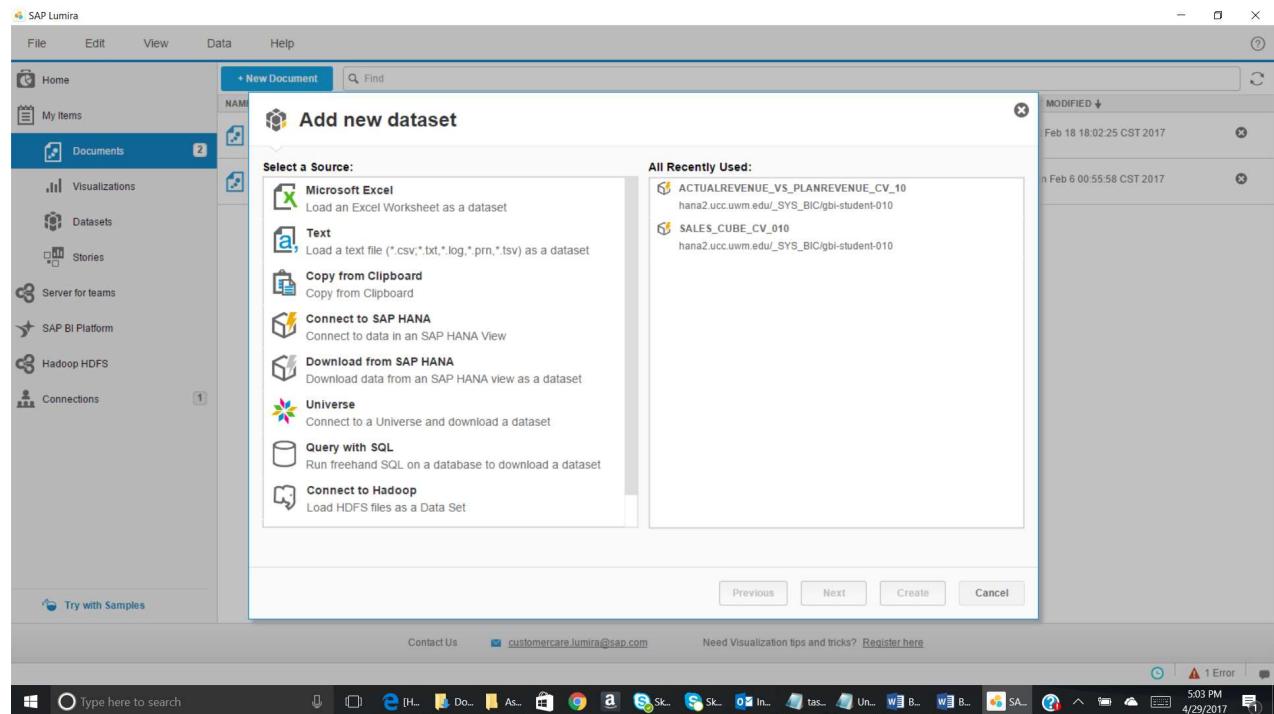
2) Create a Tag Cloud with SAP Lumira Server

A tag cloud is a nice tool to find out which terms are used very frequently in a given data set. Jun Lee wants to get an overview about the sentiments. He thinks it is a good starting point to use a tag cloud for visualization.

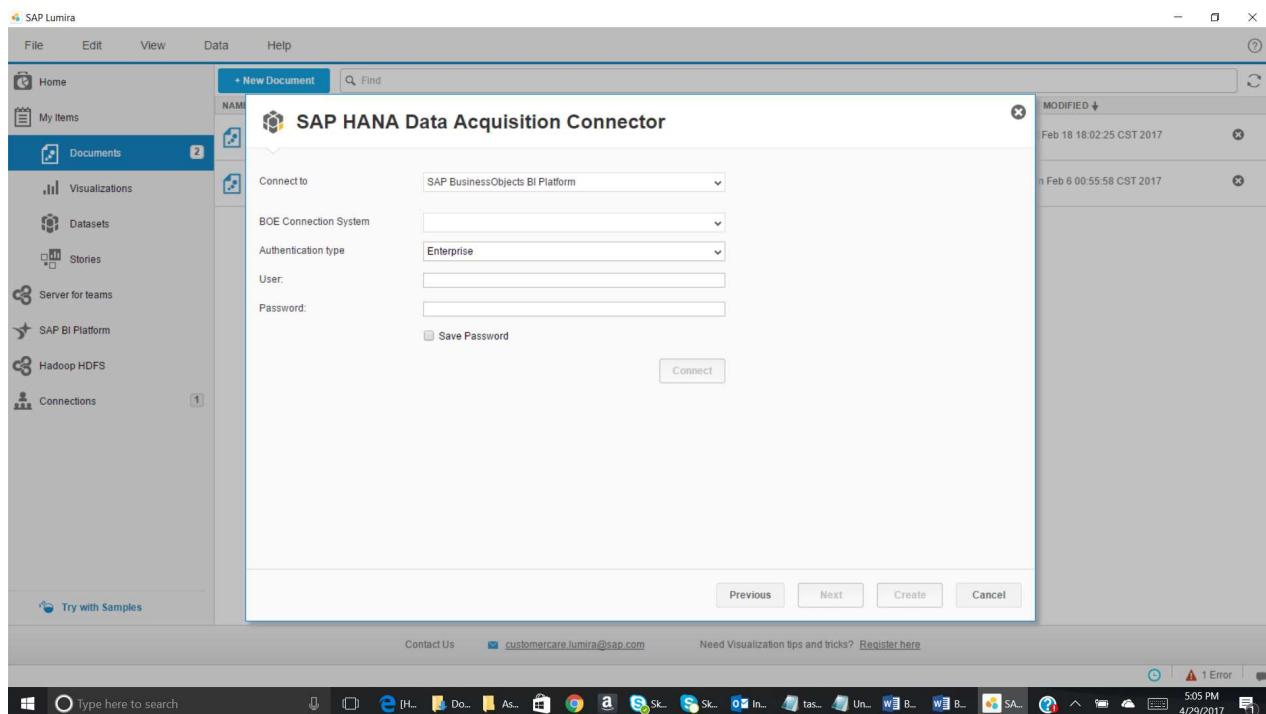
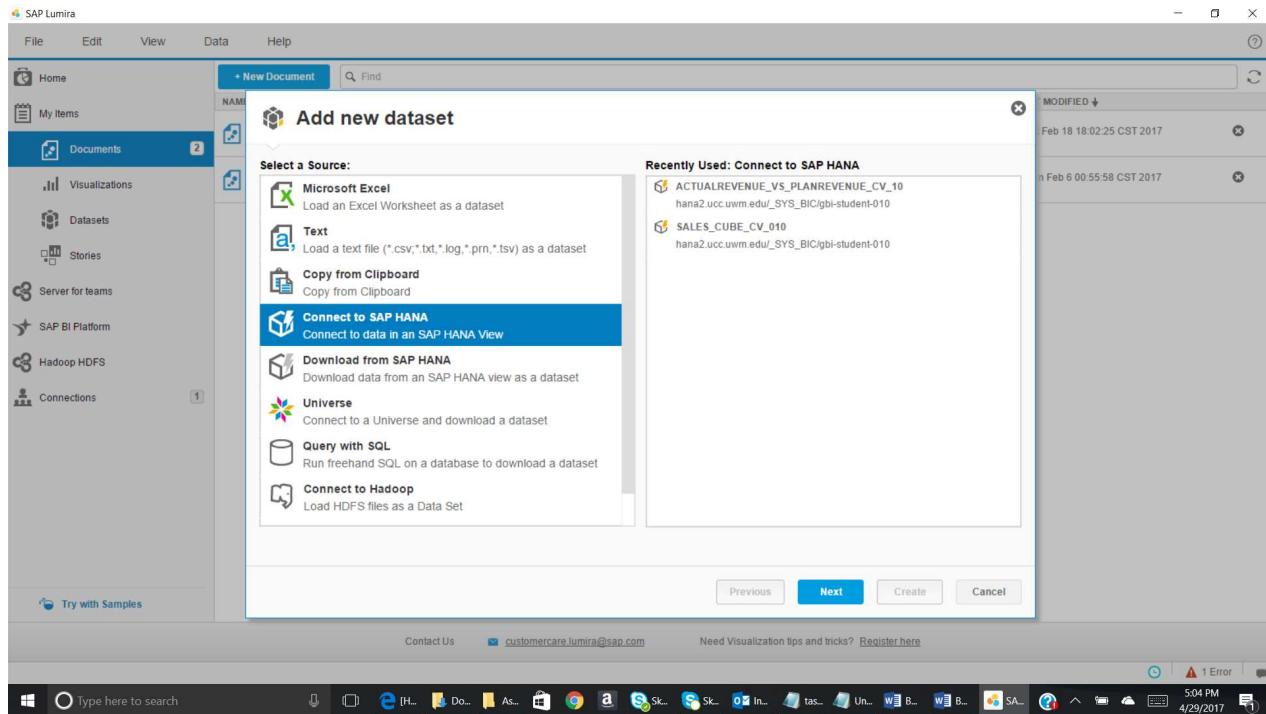
Open the SAP Lumira Desktop Application. Go to file and click on New.



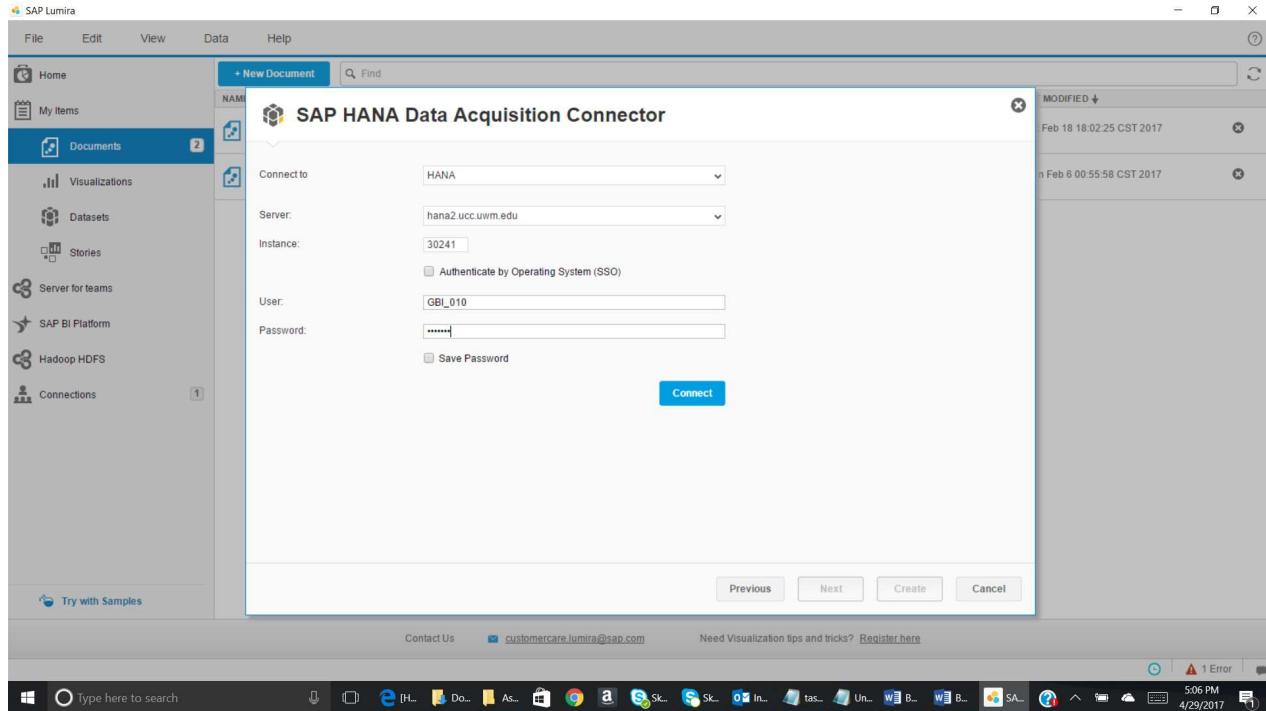
The below given pop up will come:



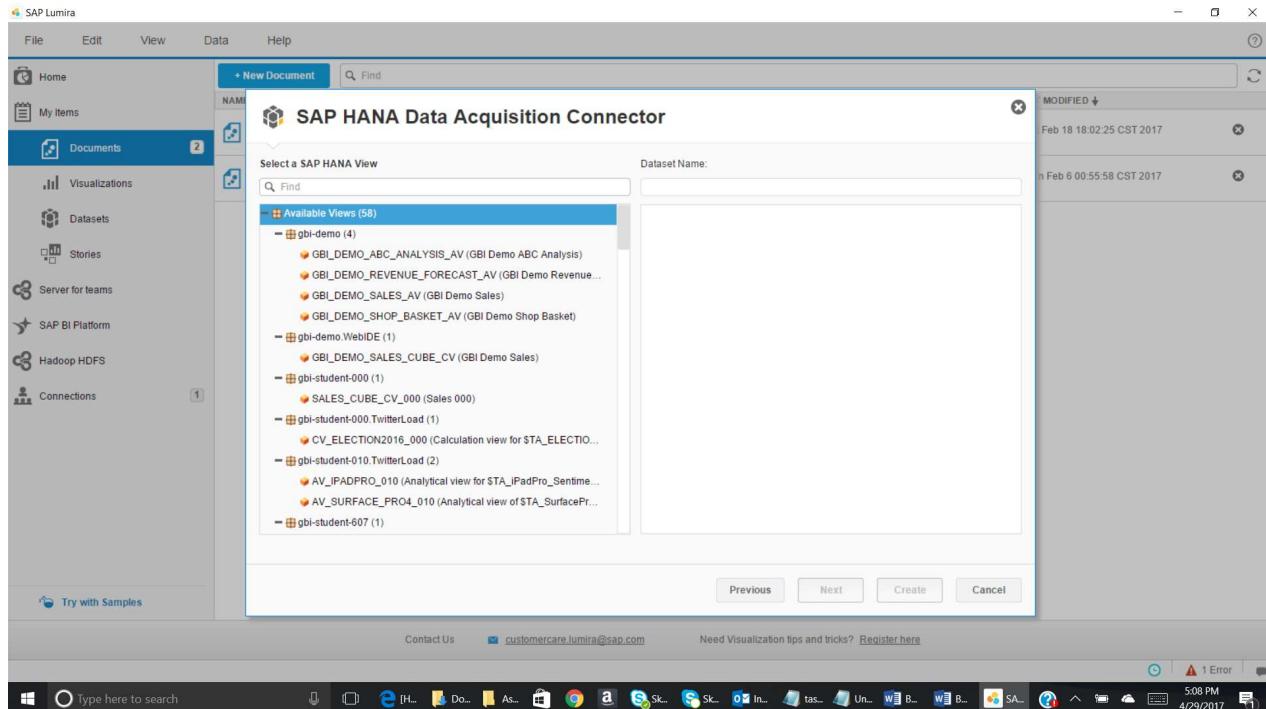
Now select Connect to SAP HANA and click on Next.



Now make the selection as given in the pop up below:

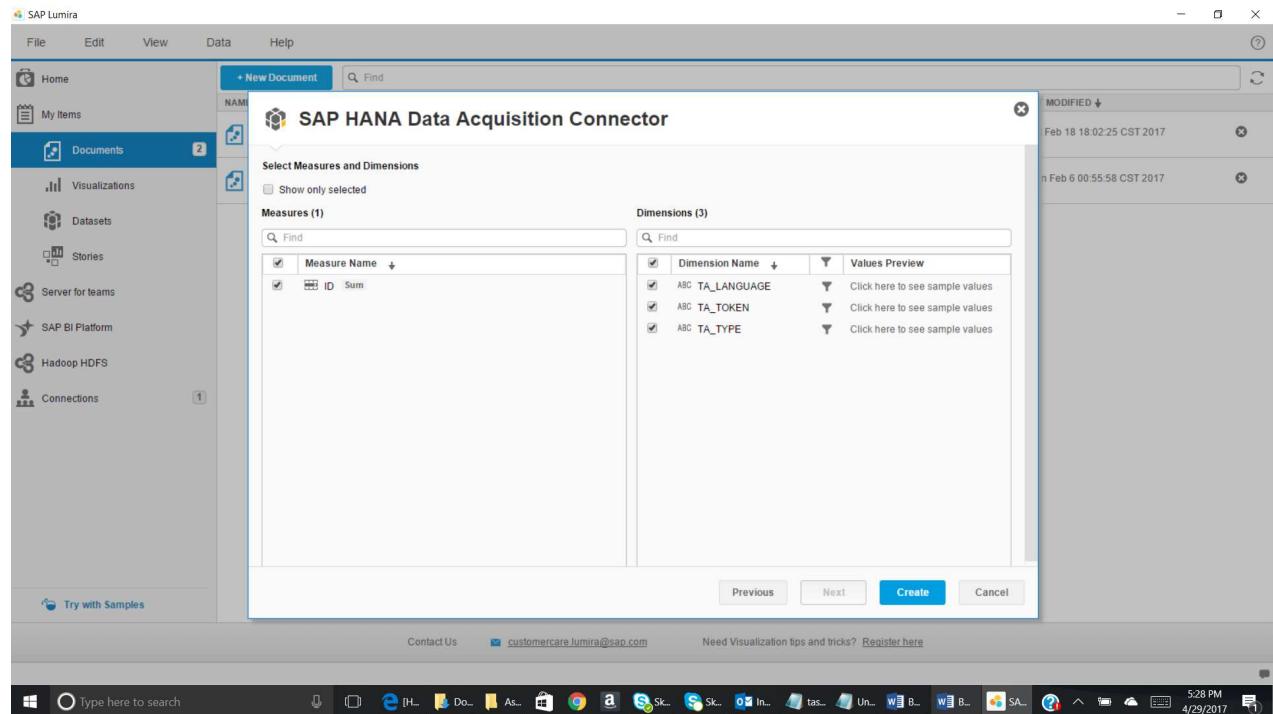


After that click on Connect. The below given pop up will come:

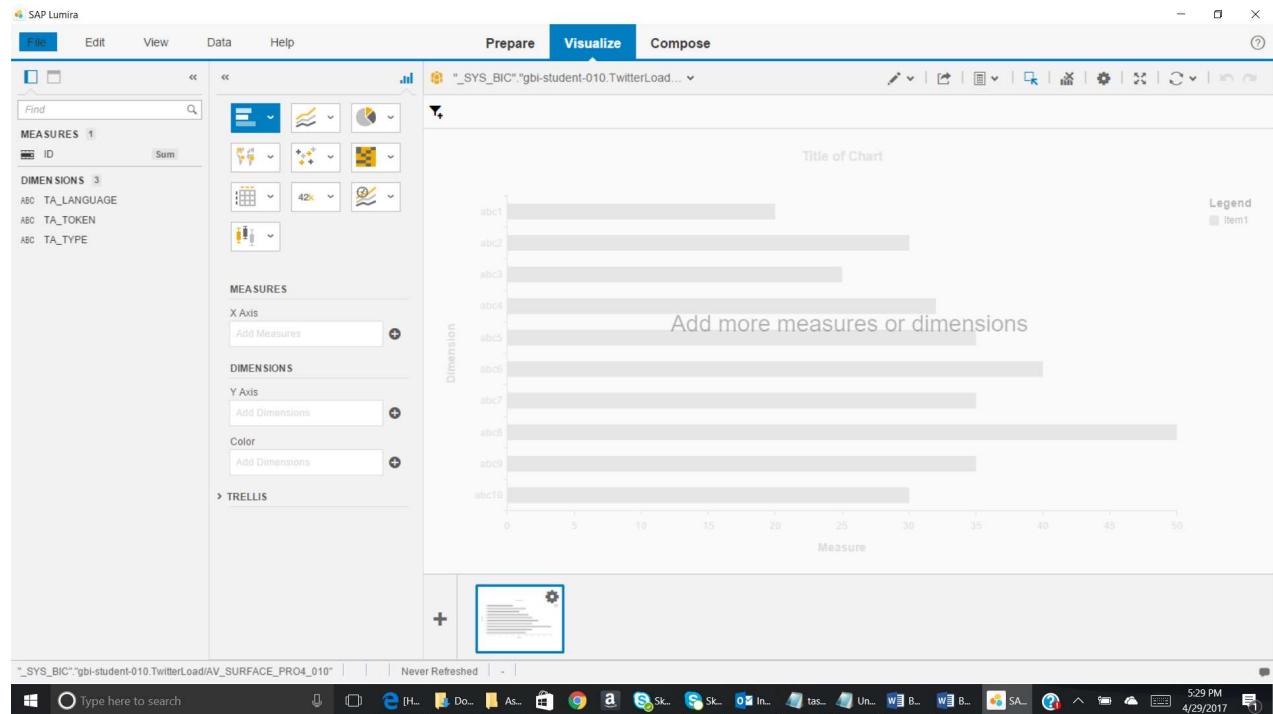


We can see the analytical view which we have created in the above screenshot.

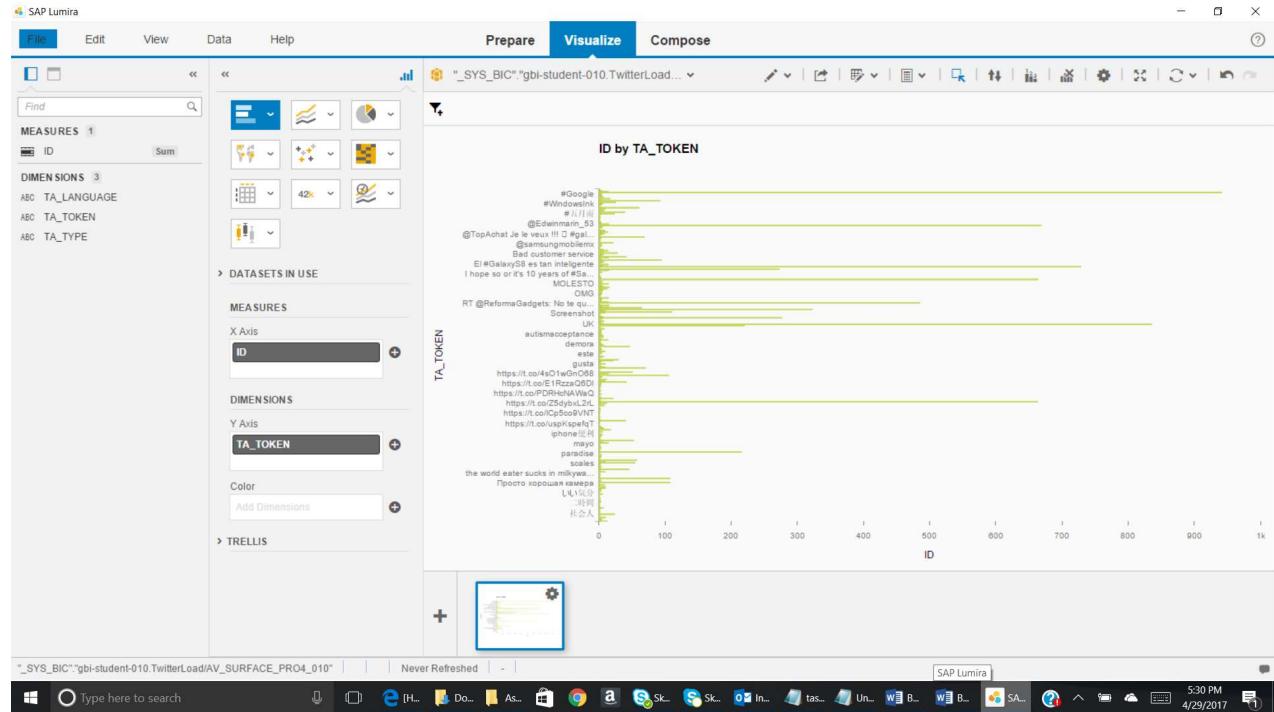
Click on the view for the table “\$TA_SurfacePro4_Sentiment_010” and then click on Next. The below given pop up will come:



Click on Create.

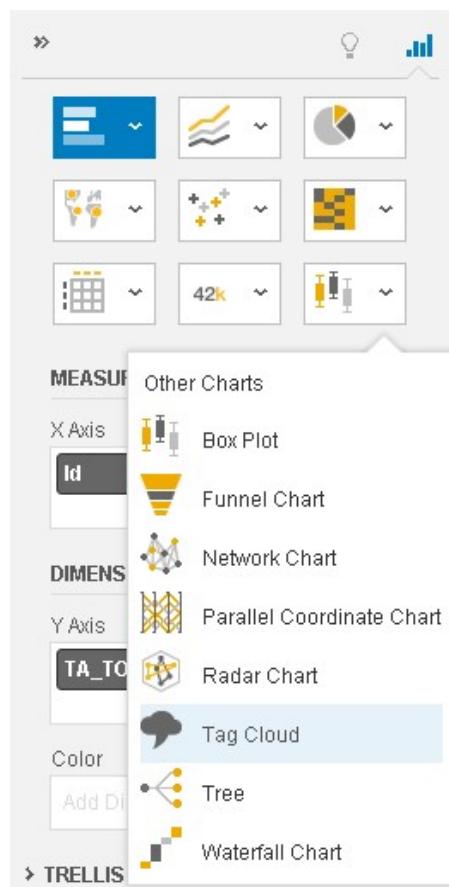


The Visualize perspective opens. Drag and drop the measure “Id” to the field “X Axis” under “MEASURES” on the right of the screen. Then drag and drop the dimension “TA_TOKEN” to the field “Y Axis” under “DIMENSIONS” on the right of the screen. The data will be shown as a bar diagram.



Change the type of the visualization to tag cloud. You can do this by clicking on the icon for others

charts . Then, choose Tag Cloud (see screenshot below).

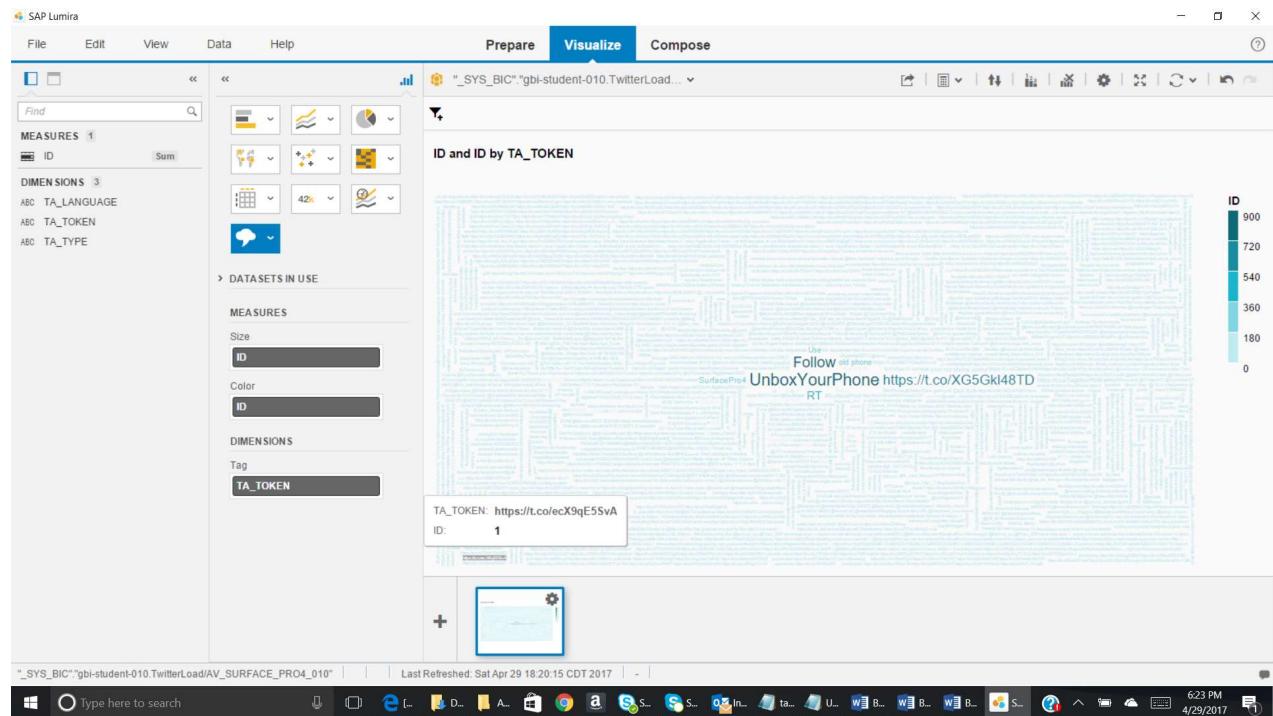


The tag cloud visualizes all sentiments that are stored in the database table. Terms that have been used more frequently are displayed in a larger font size than the others.



Attention: Please note that the screenshots can look different depending on your data!

If you want, you can also drag and drop the measure “Id” to the field “Color” under “MEASURE” on the right of the screen. Terms that have been used very often will be displayed in a darker color. On the right of the tag cloud legends with the values will be shown.



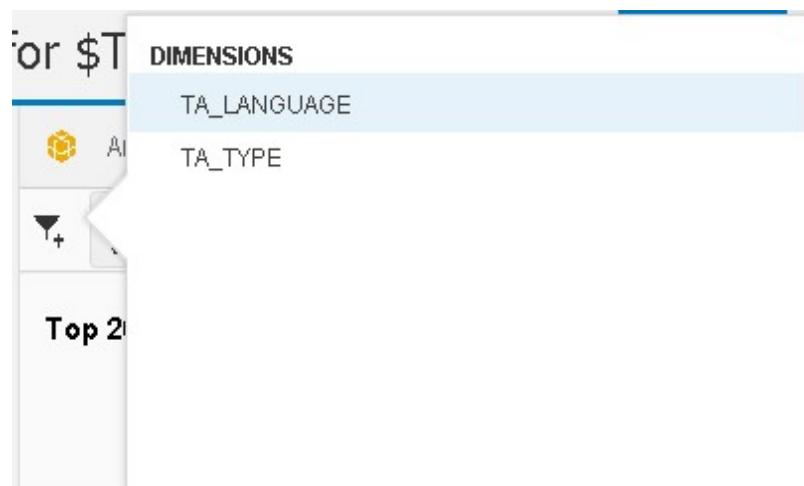
The tag cloud is still not really readable because there are so many terms in it. To solve this issue, you can add a ranking for the column “Id”. Therefore, click on the ranking symbol at the top of the tag cloud. Enter 20 into the field with the number to show the top 20 sentiments.



The result is shown in the screenshot on the next page:



If you want, you can also add a filter for one language. Therefore, click on the filter symbol  on the top of the table. Choose the dimension “TA_LANGUAGE”.



Choose one of the languages from the value list (e.g. “es” for Spanish) and click on **Apply**. You can also add multiple languages to the list.

Filter

ABC **TA_LANGUAGE** 7

- de
- en
- es**
- fr
- it
- ru
- zh

Apply to Current Visualization Apply to Entire Dataset

Apply **Cancel**

Now your tag cloud changes again and only show terms that were written in Spanish.



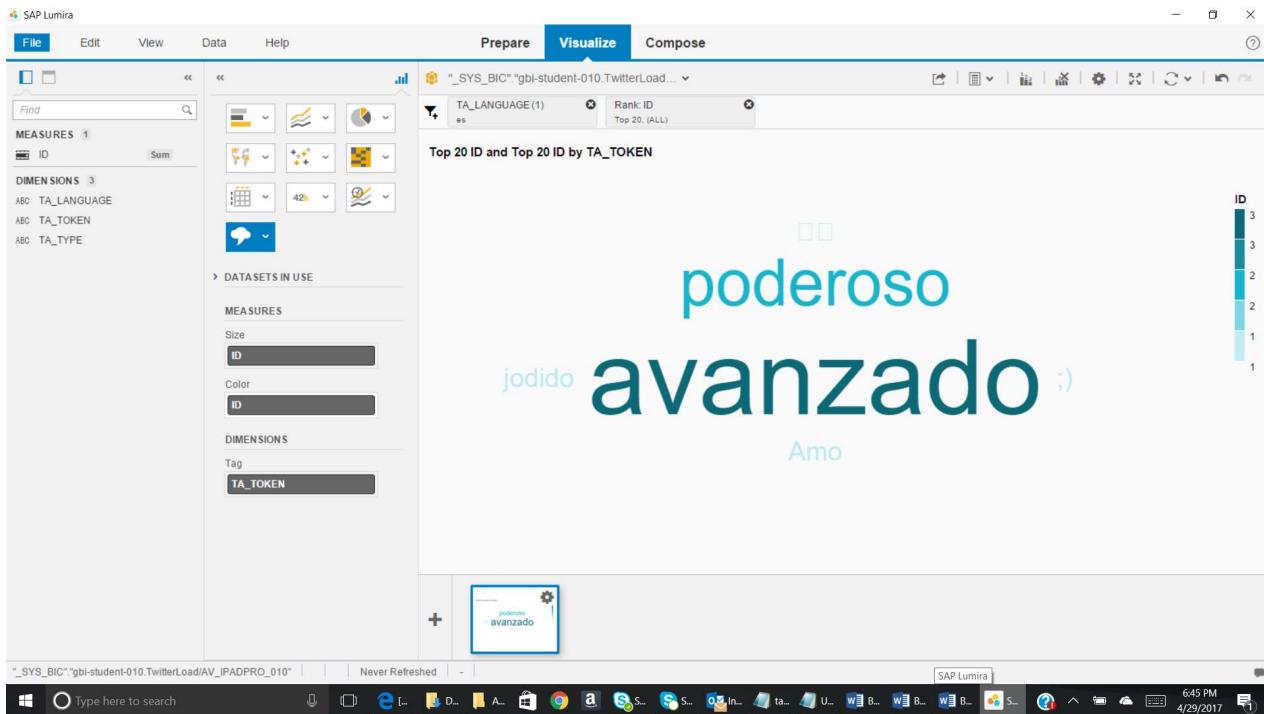
Adjust the diagram for your manager. Then click on **File and then select Save (Ctrl + S)**. Enter SurfacePro4_010 into the field "Name" and click on **OK**.



Now you can repeat the steps for the table with the iPad Pro analysis results. In our case, the result for the tag cloud without any additional configurations or filters looks like shown in the screenshot below.



If we filter the analytic view for language “Spanish”, we receive the following result for the iPad Pro.



It says that the iPad Pro is advanced (“Avanzado”) and powerful (Poderoso). There are also people who think that it is weak (“jodido”). In the screenshot you can also see, that emoticons are also recognized as sentiments and can be analyzed by the SAP HANA system.

Save the configuration under the name "iPadPro_010".

3) Create a Network Chart with SAP Lumira Server

After creating the tag cloud production planner notices that it doesn't provide any information about the type of the sentiments. He wants to know if there are more positive or negative sentiments. To analyze the data, he creates a Network Chart.

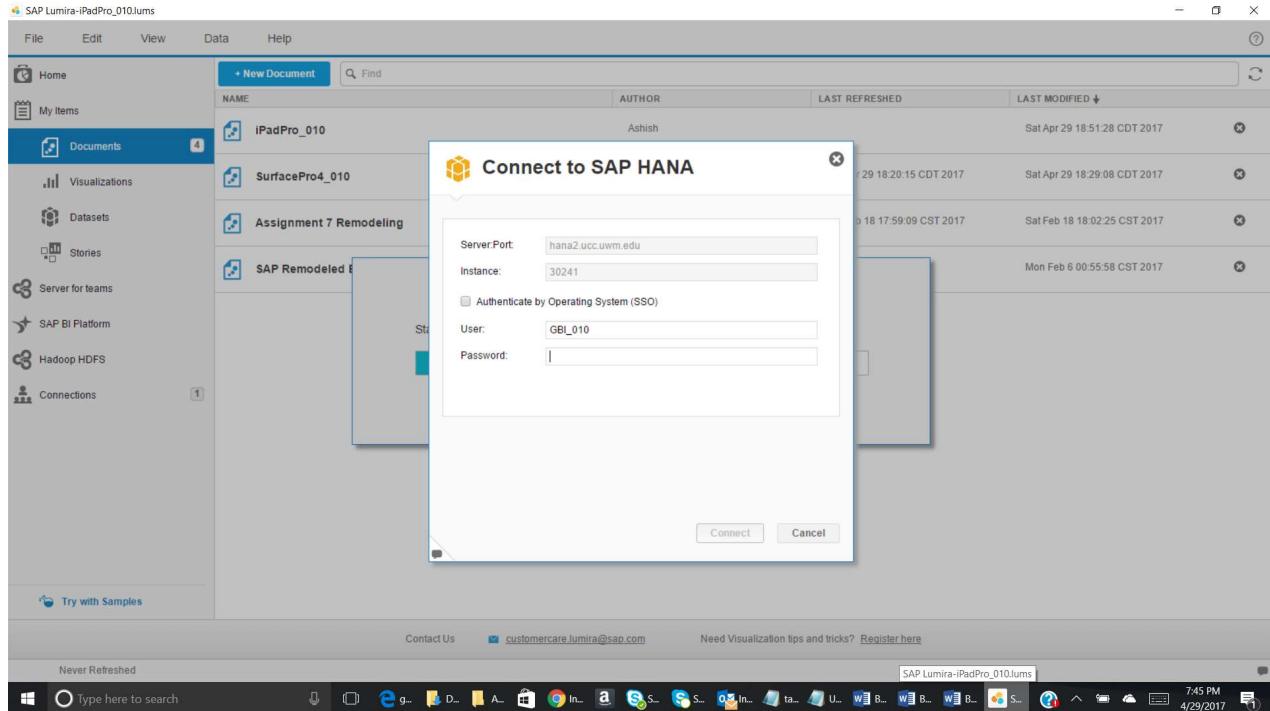
Reopen the SAP Lumira and then double click on the iPadPro_010 as given below:

The screenshot shows the SAP Lumira interface. On the left, there's a sidebar with options like Home, My items, Documents (which is selected), Visualizations, Datasets, Stories, Server for teams, SAP BI Platform, Hadoop HDFS, and Connections. Below the sidebar is a 'Try with Samples' button. The main area displays a list of documents in a table format. The columns are NAME, AUTHOR, LAST REFRESHED, and LAST MODIFIED. The table contains four rows:

NAME	AUTHOR	LAST REFRESHED	LAST MODIFIED
iPadPro_010	Ashish	Sat Apr 29 18:51:28 CDT 2017	Sat Apr 29 18:51:28 CDT 2017
SurfacePro4_010	Ashish	Sat Apr 29 18:20:15 CDT 2017	Sat Apr 29 18:29:08 CDT 2017
Assignment 7 Remodeling	Ashish	Sat Feb 18 17:59:09 CST 2017	Sat Feb 18 18:02:25 CST 2017

Below the table, there's a network chart visualization showing various nodes connected by lines, representing sentiment analysis results. At the bottom of the screen, there's a taskbar with icons for different applications like Microsoft Word, Excel, and Power BI, along with a search bar and system status indicators.

The below given pop up will come. Enter the password.



The “Visualize” perspective opens and shows your tag cloud. You can edit the view if you want. We want to create an additional chart. Click on the plus symbol on the bottom of the chart.

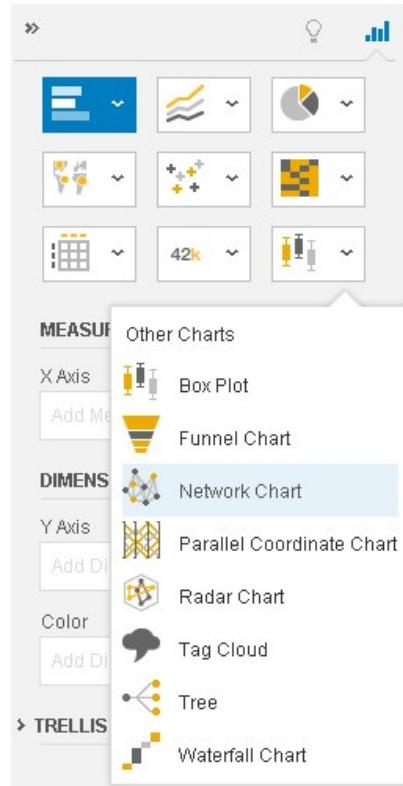


An empty chart will open.

Change the visualization type to “Network Chart”. Therefore, click on the icon for others charts



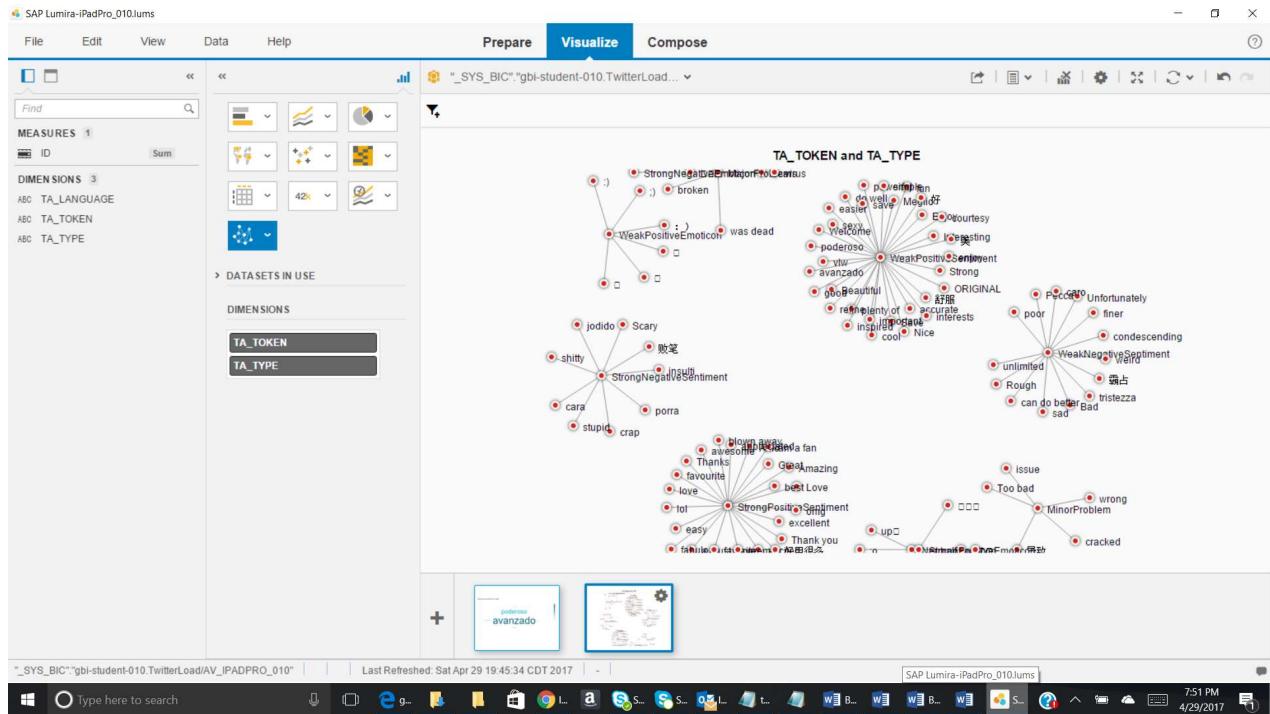
and choose “Network Chart”.



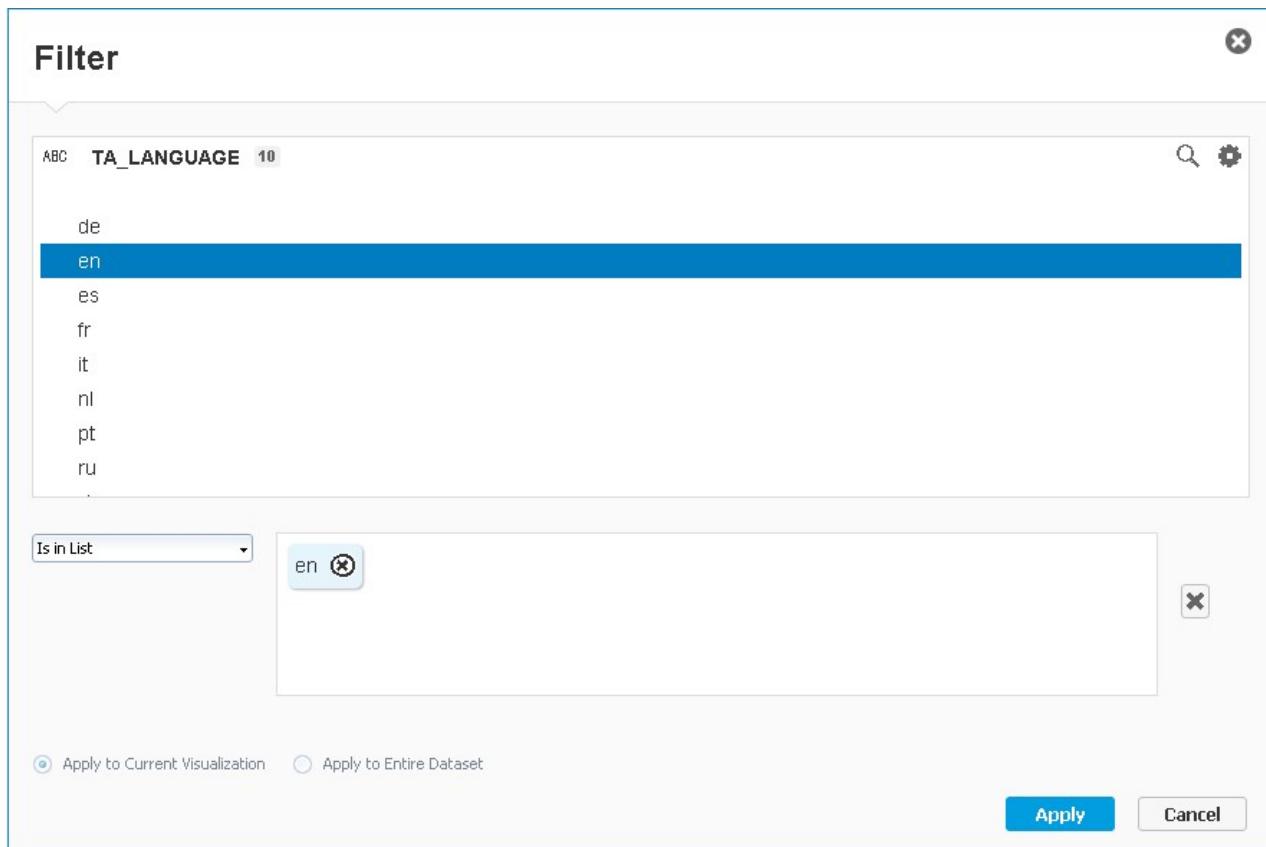
Network charts use dimensions only. Drag and drop the dimension “TA_TOKEN” to the field under “DIMENSIONS” on the right of the screen. Note that the chart in the middle of the screen asks you to add more dimensions to visualize the data.

The screenshot shows the SAP Lumira interface with the "Visualize" tab selected. On the left, the "Measures" section lists "ID" with a "Sum" aggregation, and the "Dimensions" section lists "ABC TA_LANGUAGE", "ABC TA_TOKEN", and "ABC TA_TYPE". In the center, a network chart is displayed with many nodes and connecting lines. A text overlay "Add more dimensions" is centered in the chart area. The top menu bar includes File, Edit, View, Data, Help, Prepare, Visualize (which is highlighted in blue), and Compose. The bottom taskbar shows the Windows Start button, a search bar, and various pinned application icons.

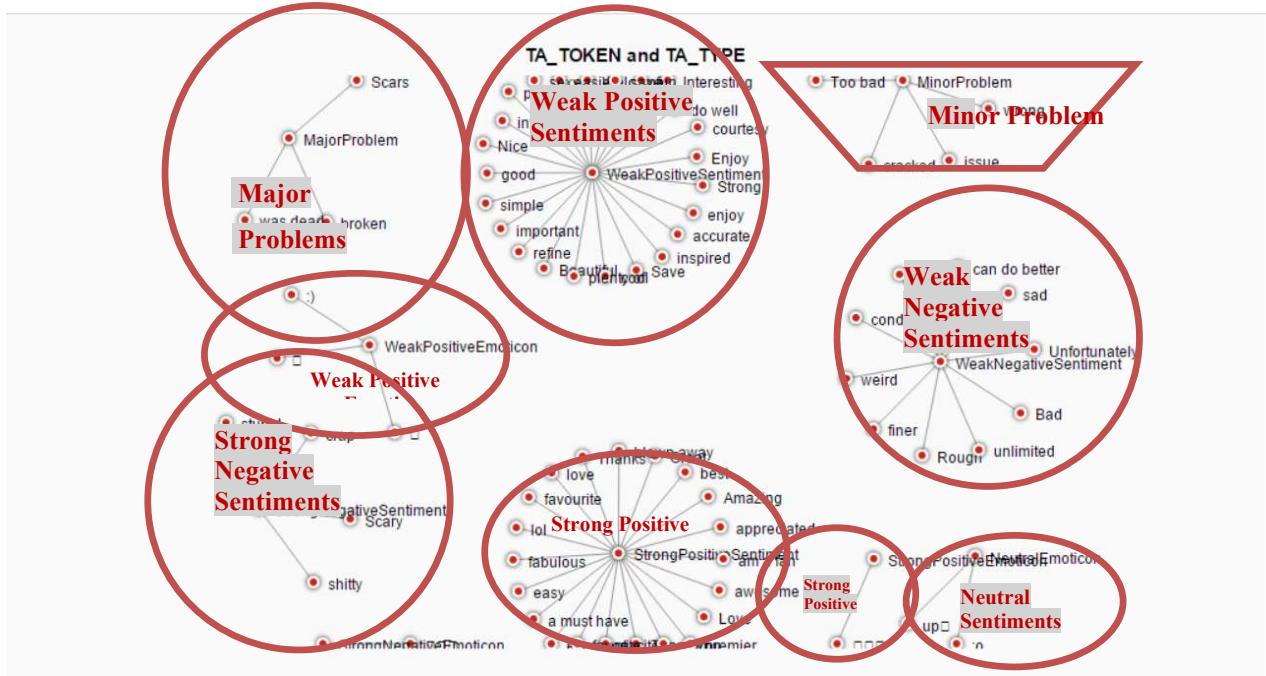
That means that we have to add a second dimension. Drag and drop the dimension “TA_TYPE” to the field under “DIMENSIONS” on the right of the screen.



If in case the network chart doesn't look really readable yet then, we need to configure the charts first. Click on the filter symbol at the top of the chart and choose the dimension “TA_LANGUAGE”. Add one language to the list, e.g. “en” for English.

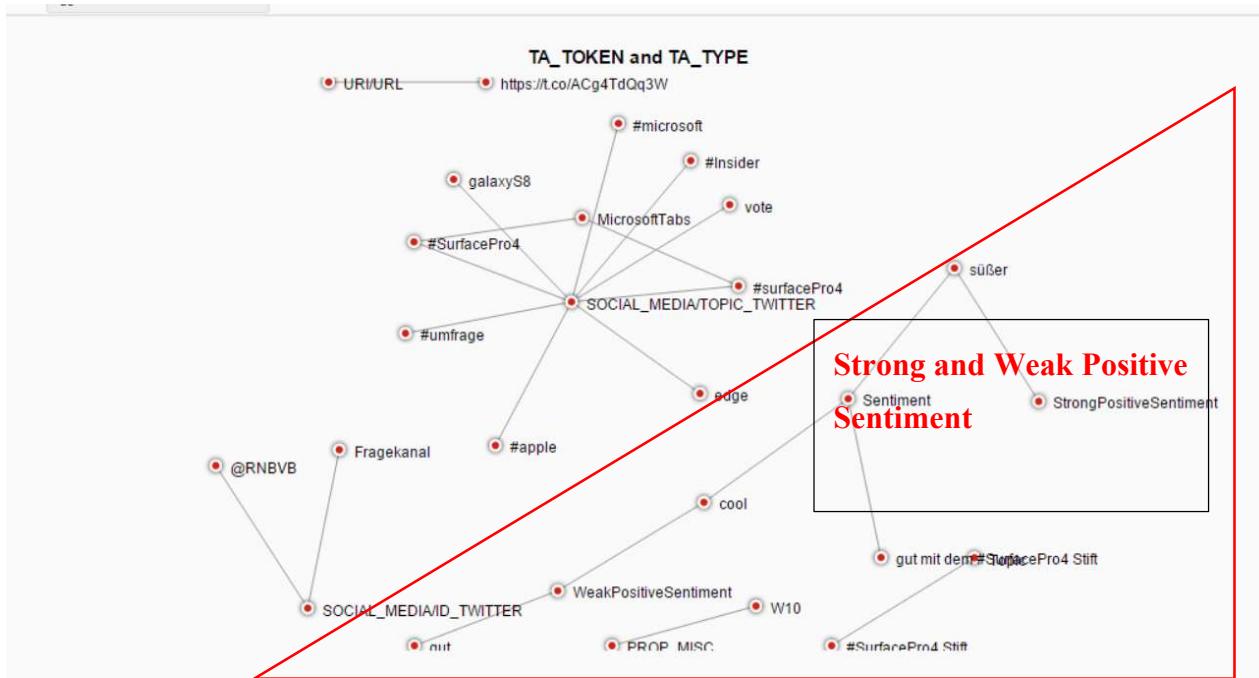


If you click on one spot in the middle of one network segment, you can drag and drop it to another place in the chart. The other network segments will organize their selves. Organize the segments that the positive sentiments are on the right side and the negative sentiments are on the left one.



In the screenshot above you can see that there are lots of minor problems but just a few major problems. You can also see that there are lots of positive statements about the iPad Pro and some positive emoticons.

Click on the **save** button in the upper right corner to save the configuration. You can repeat the steps for the view with the data of the Surface Pro 4. In our case the result looks like shown in the screenshot on the next page. The graph is filtered for



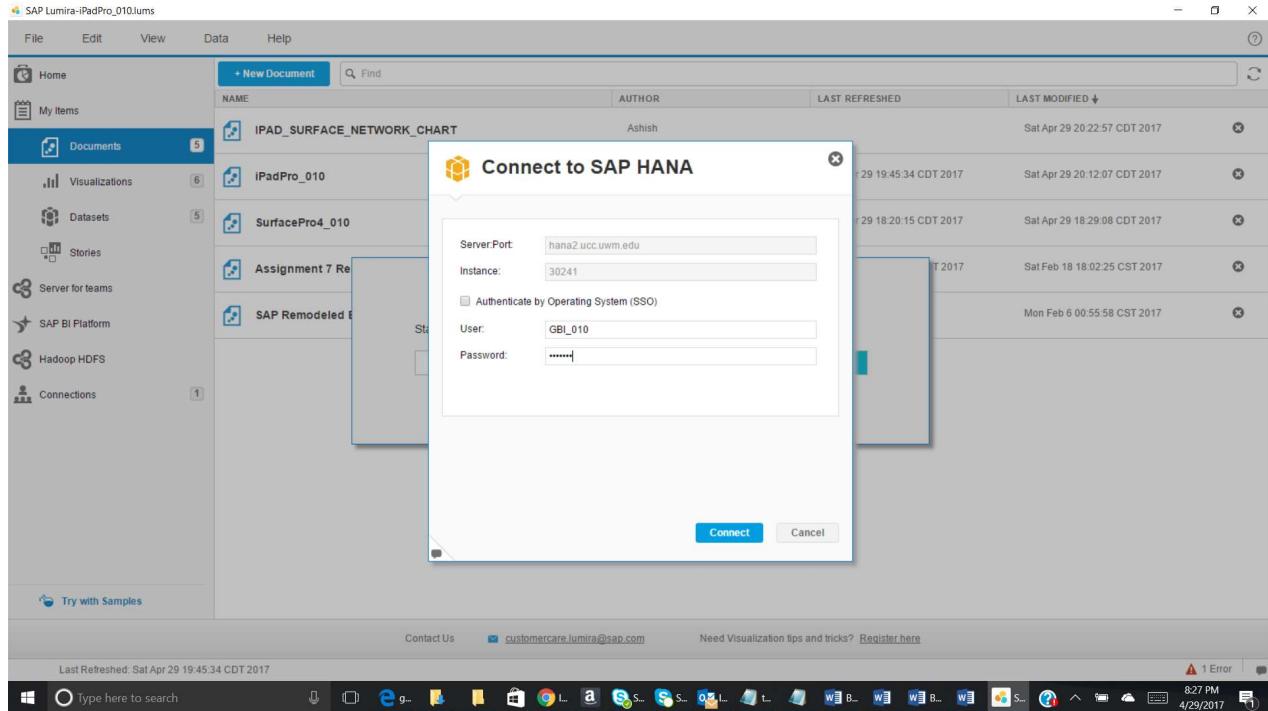
In this case you can see that there are much more positive sentiments than negative sentiments.

Next, we want to know what that means in numbers.

4) Create a Pie Chart with SAP Lumira Server

After creating the network chart production planner needs some real numbers to show to the manager. He creates a Pie Chart to see if there are more positive or negative sentiments. Afterwards he creates the presentation for the manager.

Restart the SAP Lumira. Double click on iPadPro_010 table. Enter the password.



The “Visualize” perspective opens and shows your charts. You can edit the view if you want. We want to create an additional chart. Click on the plus symbol on the bottom of the chart.

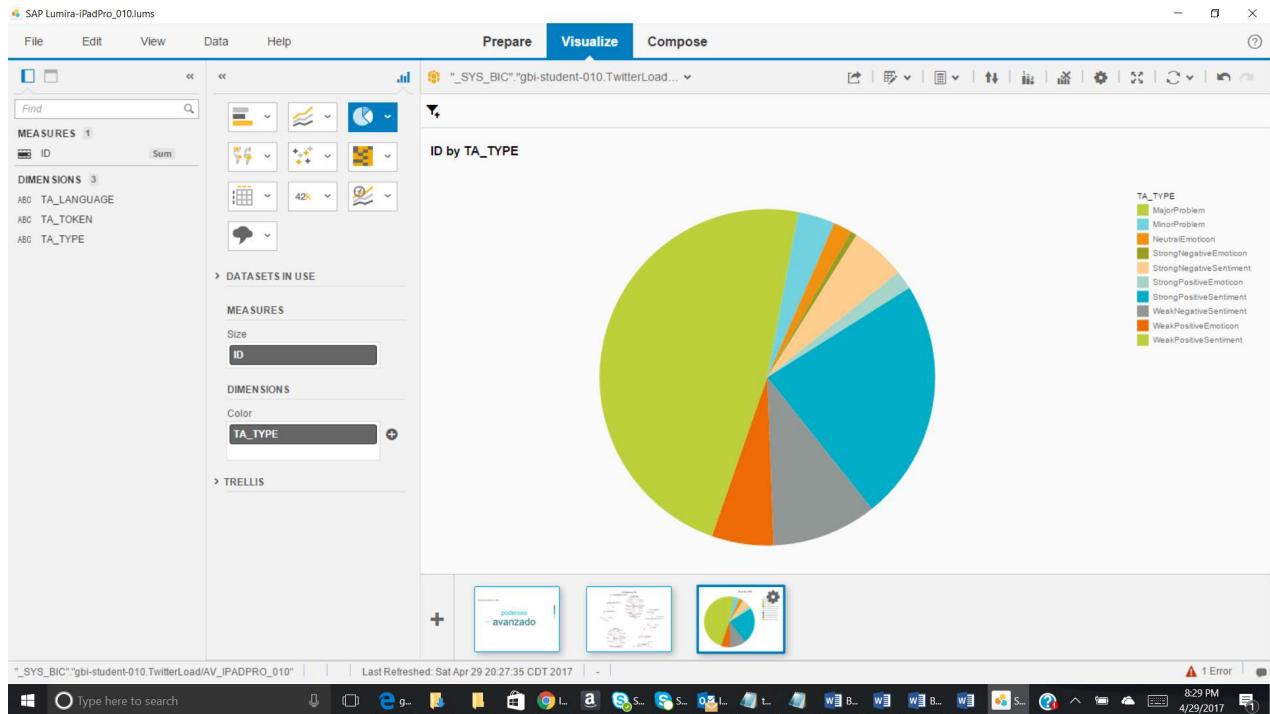


An empty chart will open. Change the visualization type to “Pie Chart”. Therefore, click on the

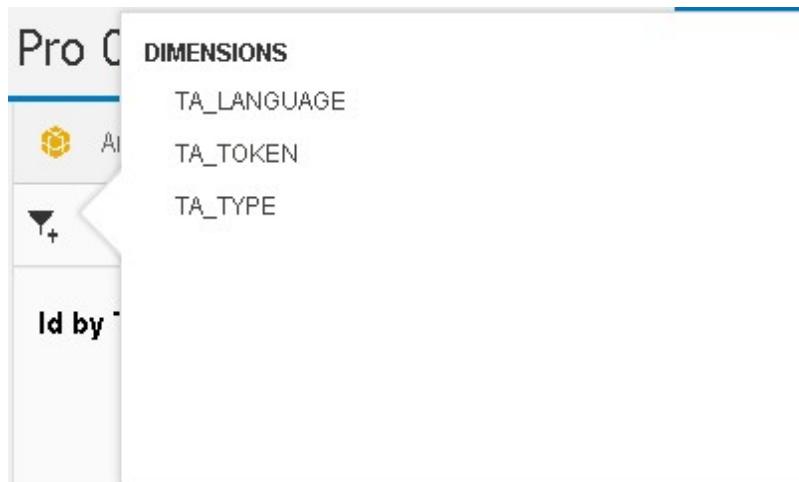


icon for pie charts and choose “Pie Chart”.

Drag and drop the dimension “TA_TYPE” to the field “Colors” under “DIMENSIONS” on the right of the screen. Then, drag and drop the measure “Id” to the field “Size” under “MEASURES” on the right of the screen.



If you want, you can filter out the emoticons, as they don't influence the overall pie chart that much. Click on the filter symbol at the upper left corner and choose TA_TYPE.



Now choose “Is in List” from the dropdown field and select “Major Problem”, “Minor Problem”, “Neutral Sentiment”, “WeakPositiveSentiment”, “StrongPostitiveSentiment”, “WeakNegativeSentiment” and “StrongNegativeSentiment”. Click on **Apply** to set the filter.

Filter

ABC TA_TYPE 54

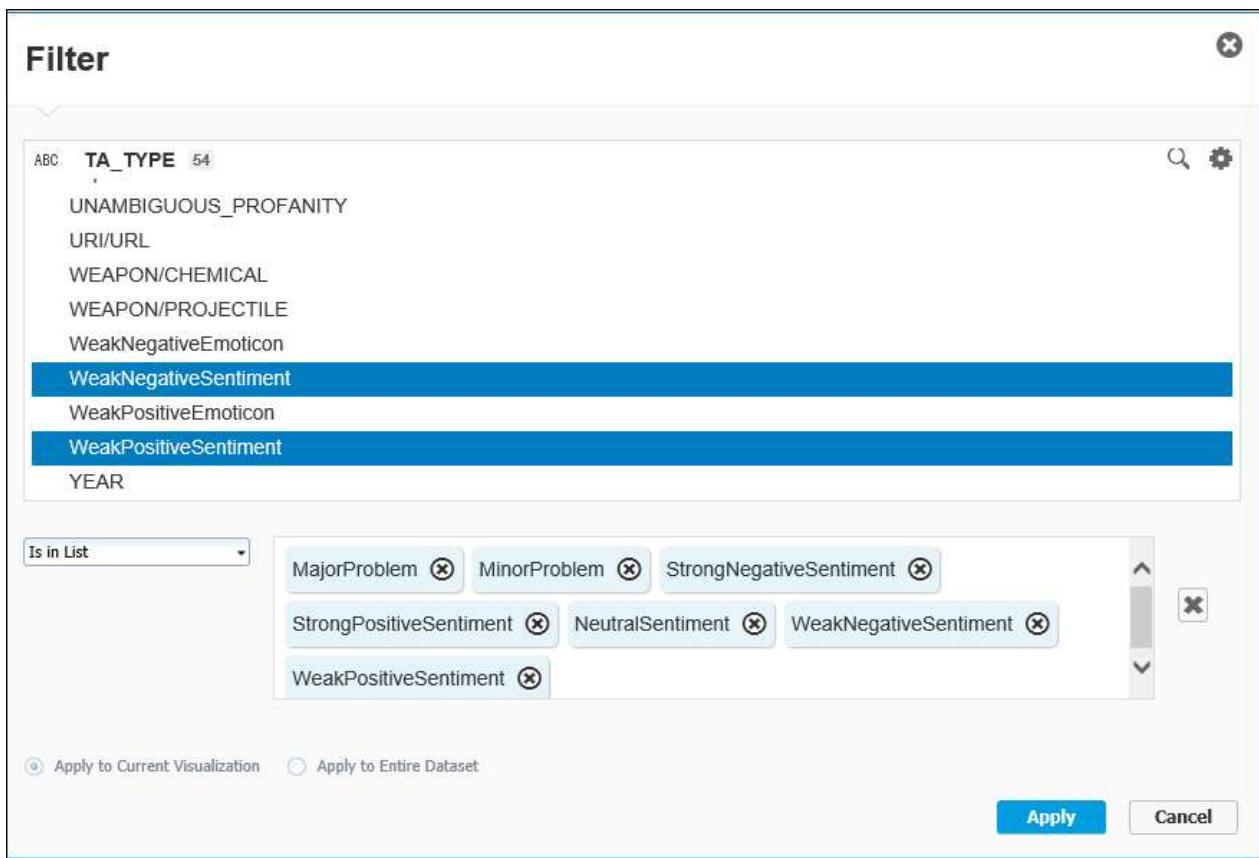
UNAMBIGUOUS_PROFANITY
URI/URL
WEAPON/CHEMICAL
WEAPON/PROJECTILE
WeakNegativeEmoticon
WeakNegativeSentiment
WeakPositiveEmoticon
WeakPositiveSentiment
YEAR

Is in List ▾

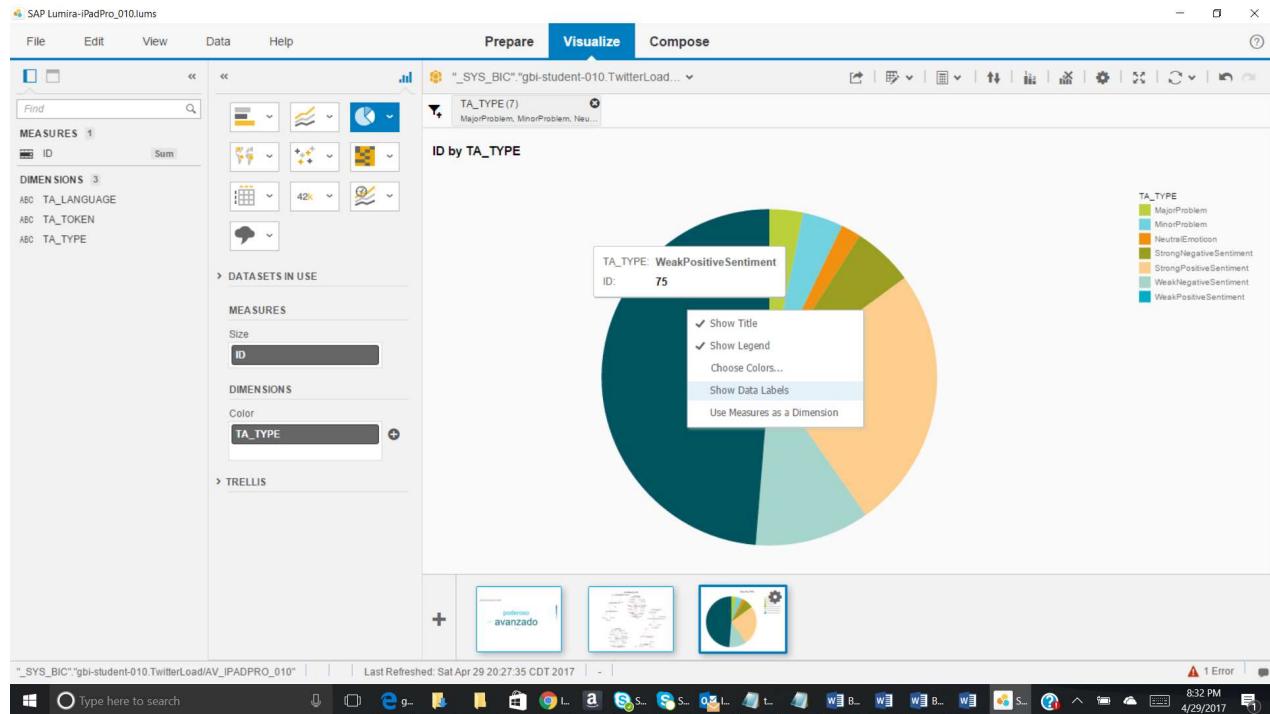
MajorProblem MinorProblem StrongNegativeSentiment
StrongPositiveSentiment NeutralSentiment WeakNegativeSentiment
WeakPositiveSentiment

Apply to Current Visualization Apply to Entire Dataset

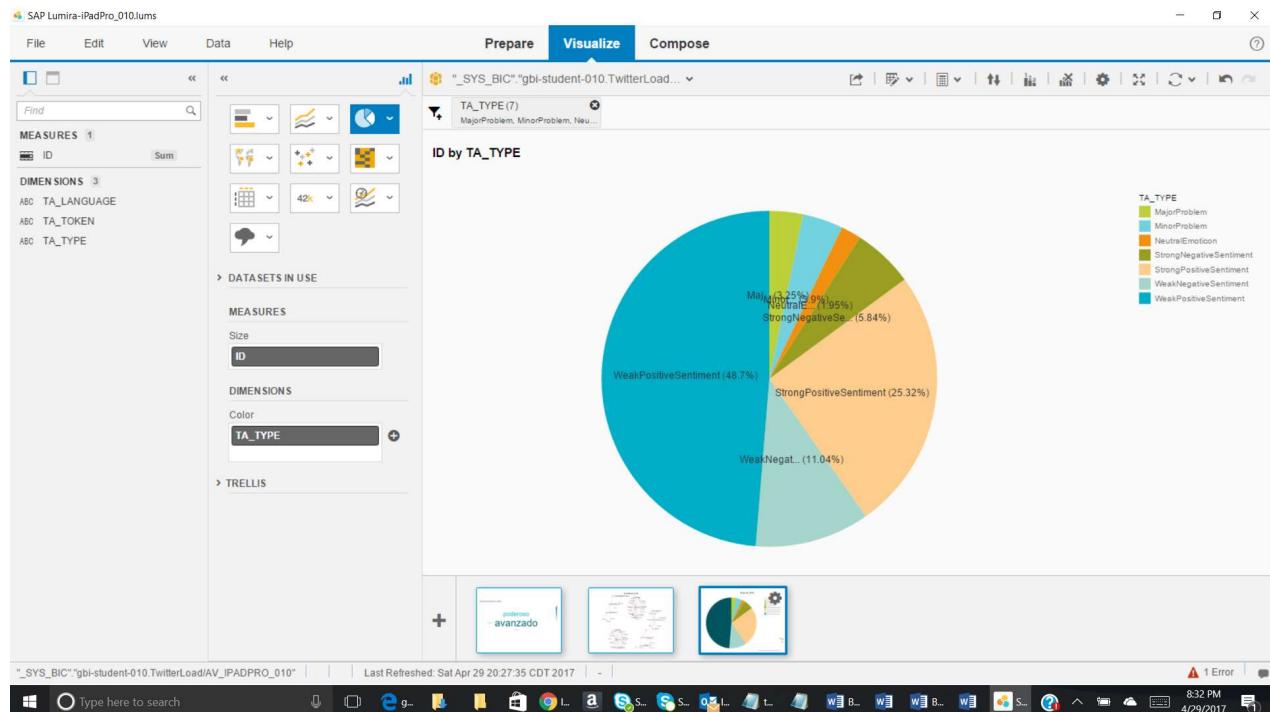
Apply **Cancel**

The screenshot shows a 'Filter' dialog box with a title bar and a close button. Below the title is a search bar and a settings gear icon. The main area contains a list of categories under 'TA_TYPE' with a count of 54. Some items are highlighted in blue. Below the list is a section for filtering by sentiment, with several checkboxes for different levels of sentiment. At the bottom are radio buttons for applying the filter to the current visualization or the entire dataset, and two buttons: 'Apply' and 'Cancel'.

To enable the data labels for the pie chart, right click on the chart and choose **Show Data Labels**.

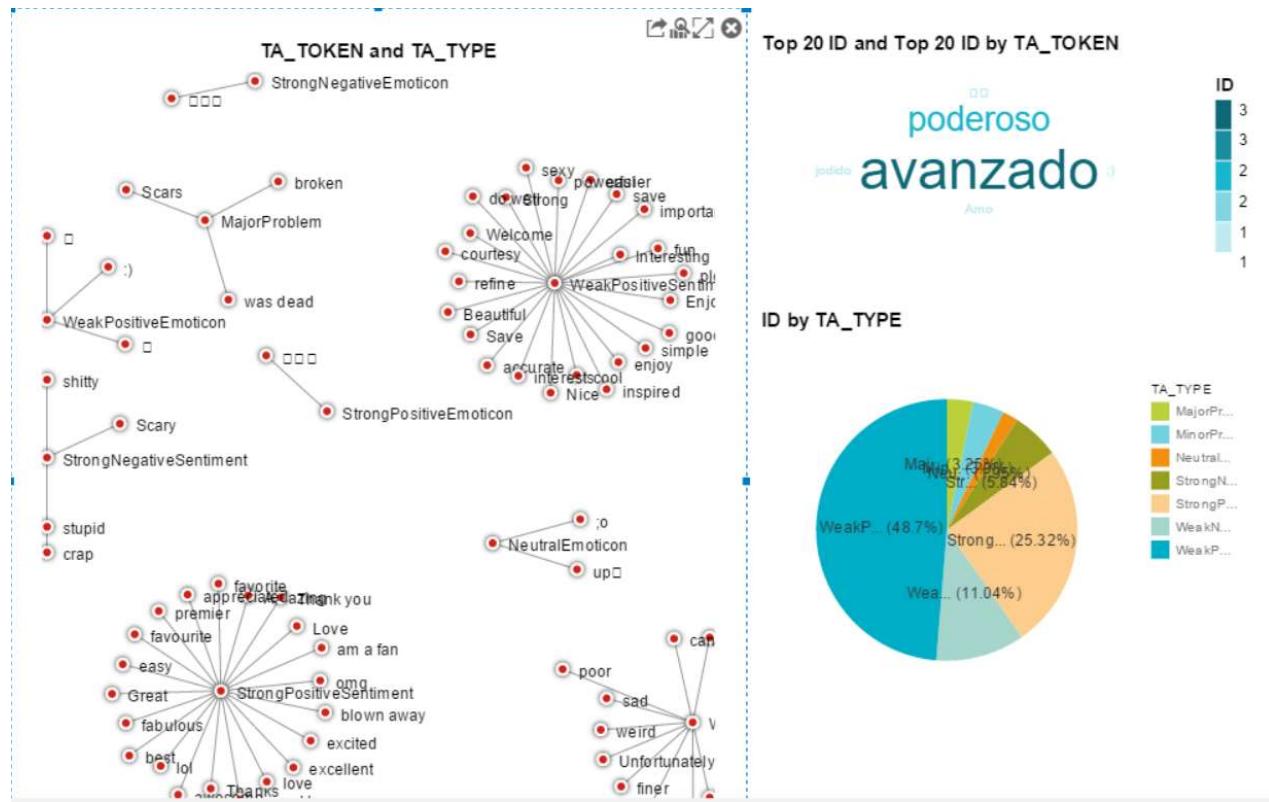


The percentages for all sentiments are shown in the pie chart now.

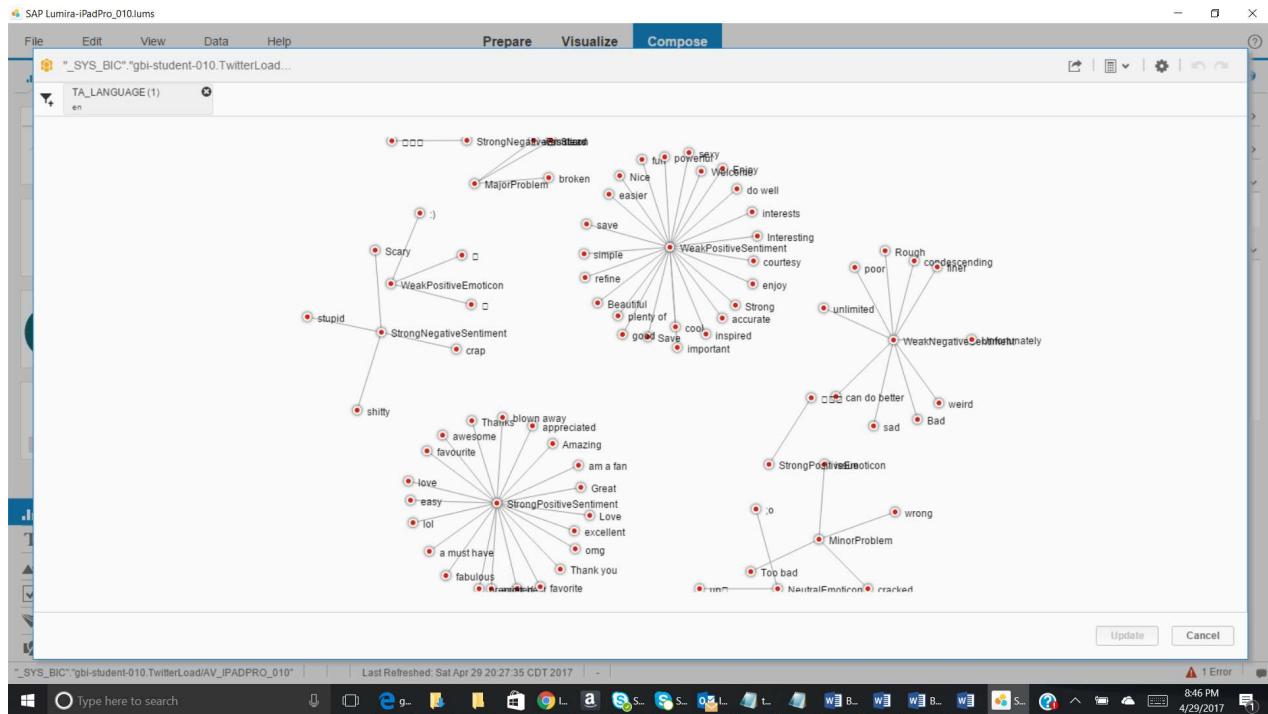


Save your visualization by clicking on the **Save** button on the upper right corner. Next, we want to create a presentation for the meeting with the manager. Therefore, change to the view “Compose” at the top of the screen. Choose the blank template.

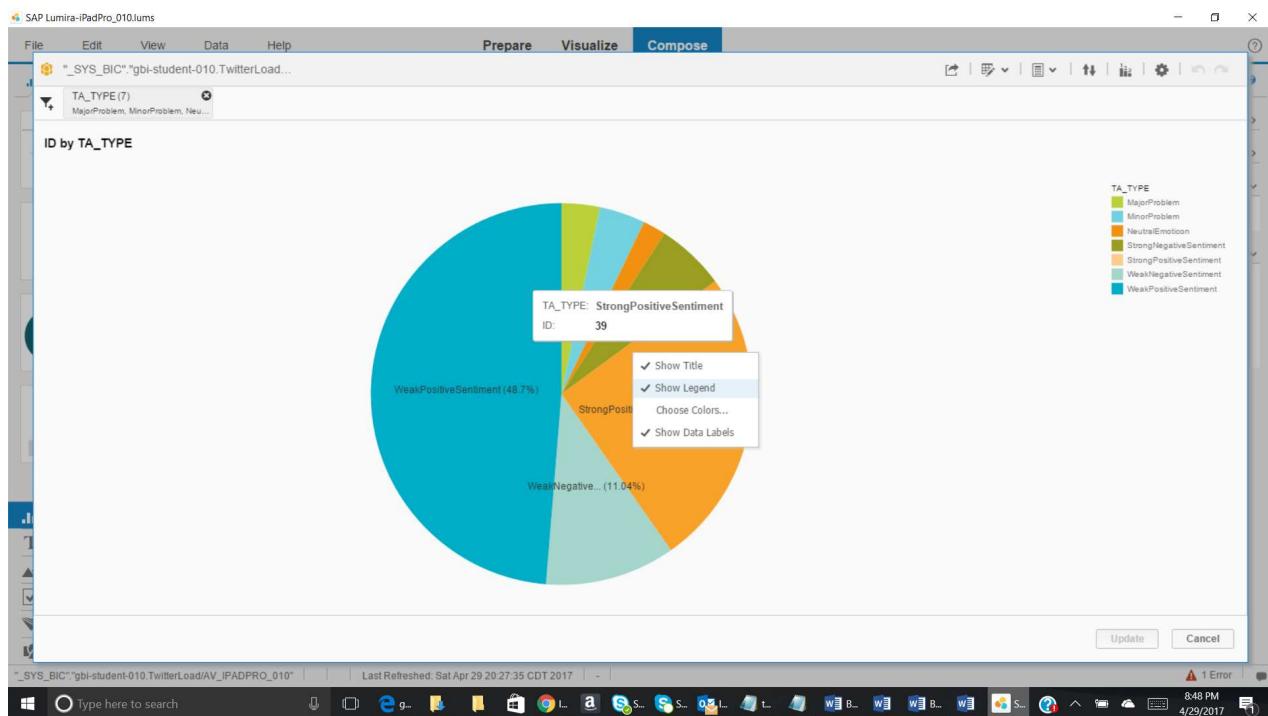
Your charts are shown on the right side of the view. Drag and drop the charts to the white page in the middle of the screen to add them to the presentation. Arrange the charts to present the content vividly. In the next screenshot, you can see one example how they can be arranged.



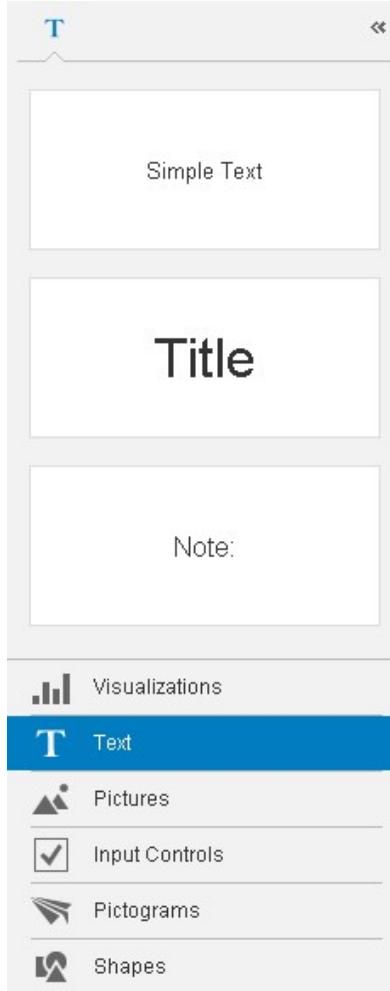
For the presentation we don't need the titles of the charts. Click on one element, e.g. the network chart. Then, click on the “explore” symbol on the upper right corner of the element. A new screen to explore and change the chart opens. Right click on the element and choose **Show Title**. Uncheck the Show Title.



Then click on the button **Update** to save your changes. Do the same for the pie chart and the tag cloud. If you want, you can also disable the legends for the pie chart and the tag cloud. Therefore, go to the explore mode, right click on the element and choose **Show Legend**.

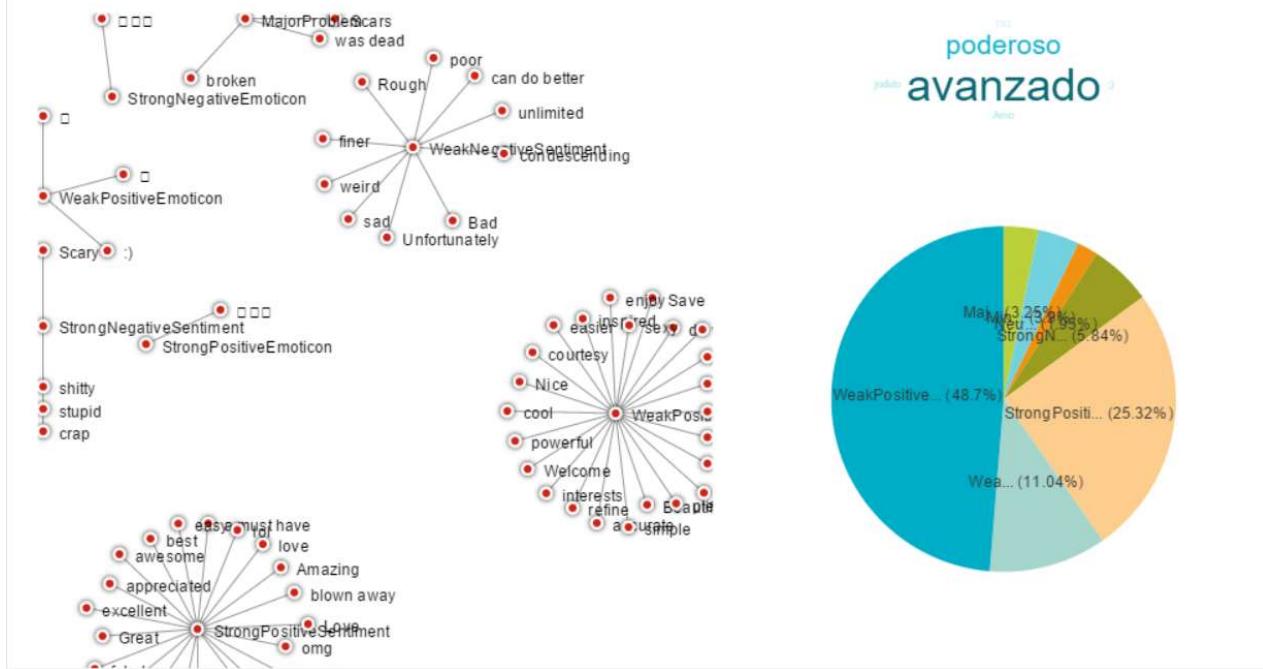


To add a title to the slide, go to “Text” on the lower left corner. Drag and drop the tile “Title” to the slide in the middle of the screen and change the text to “Sentiment Analysis iPad Pro”.

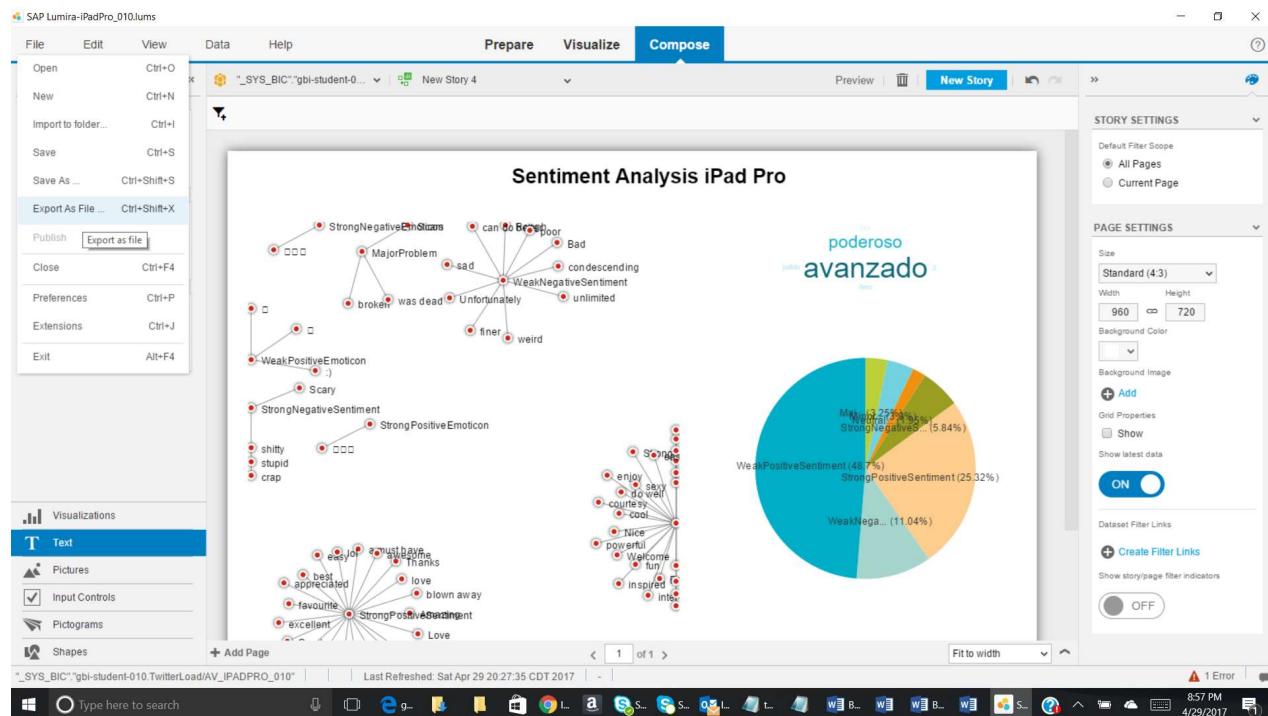


An example slide is shown in the next screenshot.

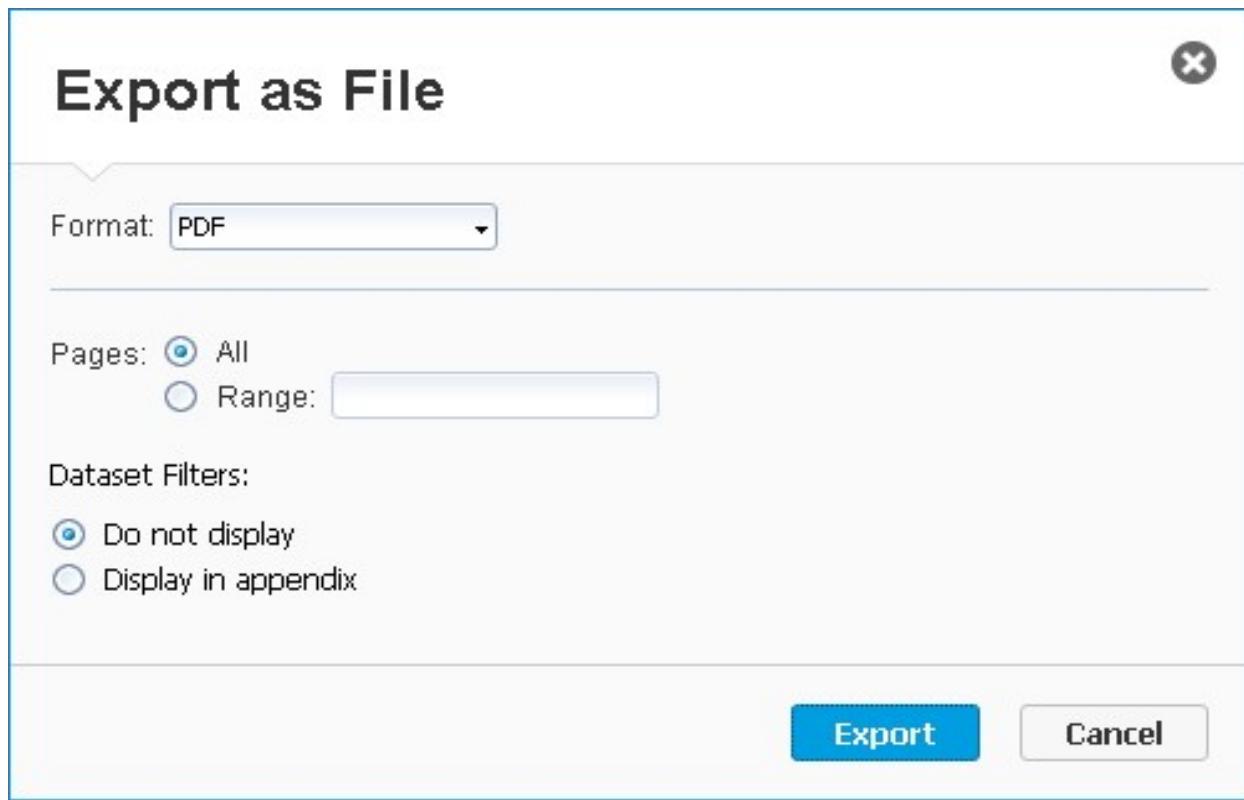
Sentiment Analysis iPad Pro



Go to file and select Export as File.



Click on it. The below given pop up will come.



Your slide will be downloaded. Now you can open it to show the presentation to the manager. Repeat the steps from this scenario for the Surface Pro 4 to compare the results.