

AGENDA

fans Oslo

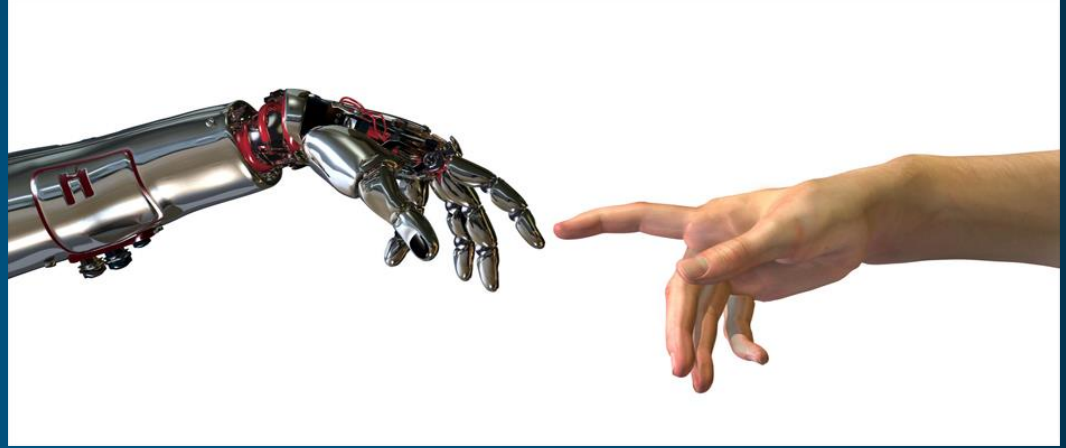
- AI/Deep Learning/Text Analytics
- Customer cases
- How does Text Analytics work in practice?
- Roadmap
- **Break**
- Open-source and SAS
- Deep learning (Image analysis) live demo
- Voice-to-Text live demo



Oslo 30/11-2017



Hot topics



ARTIFICIAL INTELLIGENCE



MACHINE LEARNING



DEEP LEARNING



1950

1960

1970

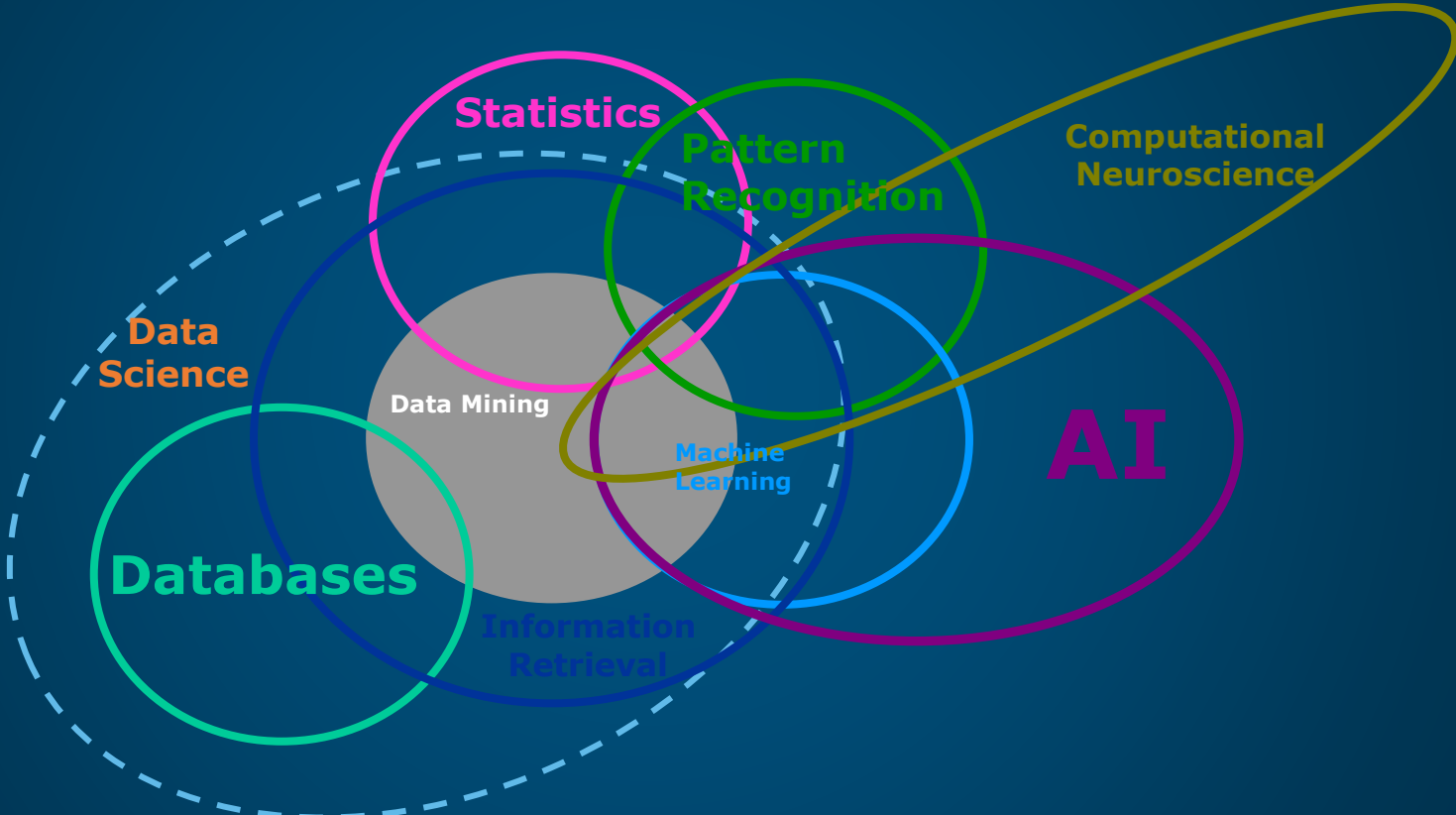
1980

1990

2000

2010

Multidisciplinary nature of data analysis



Machine Learning

- Definition

Arthur Samuel 1959: Field of study that gives computers the ability to learn without being explicitly programmed.

Wikipedia: Machine learning, a branch of artificial intelligence, concerns the construction and study of systems that can learn from data.

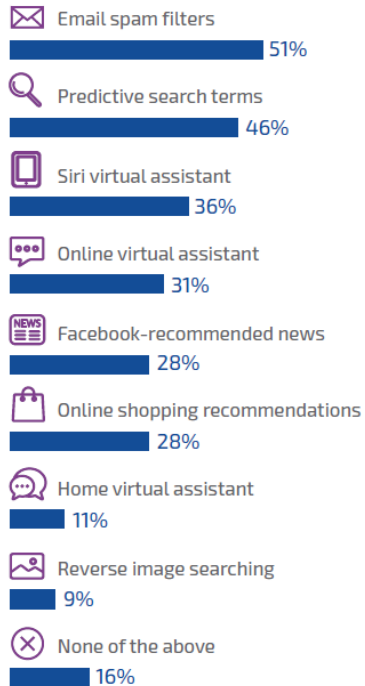
SAS: Machine learning is a method of data analysis that automates analytical model building. Using algorithms that iteratively learn from data, machine learning allows computers to find hidden insights without being explicitly programmed where to look.



Machine learning is everywhere ...

Which of the following technologies have you used or encountered in the last year?*

Check all that apply



*All use a form of AI

- 34 % of respondents think they have interacted with some sort of AI technology in the recent past.
- When asked about technologies they use in their daily lives, it reveals that 84 % had recently used at least one AI-powered service or device.
- What Consumers Really Think About AI: A Global Study (Pega)

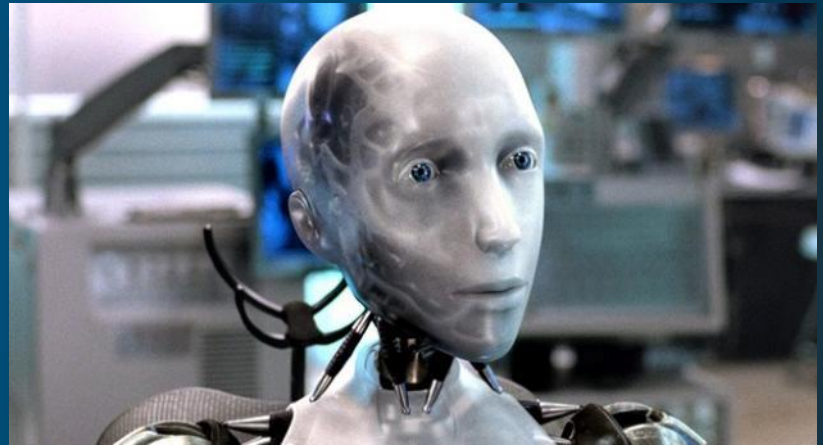
Deep learning

- Neural networks with more than two hidden layers
- Need more compute power and more data
- Extreme accuracy
- Applications in e.g.:
 - Speech recognition (recurrent neural networks)
 - Language translation
 - Image recognition (convolutional neural networks)
 - Face recognition



Use cases

- Recommendation applications
- Fraud detection
- Predictive maintenance
- Text analytics
- Pattern recognition
- Speech recognition
- Language generation and translation
- Self driving cars
- Advisors (assistants, Alicia T, Pepper)
- Etc., etc., etc....



© Getty Images, 509261913

Analytics



Healthcare



Customer Intelligence



Retail



Fraud and Security Intelligence



Risk Management



Artificial Intelligence

Approachable Analytics

- Open APIs
- Self learning
- Face Detection
- Emotion
- Text Analytics
- Improved Forecasting

Personal Assistant

- Life Coaches
- Literature Reviews
- Oncology X-rays & MRIs
- Personalized Medicine

Contextual Marketing

- Next Best Action
- Optimized A/B Testing
- Segment Discovery
- Customer Journey Optimization

Personalized Recommendations

- Virtual Shopping
- Conversational chat bots
- Stock Management
- Site layout

Adaptive Rare Event Modeling

- Surveillance
- Anomaly Detection
- Face Detection
- Narrative Report Summaries

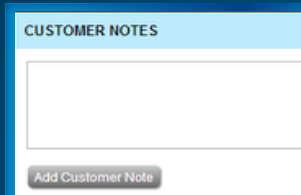
Due Diligence Monitoring

- Improved investment analyses
- Long Tail Risk Management
- Anti Hacking

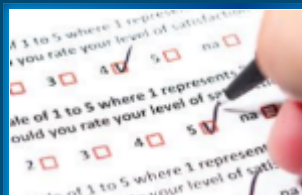
Uncover the value in your free-form text



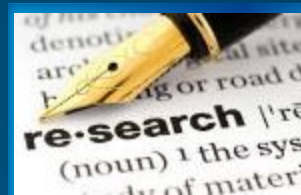
Call Center Notes



CRM Comments



Survey Feedback



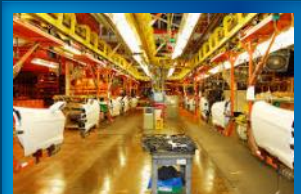
Research & Publications



Claims & Case Notes



Live Chat



Field Notes



HR data



Medical/Health Records



Contracts & Applications



Online Forums



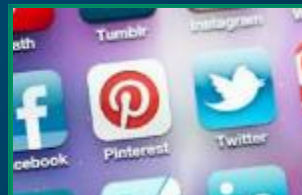
Blogs



Consumer Reviews



Online News



Social Networks

case studies

"The SAS analytics solutions are making our webchat agents more capable and more driven. In turn, they are delivering a better service to our customers."

Mark Calderhead, Data and Analytics Services, Royal Bank of Scotland

SAS helps Royal Bank of Scotland to become the number one bank for customer service, trust and advocacy by 2020.



SAS helps Royal Bank of Scotland unlock the Voice of the Customer

- Challenge – manual review of just 200 conversations
 - 3 million web chat conversations each year, channel growing in popularity
 - minimal understanding of causes of dissatisfaction
- Solution - initial analysis, focused on 500,000 conversations
 - data stored in Hadoop data lake
 - SAS Text Analytics automatically determines conversation topic / sentiment
 - SAS Visual Analytics presented the results in intuitive dashboards
- Benefit
 - understand customer objectives and which queries agents struggle to handle
 - see performance of individual agents so training efforts can be targeted
 - agent performance all-time high leading to higher customer satisfaction scores
 - as channel effectiveness increases eases inbound burden on call centres
- Future
 - automating process to and drive continuous improvement
 - now also analysing complaints and NPS surveys



“By helping us mine Voice of Customer, SAS has given us the power to know and understand our customers.”

Mohammed Chaara
Director of Customer
Insight & VOC
Analytics

Lenovo uses SAS Analytics allowed assessment of quality from the view of the customer

■ Challenge

- to bring the customer voice into the design process and quality equation
- understanding quality had built-in weaknesses and time lag
- difficult to decipher the causes of customer discontent and product issues
- 165 countries 30 languages

■ Solution - Lenovo Early Detection (LED) system

- SAS Text Analytics
- more than 300 users of SAS Visual Analytics

■ Benefit

- detecting product issues in a third the time of traditional warranty analysis.
- reduced warranty costs 10 - 15 %
- revamped F&Q's to reduce call centre requests 30 -50%.
- avoided a potentially sale-killing keyboard redesign

■ Future

- dashboard view for the C-suite

Major European airline

Complaint handling and corporate text analysis

■ Challenge

- established analytical centre of excellence, but no text analytics capability
- rising complaint levels
- three day lead time to manually code complaints, before they can be routed for handling
- codes were unnecessarily complex complaints (over 1,500 codes), and did not facilitate root cause analysis or operational handling
- wide variety of text sources and use cases (e.g. surveys, complaints, engineering reports, health and safety, Emails, legal, etc.)

■ Benefit

- reduced cost of handling complaints and reduced time to resolve
- simplified coding complexity and usability of these codes
- improved coding accuracy
- now looking at a variety of other use cases

SAS solution

- SAS Contextual Analysis
 - SAS Enterprise Miner
 - SAS Text Mining
- + 3rd party reporting interface



demonstration

- Browse
- Shortcut
- Collection
- Data Explorer
- Report Designer
- Data Preparation
- SAS Contextual Analysis
- Administrator
- Report Viewer

Welcome, SAS Demo User!

Here are a few quick tips:

- Add application shortcuts to your home page. You can customize the color and the name.
- Click the icon beside "SAS® Home" in the banner to access your applications using a side menu.
- Sign out of your application by selecting your name and clicking "Sign Out".
- Join a SAS community for great discussions on tips and best practices: <https://communities.sas.com/welcome>

Recent

- [Airline Opinion](#)
Jan 19, 2016, 10:36:56 AM

Visual Analytics Samples

/Products/SAS Visual Analytics/Visual Analytics Samples

- [SAS Visual Analytics Sample Incl...](#)
SAS report (2G)
- [SAS Visual Analytics Sample](#)
SAS report (2G)
- [Capital Exposure and Risk Sample](#)
SAS report (2G)
- [Casino Floor Performance Sample](#)
SAS report (2G)
- [Revenue Optimization Sample](#)
SAS report (2G)
- [Student Analysis Sample](#)
SAS report (2G)
- [Warranty Analysis Sample](#)
SAS report (2G)
- [Wireless Call Quality Analysis Sa...](#)
SAS report (2G)

Favorites

Content that you mark as a favorite will be displayed here. [Add favorites](#) now or later.

Links

Links will be displayed here. [Add links](#) now or later.

Summary

Name: Airline_Opinion
 Run status: Successful
 Created: Tuesday, January 19, 2016 05:34:52 AM GMT-0500
 Language: English
 Documents: 992
 Custom concepts: 15
 Terms: 3231
 Topics: 9
 Categories: 106
 SAS server directory: C:\User\sasdemo\Documents\My SAS Files\9.4\airline_opinion
 SAS metadata folder: /User Folders/sasdemo/My Folder/airline_opinion
 Sentiment model file path: Default

Status

Task	Task Up-to-Date	Last Run Date	Last Run Time	Last Run Duration	Run Status
DATASOURCE	Yes	Jan 19, 2016	06:37 AM	Less than a second	
CONCEPTS	Yes	Jan 19, 2016	09:00 AM	21 seconds	
TERMS	Yes	Jan 19, 2016	09:00 AM	29 seconds	
TOPICS	Yes	Jan 19, 2016	09:00 AM	5 seconds	
CATEGORIES	Yes	Jan 19, 2016	09:01 AM	48 seconds	

Last run date: Tuesday, January 19, 2016 09:01:52 AM GMT-0500
 Last run duration: 1 minutes, 56 seconds

Data Source

Airline_Opinion

Properties Run View

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TOPICS	Yes	Jan 19, 2016
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Last run date: Tuesday, January 19, 2016 09:01:52 AM GMT-0500
Last run duration: 1 minutes, 56 seconds

Data Source

Edit Project

Data Source Step 4 of 5

Properties Lists Predefined Concepts Data Source Run

Select a representative data source to help identify analysis topics and to test the accuracy of your analysis model.

Select a data source later
Select variables from within a data set
Use files in a directory

Select a data set and variables:

Data set: SCA AIRLINE_OPINION Browse
Text variable: review +
 Text variable contains a file reference

Category variables: +
cabin

1 category variable

Previous Next Finish Cancel

Kept Terms

Search

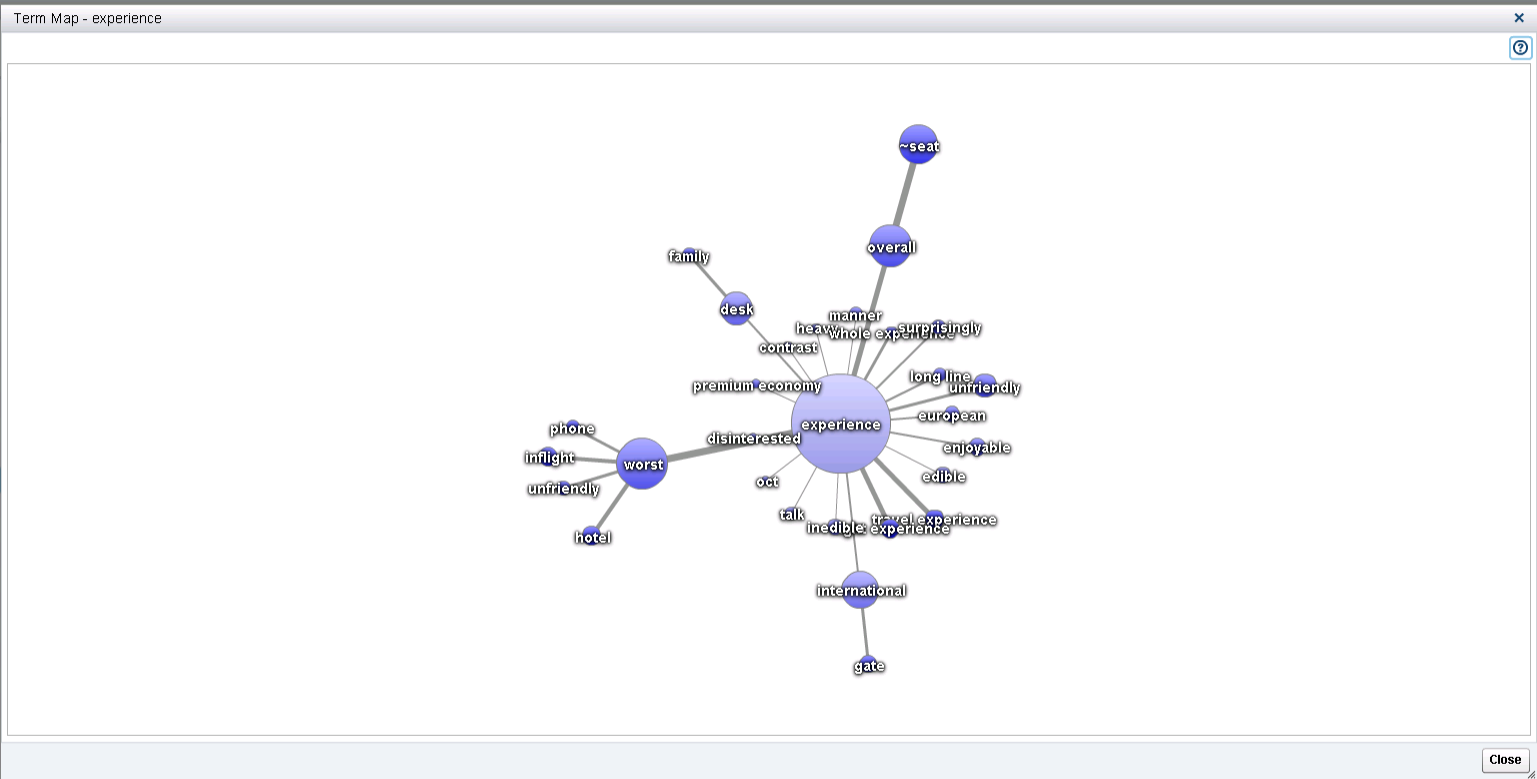
Terms and Synonyms	Number of Documents	Concept
flight	891	
fly	555	
time	458	
hour	431	
seat	426	
service	416	
airline	374	
plane	355	
food	283	
board	274	
first	262	
late	254	
crew	250	
experience	230	
experience	206	
experienced	30	
experiences	7	
experiencing	2	
staff	227	
back	223	
delayed	221	CON_NEGATIVE
return	216	
airport	213	
minute	210	
customer	209	
arrive	207	

Dropped Terms Documents

Search

Terms and Synonyms	Number of Documents	Concept
be	960	
the	942	
to	941	
and	937	
a	848	
on	806	
in	755	
i	745	
have	743	
for	701	
of	696	
with	628	
not	613	
from	571	
they	571	
that	551	
will	509	
at	505	
it	492	
my	488	
but	479	
this	474	
do	463	
we	449	
get	397	
an	359	

- flight
- by
- time
- hour
- seat
- service
- airline
- plane
- food
- board
- first
- late
- crew
- experience**
 - experience
 - experienced
 - experiences
 - experiencing
- staff
- back
- delayed
- return
- airport
- minute
- customer
- arrive



Terms and Synonyms	Number of Documents	Concept
flight	891	
fly	555	
time	458	
hour	431	
seat	426	
service	416	
airline	374	
plane	355	
food	283	
board	274	
first	262	
late	254	
crew	250	
experience	230	
experience	206	
experienced	30	
experiences	7	
experiencing	2	
staff	227	
back	223	
delayed	221	CON_NEGATIVE
return	216	
airport	213	
minute	210	
customer	209	
arrive	207	

Documents (230 of 230)

Term > experience

Narita - Bangkok June 13 Business Elite 747. Slight delay due to hold for other delayed inbound flights but all in all an excellent flight. Chief Purser was an **experienced** friendly (old school) gentleman who worked hard to insure good service. Seat was a comfortable lie flat pod offering more privacy than the first class American 777 I had just connected from. Decent food with even a light second offering before landing. Excellent..

I was a bit stubborn about flying Delta for the first time since I'm a fan of Frontier and I don't fly very often about once every three to four years. I took flight 1531 from MSP to BWI and I was very impressed. We left on time and the crew was friendly. After this **experience** I am very eager to fly Delta again.

DL 1134 PBI-ATL. Great ground **experience**. Inbound flight late prior to equipment arrival gate agents asked for volunteers to check baggage at no charge to destination to speed up boarding and ease overheads. Turn around was 25 minutes gate arrival-departure. Plane was clean crew greeted boarding passengers with genuine smiles. They assisted loading overheads with no attitude. In flight they chatted with passengers. ...

Considering how Delta Airlines was an American Air carrier I initially wasn't expecting much and imagined that service would be mediocre sort of like Air Canada but to my surprise my Delta **experience** was great Staff were polite the flights were punctual with my returning flight from MSP- YVR being about 15 minutes late due to a computer that needed replacement. Other than the fact that they should really replace/refurbish those ...

Boy are we never going to fly Delta ever again. Our first **experience** with Delta involved our honeymoon - they overbooked our flight to go to Jackson Hole so they re routed us to a different airport and set us up with a car service to take us to Jackson Hole (this delayed our trip about 5-6 hours and we were driving through Yellowstone Park in pitch black to our cabin). They also gave us Delta vouchers to put towards a ticket for our...

YUL-JFK-NRT-HKG. It was my first time flying Delta. I usually fly Japan Airlines or any other Asian airlines because of all the **bad experiences** I had with US based Airlines. From the check in agent I was greeted with a big smile. The planes were clean flight attendants full of energy and smile. To my surprise the captain apologize for the slight delay we had from JFK to Narita. That is something you hear only on Asian Airlines. Th...

Topics	😊 %	😡 %	😐 %	Number of Documents
All Topics (992)				
+cancel,+delayed,+day,weather,pm	0	98	2	101
good,+comfortable,+crew,+cabin,+fri	87	8	5	103
+line,+check,+bag,+board pass,+pas	9	77	14	88
+plane,+attendant,+gate,+connect flig	12	81	7	85
+airways,+us airways,+philadelphia,phi,charlotte	32	61	7	97
+class,business,+first class,first,+lounge	41	49	10	88
united,united,+san francisco,san francisco	18	74	8	84
+southwest,extra,+seat,+pay,+trip	32	60	7	81
delta,atlanta,jfk,+delta,detroit	32	64	4	96

- Merge Topics
- Split Topic
- Add Topic As Category
- Show Topic Term Map

Topic > +cancel,+delayed,+day,weather,pm

Wilmington NC to Philadelphia and Philadelphia to Burlington Vermont. **First flight delayed for 'maintenance'** a couple of **hours** then **finally canceled**. Then **booked** on evening **flight** at 7.40pm. That **flight canceled due to weather**. **Finally** I took a **flight** the **next morning** at 6.40 **arrived** to my **destination** a **day late**. My **return trip scheduled** for 5.40 **pm** but there was a **delay**. Counter personnel could not give straight answers or ...

1

My husband and I recently **returned** from a **trip** using **United Airlines**. We **arrived** at our international **destination** **12 hours later** than the **original arrival time**. Since that was mainly **due to weather** I can't blame **United**. On the way **home** though we had a terrible experience. Our final **flight** from **Houston** to Fayetteville was **supposed** to board at 6.45**pm** but they kept delaying it around every half **hour** until **finally** at midnight they **canceled** t...

0.991

Flew to Chicago on Friday **flight** was **delayed 6 hours**. When it came **time to return home** I received an email that my **flight** was **canceled**. I talked to a **United** rep she told me an identical **flight** was **leaving** at the same **time** as my **canceled flight** so she would **book** me on that one. Turns out she misinformed me there was no such **flight**. I got to the **airport** found out she had **booked** me for a **flight** the following **day** so I had to **rebook** ye...

0.968

I will never **fly United** ever again. **Leaving** from LAX-ELP **United** decided to do "maintenance" on the **aircraft** before it takes off which set us back **2 hours** in **departure** which meant most everyone was going to miss their **connecting flight** in **Denver**. We were redirected to the **customer service** which took 1.5 **hrs** standing in line to **finally** be told that there were no **flights** until the **next day** that could take me **home**. Ridiculous. At least they ...

0.956

Wilmington NC to **LaGuardia NY**. Received message of **canceled flight 45 minutes** before **leaving** for **airport**. **Rescheduled** for **flight 3.5 hours later**. That **flight** was then **delayed** for over **3 hours** and eventually **cancelled** kept saying it was **weather** related. **Booked** us for **flight** at 6 am the **next morning** started **taxiing** out and stopped for a **45 minute delay**. **Finally** got to **LaGuardia** and **found** that our **next flight** had been **canceled**. ...

0.93

Why is it that **United** is the only **airline** that **canceled a flight** from **Denver** to Omaha **due to weather** but all the other **airlines** going to and from **Denver** only **delayed**? Of course because we are having poor **weather** they can blame it on the **weather** which means as a **customer** we cannot recoup anything from them and we have to then **wait** until a **pm flight** when we are **scheduled** on the **first flight** out of OMA. I wonder how many ...

0.886

Categories	Document Frequency	Number of Documents
✓ All Categories		965
▼ All Categories		
▼ cabin		864
► Business		83
► Economy		751
► First Class		68
► Premium		76
CAT_DELAY		137
CAT_ROUTE		303
▼ Negative		563
Neg_Baggage		35
Neg_Checkin		35
Neg_Crew		47
Neg_Delay		425
Neg_Entertainment		45
Neg_Food		95
▼ Positive		425
Pos_Baggage		66
Pos_Checkin		46
Pos_Crew		98
Pos_Delay		191
Pos_Entertainment		91
Pos_Food		165

I just returned from a round-trip First **Business Elite** FLL-ATL-MUC-ATL-FLL trip. I really must say that all the flights were great. Every flight was on-time the flight crews were exceptionally good the in-flight entertainment was good but could be improved the meals were good and tasty. I only wish Delta would update its meal service and add some new items. Going over to MUC the man behind me even commented to the flight ...

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We flew paid **business** class fares in Delta's **Business Elite** LAX to SYD and SYD to LAX in the forward B/E cabin on Delta's 777-200LR. We checked in using the kiosks in Delta's terminal and went through security quickly (we are both Global Entry/Precheck). The Delta SkyClub at LAX which doubles as Delta's **business** class lounge was crowded noisy and inferior in all respects to the **business** class lounges operated by oth...

JFK-LAX on a 757-200 in **Business** on May 17 angled seats with ample leg room excellent service then onward to HNL on a 757-300 in First: seats comparable to Premium Economy as far as the leg room goes poor recline the service was excellent though large screen IFE good food and drinks. May 25 HNL-LAX on an aged 767-200 in First same poor seat recline but good food and service old-style IFE. May 26 LAX-NYC on a ...

I just tried Delta's "**Business Elite**" from JFK to BOG on a 737-700 and what a ripoff! These "premium" seats offer a pitch of just 37 inches (that's less than JetBlue's premium economy), they also recline quite a bit and the result is a wedge experience which made for one of the most uncomfortable flights I can remember. I couldn't even open my computer until my neighbor decided to join his wife in much more comfortable ...

The gate experience is good with staff pointing the way. This is especially good at Paris DeGaulle where there are endless gates and lines and confusion. Once on board the experience lessens as the attendants seemingly are frequently tired and occasionally indifferent. I have never been hot (not warm but hot as in a cabin temp of the high 70's) on an overseas flight. A request to a attendant brought the equivalent of a sleepy shru...

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CAT_DELAY		137
CAT_ROUTE		303
▼ Negative		563
Neg_Baggage		35
Neg_Checkin		35
Neg_Crew		47
Neg_Delay		425
Neg_Entertainment		45
Neg_Food		95
▼ Positive		425
Pos_Baggage		66
Pos_Checkin		46
Pos_Crew		98
Pos_Delay		191
Pos_Entertainment		91
Pos_Food		165

```
(SENT,  
  (DIST_3,  
    (OR, "cabin crew", "crew", "steward", "stewardess", "purser", "onboard staff"),  
    (OR, "[CON_NEGATIVE]", "[CON_NEGATED_POSITIVE]")  
  )  
)
```

Categories	Document Frequency	Number of Documents
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Pos_Crew		98
Pos_Delay		191
Pos_Entertainment		91
Pos_Food		165

Category > Negative > Neg_Crew

I flew from Toronto to Atlanta Atlanta to Cancun and Cancun to Atlanta. The seats were very comfy with a good recline especially between Atlanta and Cancun. Crew was very polite but the food choice was very poor. My flight between Toronto and Atlanta was the worst. It was operated by express jet on the behalf of Delta Airlines: poor food was served and the crew wasn't helpful at all. The seats were very hard. Definitely a bad ...

Took 4 Delta flights 11/10/13 London - Minneapolis - Las Vegas 15/10/13 Las Vegas - Atlanta - London. First time experiencing flying with Delta and it was very disappointing. Like previous comments booked ticket through KLM/Air France where we have always receive a brilliant service. Wondering why they have partnered with Delta to lower their standards. Flight from London to Minneapolis ever so rude cabin crew. Nobody at l...

AMS to JFK 14th Sep Flight DL 71. Since my husband is 2 meters tall and suffers from a double hernia I always book him a comfort seat. As I did on his flight yesterday (09/14). The seat however was broken and did not recline at all the inflight entertainment system was broken as well. On telling a crew member about the problem it was laughed away and he was told to "phone China because that is where the manufacturer is ...

Very chaotic check in at JFK for Europe. We tried to book our seats in advance and noticed that all 3 of us 2 adults and one child of 9 were seated apart. No one at the gate would help us. Once on the overcrowded flight we found the flight crew rude who made it clear that it would be my job to negotiate with other passengers if I wanted to sit with my family. Long unassisted walk to gate where a bus would ship us off to another termina...

NRT-BKK. Connected to BKK from SEA via NRT. Flight left on time. Upgraded 747-400. Seat was comfortable with the additional leg room and recline in Economy Comfort. The small fee paid for the upgrade was worth it. Food was adequate and choices were available between entrees. Free alcohol in Economy Comfort but did not see many passengers taking advantage of this perk. Lots of overhead storage on this airplane. ...

I flew from Brussels (Belgium) to Fort Lauderdale and back on 16th Feb and 24th. I was supposed to take connecting flights via Philadelphia and Charlotte on both trips. I actually missed my first connection on my way to FLL due to the long security lines the customs control and the baggage re-checking in PHL. I arrived just a few minutes after my flight to CLT had closed and a very rude lady didn't want to let me board the plane even ...

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Neg_Food		95
▼ Positive		425
Pos_Baggage		66
Pos_Checkin		46
Pos_Crew		98
Pos_Delay		191
Pos_Entertainment		91
Pos_Food		165

Category > Positive > Pos_Entertainment

Flew Mar 30 NRT to BKK. All flights were great. Flight was on-time and the **in-flight entertainment** was **great**. Apart from the meals - some Thai passengers cannot eat beef so the flight crews tried to ask other passengers who could eat beef and changed the meals around. We feel disappointed with their food services.

I just returned from a round-trip FirstBusiness Elite FLL-ATL-MUC-ATL-FLL trip. I really must say that all the flights were great. Every flight was on-time the flight crews were **exceptionally good** the **in-flight entertainment** was **good** but could be improved the meals were good and tasty. I only wish Delta would update its meal service and add some new items. Going over to MUC the man behind me even commented to the flight ...

Narita - Bangkok June 13 Business Elite 747. Slight delay due to hold for other delayed inbound flights but all in all an excellent flight. Chief Purser was an experienced friendly (old school) gentleman who worked hard to insure good service. Seat was a comfortable lie flat pod offering more privacy than the first class American 777 I had just connected from. Decent food with even a light second offering before landing. **Excellent..**

I flew from Heathrow to Seattle. To be honest I was dreading the flight as I had read some really bad reviews of Delta. But it was excellent. The seat back screens were the biggest I have seen in Economy - with a **great** selection of **films** TV shows and music. The food whilst being obviously "airline food" was nice enough and lots of it. They listed only one meal - lunch - on the website but they served two more rounds of ...

DL 1134 PBI-ATL. Great ground experience. Inbound flight late prior to equipment arrival gate agents asked for volunteers to check baggage at no charge to destination to speed up boarding and ease overheads. Turn around was 25 minutes gate arrival-departure. Plane was clean crew greeted boarding passengers with genuine smiles. They assisted loading overheads with no attitude. In flight they chatted with passengers. ...

JFK-LAX on a 757-200 in Business on May 17 angled seats with ample leg room excellent service then onward to HNL on a 757-300 in First: seats comparable to Premium Economy as far as the leg room goes poor recline the service was excellent though **large screen IFE good** food and drinks. May 25 HNL-LAX on an aged 767-200 in First same poor seat recline but good food and service old-style IFE. May 26 LAX-NYC on a ...

Concepts

- Concept
 - ADDRESS
 - COMPANY
 - CURRENCY
 - DATE
 - INTERNET
 - LOCATION
 - MEASURE
 - NOUN_GROUP
 - ORGANIZATION
 - PERCENT
 - PERSON
 - PHONE
 - PROP_MISC
 - SSN
 - TIME
 - TIME_PERIOD
 - TITLE
 - VEHICLE
- Custom Concepts (15)
 - CON_NEGATED_NEGATIVE
 - CON_NEGATED_POSITIVE
 - CON_NEGATIVE
 - CON_POSITIVE
 - FCT_DELAY
 - FCT_ROUTE
 - INTERMEDIATE

Predefined Concept > TIME_PERIOD

Flight from NY La Guardia to Cleveland OH at 01.15am email said flight would be delayed by 2 hours . Delayed our taxi to airport by 2 hours . Got to airport to find flight now cancelled but no email communication from Delta no phone call just the pleasure of an extra 1.5 hours at the airport as they had rebooked us onto 3.20 flight. Staff no training in apologising to passengers for inconvenience - staff couldn't give a damn. Although ...	+
Originally I had a 2 hour layover. Delta changed our flights to a 4 hour layover. The plane now has been delayed another 20 minutes so my family of 6 and I are at the airport right now for a 4.5 hour layover. This is not acceptable Delta should do something about this. Fly with an airline that cares. It's surely not Delta!	+
I was a bit stubborn about flying Delta for the first time since I'm a fan of Frontier and I don't fly very often about once every three to four years . I took flight 1531 from MSP to BWI and I was very impressed. We left on time and the crew was friendly. After this experience I am very eager to fly Delta again.	+
DL 1134 FBI-ATL. Great ground experience. Inbound flight late prior to equipment arrival gate agents asked for volunteers to check baggage at no charge to destination to speed up boarding and ease overheads. Turn around was 25 minutes gate arrival-departure. Plane was clean crew greeted boarding passengers with genuine smiles. They assisted loading overheads with no attitude. In flight they chatted with passengers. ...	+
Considering how Delta Airlines was an American Air carrier I initially wasn't expecting much and imagined that service would be mediocre sort of like Air Canada but to my surprise my Delta experience was great Staff were polite the flights were punctual with my returning flight from MSP-YVR being about 15 minutes late due to a computer that needed replacement. Other than the fact that they should really replace/refurbish those ...	+
LHR-JFK (Virgin) then JFK-DTW with Delta Connection (Returned on the same route and carriers 10 days later. Held up at JFK both ways for 12 hours due to weather not Delta's fault but our return connection to LHR was rebooked without our knowledge due to our late departure from DTW. This resulted in a rush to try and make the connection only to be told we were of the flight and rebooked for the following morning. Delta then di...	+

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 - CON_NEGATIVE
 - CON_POSITIVE
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 - FCT_ROUTE
 - INTERMEDIATE

Custom Concept > FCT_DELAY

```

1 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ delay }", "_timeperiod{ TIME_PERIOD }")
2 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ delayed }", "_timeperiod{ TIME_PERIOD }")
3 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ cancel }", "_timeperiod{ TIME_PERIOD }")
4 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ cancelled }", "_timeperiod{ TIME_PERIOD }")
5 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ late }", "_timeperiod{ TIME_PERIOD }")
6 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ re-schedule }", "_timeperiod{ TIME_PERIOD }")
7 PREDICATE_RULE:(delay,timeperiod):(DIST_8, "_delay{ re-scheduled }", "_timeperiod{ TIME_PERIOD }")
8
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29
30

```

Custom Concept > FCT_DELAY

1 matched string

The flight was **delayed over 3 hours.**

Home SAS Contextual Analysis

File Help Sign Out

Airline_Opinion

Concepts Run View

Concepts

Concept

- ADDRESS
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- INTERNET
- LOCATION
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- NOUN_GROUP
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 - CON_POSITIVE
 - FCT_DELAY
 - FCT_ROUTE
 - INTERMEDIATE

Edit Rules Documents Test Rules

Category Score Code

```
*****
* SAS Contextual Analysis
* Categories Score Code
*
* Modify the following macro variables to match your needs.
* The "mco_binary_path" variable should have already been
* set to point at the categories binary for the
* associated SAS Contextual Analysis project.
*****
/* check if the variables were defined elsewhere - this is used for embedding code into SAS Text Miner */
%sysfunc(%symexist(mn_defined_vars), %nrstr(
  /* the path to the directory containing the data set you would like to score */
  %let lib_path=(put_your_directory_path_here);
  /* the data set you would like to score */
  %let input_ds = _my_lib.(put_your_data_set_name_here);
  /* the column in the data set that contains the text data to score */
  %let document_column = (put_your_document_column_name_here);
));

libname _my_lib "&lib_path";
/* boolean indicating if the document column is a reference to a file path (Y/N) */
%let is_reference = 'N';
/* the name of the output data set to produce */
%let output_position_ds = _out_pos_ds;
/* the name of the output document data set to produce */
%let output_document_ds = _out_docs_ds;
/* the path to the mco binary... should have been set to your SCA project's category binary path */
%let mco_binary_path = "C:\Users\ssasdemo\Documents\My SAS Files\9.4\airline_opinion\config\categories.mco";

/* assign IDs to the documents */
data _input_doc_ds;
```

Close

- Browse
- Shortcut
- Collection
- Data Explorer
- Report Designer
- Data Preparation
- SAS Contextual Analysis
- Administrator
- Report Viewer

Welcome, SAS Demo User!

Here are a few quick tips:

- Add application shortcuts to your home page. You can customize the color and the name.
- Click the icon beside "SAS® Home" in the banner to access your applications using a side menu.
- Sign out of your application by selecting your name and clicking "Sign Out".
- Join a SAS community for great discussions on tips and best practices: <https://communities.sas.com/welcome>

Recent

- [Airline Opinion](#)
Jan 19, 2016, 10:36:56 AM

Visual Analytics Samples

/Products/SAS Visual Analytics/Visual Analytics Samples

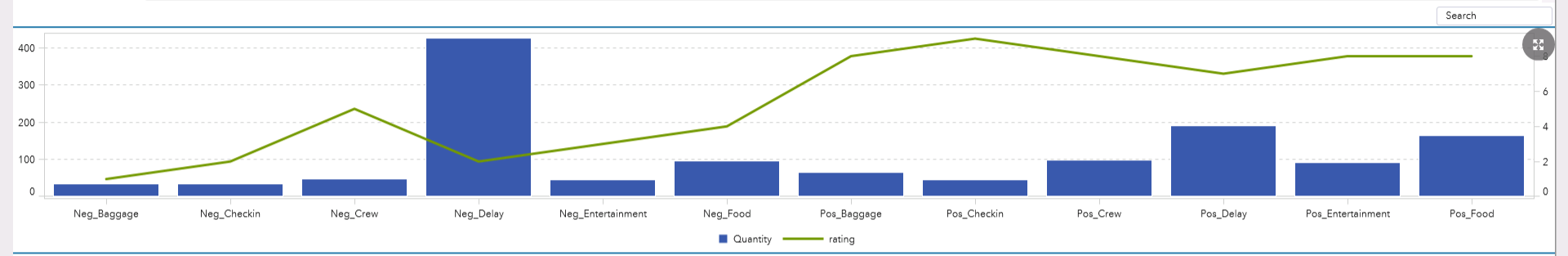
- [SAS Visual Analytics Sample Incl...](#)
SAS report (2G)
- [SAS Visual Analytics Sample](#)
SAS report (2G)
- [Capital Exposure and Risk Sample](#)
SAS report (2G)
- [Casino Floor Performance Sample](#)
SAS report (2G)
- [Revenue Optimization Sample](#)
SAS report (2G)
- [Student Analysis Sample](#)
SAS report (2G)
- [Warranty Analysis Sample](#)
SAS report (2G)
- [Wireless Call Quality Analysis Sa...](#)
SAS report (2G)

Favorites

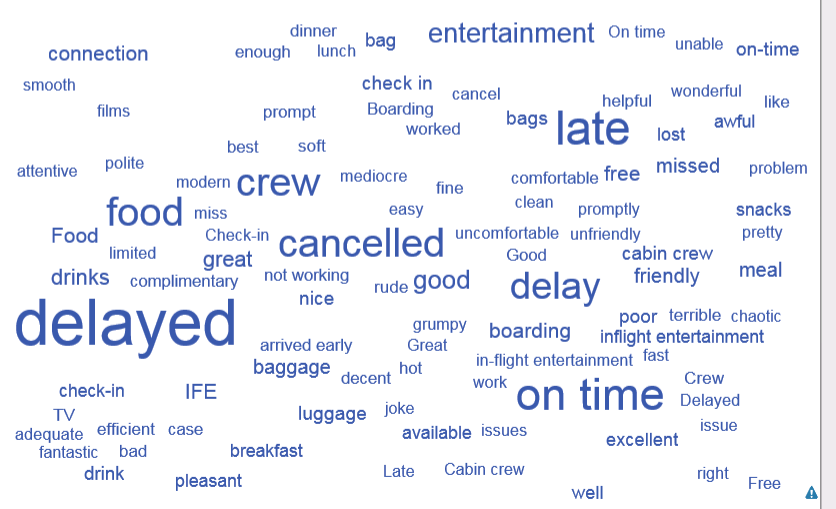
Content that you mark as a favorite will be displayed here. [Add favorites](#) now or later.

Links

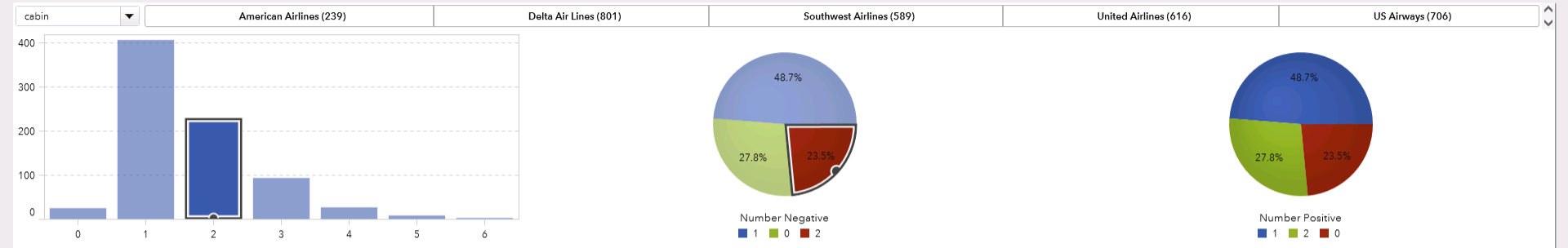
Links will be displayed here. [Add links](#) now or later.



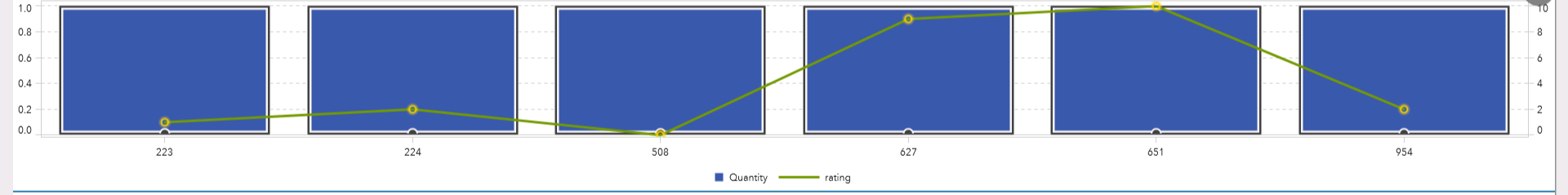
document_id	review
6970	<p>YYC-IAH-MUC in Y. As an Aeroplan Elite I got premier access check in and boarding which was greatly appreciated. I also like that United seems to be making an effort to control oversized carry-ons. As a result both flights even the full flight to Munich left with all bags in the cabin. Planes were comfortable and clean (A320 and 764) with adequate room for my 5'8" self. Crews were generally fantastic a real surprise given United's reputation. I like United's boarding structure as it prevents a mad dash to board and worked very well making boarding easy and comfortable. Only gripe is food on 10 hour IAH-MUC flight- small dinner and then before landing a mini croissant and small fruit cup- This is what I usually get on YYZ-MUC but that is a 7 hour flight. I expected more on this longer route and can imagine that some larger passengers were quite hungry! Connection in IAH was also very easy no security screening required no bus or train either even though I had to change terminals. Very impressed!</p> <p>YWG-ORD-FLL-ORD-YWG. Check seemed more complicated than other carriers but did manage to figure it out. Left YWG on-time. Arrived into ORD more or less on time. Had 50 minutes to get to next gate which was miles away. Got to the gate with about 10 minutes to spare. 4/7 of my group members got seats. Three were put up in a hotel for the afternoon and the closest United could get them to FLL the same day was to fly to MEM. They arrived in MEM only having to drive 13 hours to get to FLL. They were fairly compensated that was the only good part of the outbound trip. On the way back check in was a breeze as it was deserted. Ended up getting to the gate with about 2 hours to spare. Plane was delayed about 25 minutes aggravating but didn't lose any sleep over it. Got into ORD a couple minutes late. My connection to YWG was supposed to be 40 minutes but our plane which was coming in from SAV was 4.5 hours late leaving thus delaying us 4.5 hours. I was insulted as we only received a \$7 voucher. The only shop</p>



← ☰ Airline_Opinion_2 - Explore Multiple Categories 🔍 📄 ⋮ 📖 1 Close



[All Category Link](#) > [Negative](#) > Neg_Checkin



category_level3 ▲	Neg_Checkin	Neg_Crew	Neg_Delay	Total
recommended ▲	Quantity	Quantity	Quantity	Quantity
NO	6	1	5	6
Total	6	1	5	6

Visual Text Analytics (VTA)

- Text Mining, Contextual Analysis, Sentiment Analysis tasks all in one unified interface.

The screenshot displays the SAS Model Studio - Build Models interface. The top navigation bar includes 'Model Studio - Build Models', a search bar, and 'SAS Demo01'. The main workspace is titled 'Project 4' and shows a 'Default Text Analytics Pipeline' with six sequential nodes: 'data component', 'concepts component', 'parse component', 'sentiment component', 'topics component', and 'categories component'. The right-hand panel is titled 'topics.component.name.txt' and contains a 'Description' field with the value 'topics.component.description.txt'. Below this, the 'Topic Discovery' section is expanded, showing a checked option for 'Automatically determine number of topics', a 'Manually set number' field with the value '10', and a 'Preferred method' dropdown set to 'Exact'. At the bottom of the panel, there are two sliders for 'Term density' and 'Document density', both currently set to 1.

Visual pipeline framework

Topic Generation

AirRnR_TextReviews_v3 > Topics Close

Topics **11** 🔍 🔄 ?

Topic	Documents
<input type="checkbox"/> +house, +room, +station, +nice, +minute	12073
<input checked="" type="checkbox"/> +apartment, +great, +location, again, +stay	11883
<input type="checkbox"/> +home, +feel, +make, wonderful, +house	11513
<input type="checkbox"/> +distance, walking, +walking distance, +restaurant, +walk	10516
<input type="checkbox"/> not, no, +night, +say, +leave	10354
<input type="checkbox"/> +kitchen, +bathroom, +bed, +bedroom, +room	10280
<input type="checkbox"/> +reservation, +cancel, +arrival, +automate, +post	5109
<input type="checkbox"/> +el, muy, de, +en, que	1838
<input type="checkbox"/> est, de, nous, très, le	1798
<input type="checkbox"/> molto, che, non, casa, ci	1795
<input type="checkbox"/> +die, sehr, der, war, mit	839

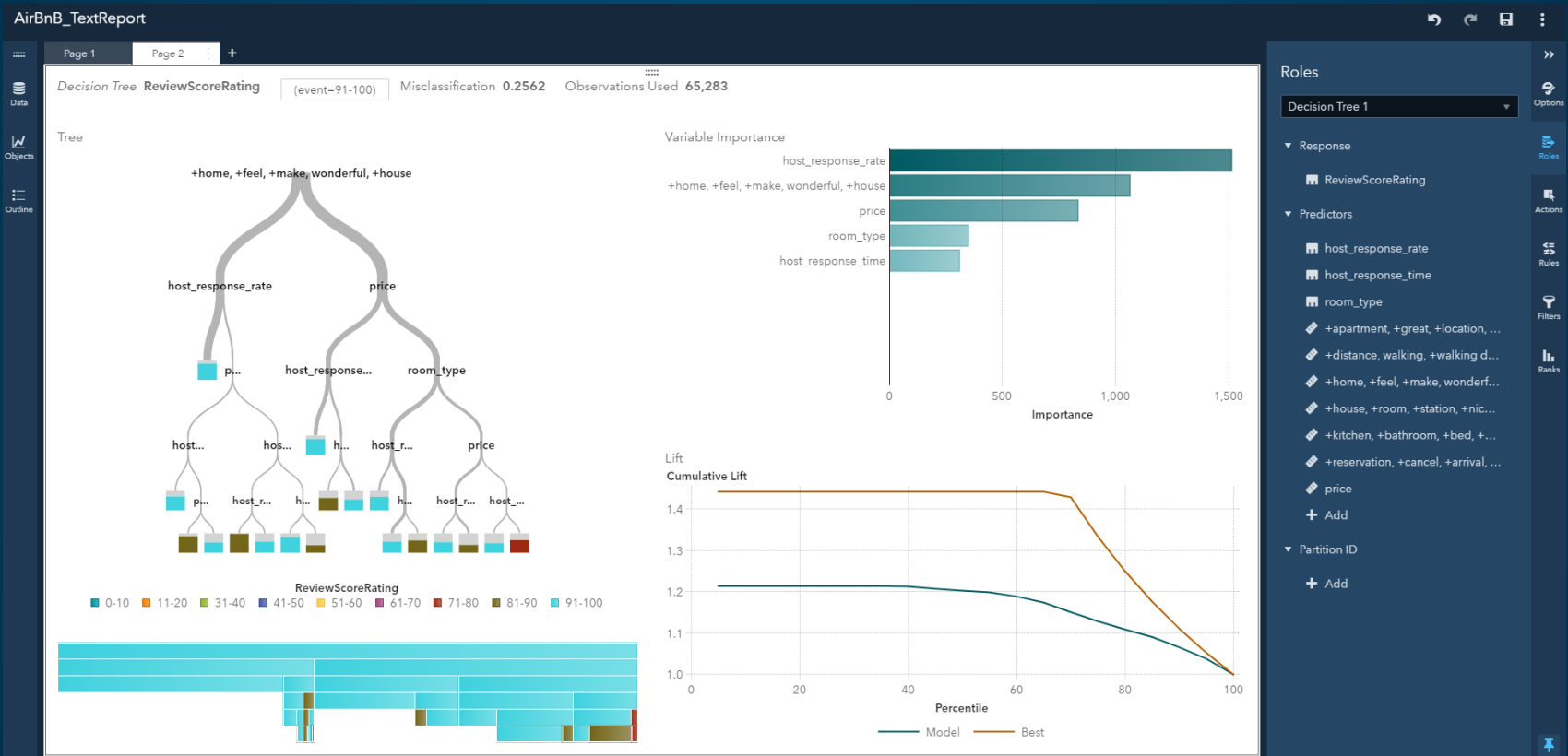
Documents **11883 of 65535** 🔍 🔄 ?

Term	Relevancy	Role	Documents	Frequency
<input type="checkbox"/> ▶ apartment	0.272	N	18347	27568
<input type="checkbox"/> ▶ great	0.248	A	21850	27703
<input type="checkbox"/> ▶ location	0.198	N	20594	22283
<input type="checkbox"/> ▶ stay	0.180	V	21523	26950
<input type="checkbox"/> again	0.180	ADV	11789	12400
<input type="checkbox"/> definitely	0.171	ADV	9314	9578
<input type="checkbox"/> very	0.170	ADV	34381	56989
<input type="checkbox"/> ▶ place	0.168	N	21777	29611
<input type="checkbox"/> ▶ recommend	0.154	V	13692	14022
<input type="checkbox"/> ▶ great location	0.154	nlpNounGroup	4647	4680

comments 🔍 📄 📑 ?

	Relevancy	Senti...	Review
<input checked="" type="checkbox"/> Quiet location, close to everything. Bernie was a great host	0.857	😊	91-1
<input type="checkbox"/> Easyundefined check in, quiet space, and in a great location. Would definitely rebook.	0.932	😊	91-1
<input type="checkbox"/> Bernie gave me a tour of the building and the condo . Very nice and luxurious. Everything was as advertised and Bernie was a great host	0.930	😊	91-1
<input type="checkbox"/> ... super good place. View , location , facility are perfect . Amenities are as good as hotel 's....	0.864	😊	91-1

Insights Generation



Deep Learning

subject to change.

- Deep Forward Neural Networks (DNNs)
 - SMP GPU support for training and scoring
- Convolutional Neural Networks (CNNs)
 - Support VGG-like models
 - Support ResNet models
 - SMP GPU support for training and scoring
- Recurrent Neural Networks (RNNs)
 - Support LSTM model
 - Support GRU model
- Autoencoders
 - Autoencoders are supported through DNNs, CNNs
 - 2D/3D medical image visualization

Q4
2017

Release
Highlights

Computer Vision

Information is subject to change.

Q4
2017

Release
Highlights

- New image processing extensions
 - FetchImages action
 - Additional mutations in augmentImages and processImages
 - ReconstructImageTable action
 - Single image column support
- Medical Image Processing
 - Support 2D/3D medical image loading
 - Support 2D/3D medical image saving
 - BuildSurface action