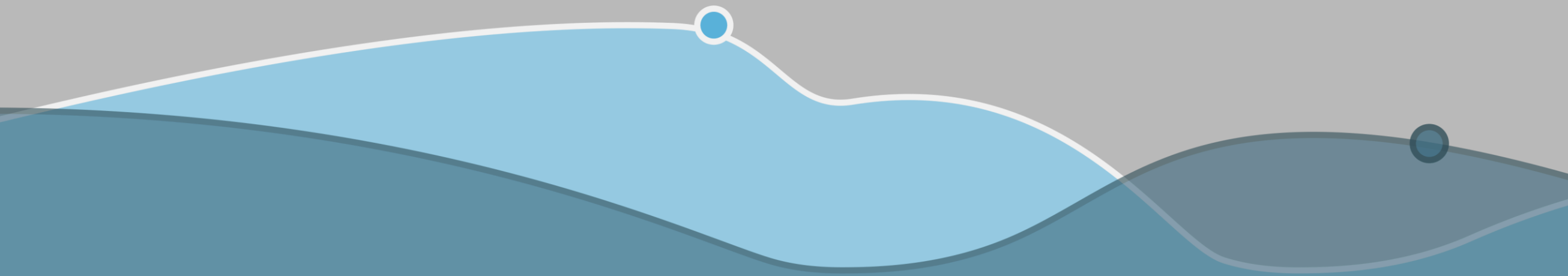




Cortana Analytics Workshop

Sept 10 – 11, 2015 • MSCC



Cortana Analytics for Marketing

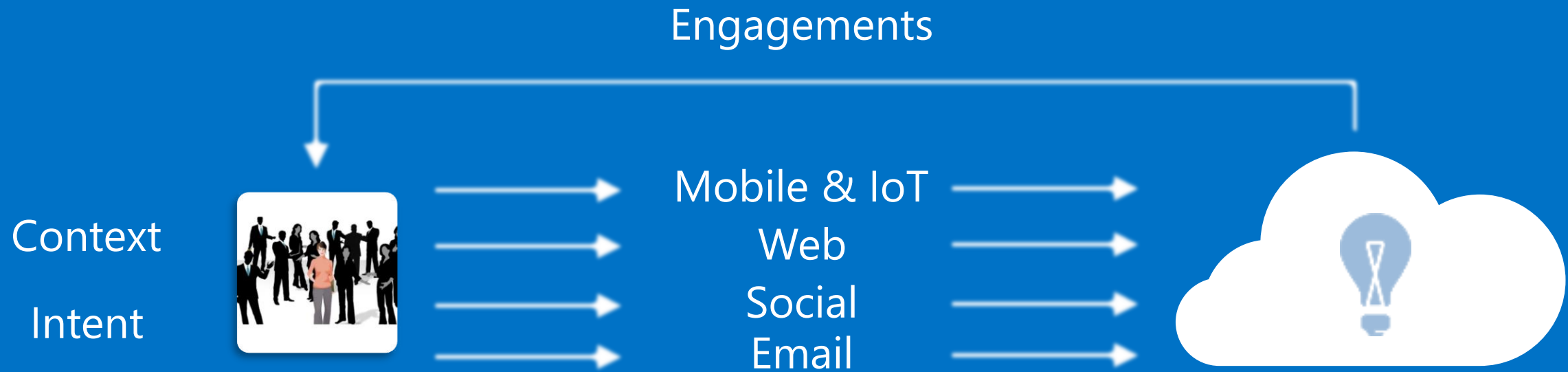
Tao Wu, PhD
Principal Data Scientist Manager
Azure Machine Learning

Cortana Analytics Suite

Transform data into intelligent action



Marketing in the Age of Big Data



Marketing, Reinvented with Data, Analytics and Cloud

Marketing is about understanding and engaging with customers

Cortana Analytics enables

- Actionable customer insights through powerful predictive analytics

- Highly relevant engagements through fully managed big data and analytics suite

Outline

Part I: Predictive analytics and insights

- Churn prediction (case study)

- Lead scoring

Part II: Customer engagements

- Customer segmentation and targeted email marketing pipeline (demo)

- Real-time marketing (demo)

Part I: Predictive Analytics and Insights

Churn Prediction (Case Study)
Lead Scoring



Churn Prediction

Churn prediction: predicting customer loss

Business value: it is often cheaper to try to retain a current customer than acquiring a new customer

Follow-up actions: customer retention engagements

Data Used in Churn Prediction

Customer behavior data

Customer profile data

Product data

Other data

Behavior

- Visit Frequency
- Visit Duration
- Viewed Product/web
- Purchase history

Demographic

- Age
- Gender
- Occupation
- Location

Product

- Category
- Promotion
- Reviews

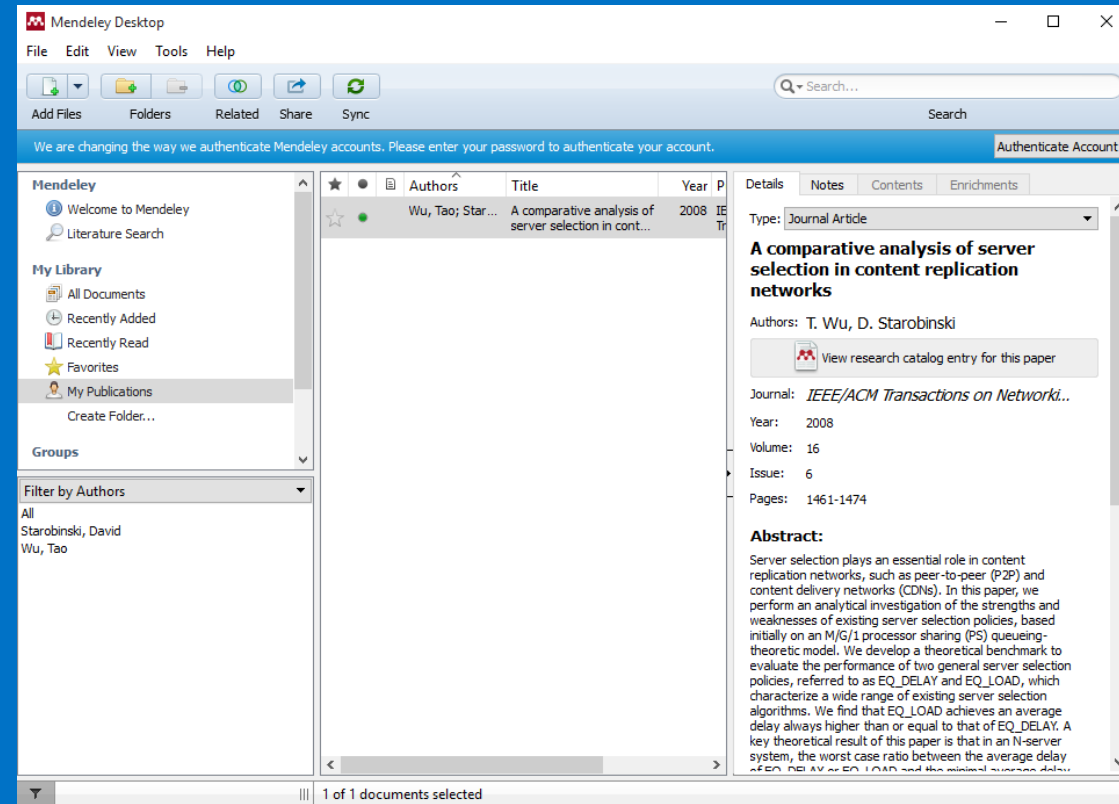
Churn Prediction: Case Study

Customer



Mendeley develops software that helps researchers manage and share references.

Library is accessible from native apps and Web.



Churn Prediction: Mendeley Case Study

Problem: Predicting user churn using activity logs

Churn Prediction: the Solution



Microsoft Azure Machine Learning | Home Studio Gallery PREVIEW TaosWorkspace

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

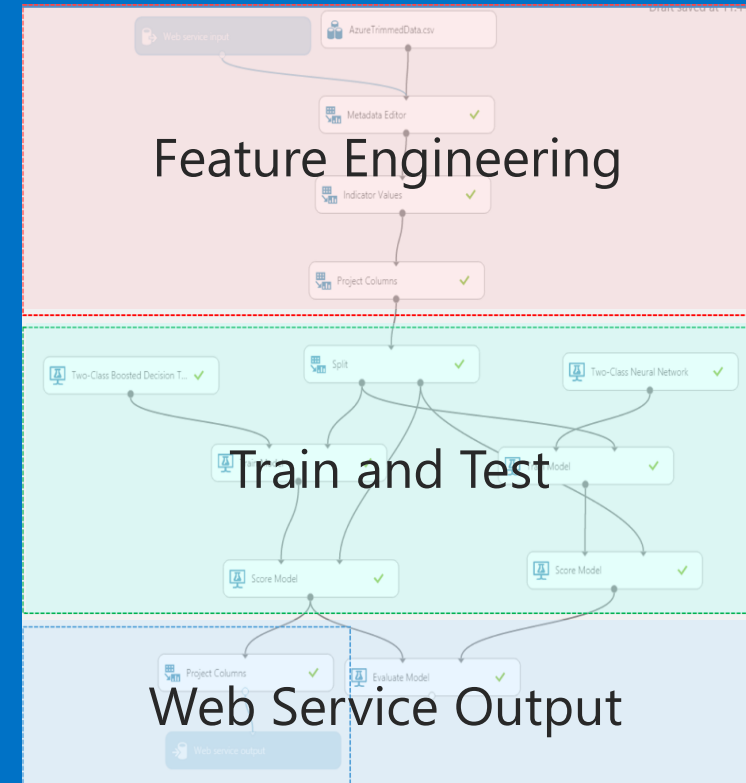
SETTINGS

experiments

MY EXPERIMENTS SAMPLES

	NAME	AUTHOR	STATUS	LAS...
<input checked="" type="checkbox"/>	Binary Classi...	tao.a.wu	Finished	8/24/2015 8...
<input type="checkbox"/>	Binary Classi...	wutao	Finished	8/18/2015 7...
<input type="checkbox"/>	Experiment c...	wutao	Finished	8/13/2015 8...
<input type="checkbox"/>	DNN Digit S...	danielleodean	Draft	8/10/2015 9...

NEW DELETE COPY TO WORKSPACE



Model constructed and trained in hours, not days

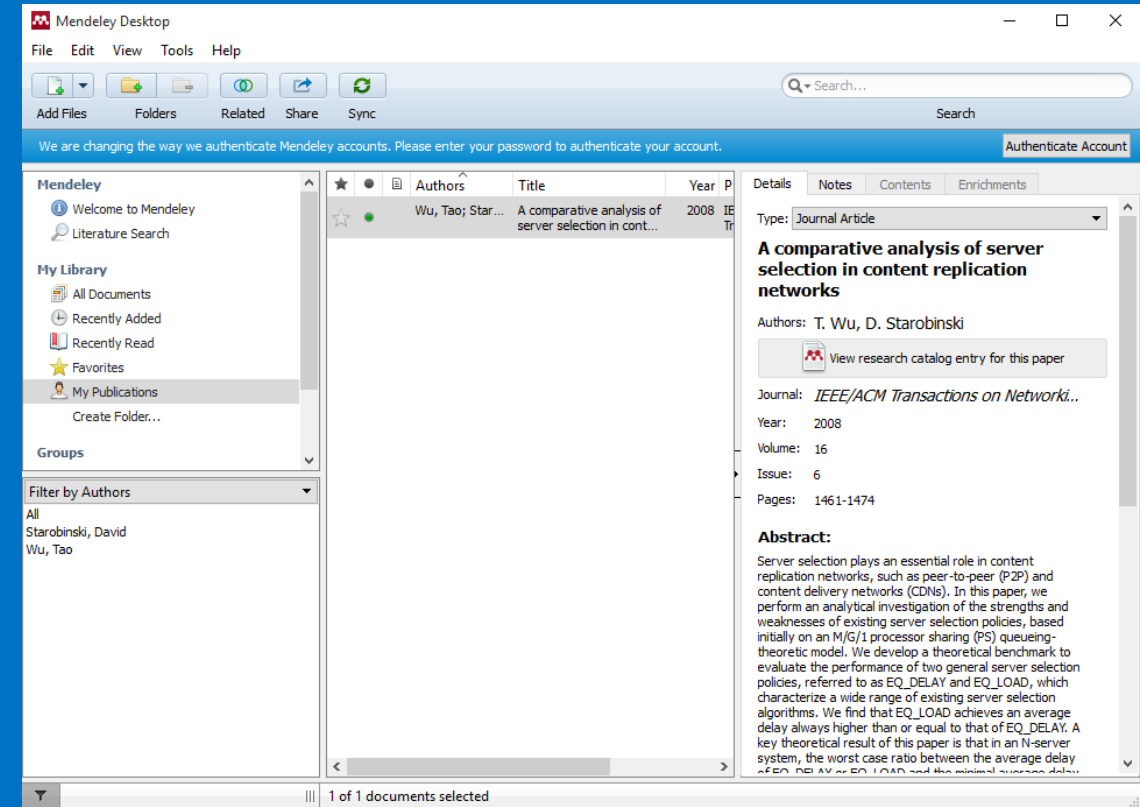
Higher accuracy than existing model right off the bat

Insights

Identified user activities that are key for retention

Example: Accessing library and papers from multiple devices

This can guide product/feature development



Lead Scoring

Lead scoring: Quantifying and ranking prospects value

Business value: Lead scoring optimizes sales team priority and thus increase revenue

Follow-up actions: Alerts to sales team; targeted engagements

Lead Scoring

- Without predictive analytics: pre-defined rules assign scores to prospects.

Criteria	Score
Location: City	+3
Occupancy: Manager	+5
Industry: Finance	+2

- With predictive analytics: machine learning model scores prospect sales readiness using historical data.

	Location	Occupancy	Industry	...	Score
James	Boston	Manager	E-commerce	...	98
Karly	Miami	Sales	Fashion	...	45

Data Used in Lead Scoring

Visitor behavior data

Visitor profile data, if available

Product data

Other data

Behavior

- Visit Frequency
- Visit Duration
- Viewed Product/web
- Purchase history

Demographic

- Age
- Gender
- Occupancy
- Location

Product

- Category
- Promotion
- Reviews

Part II: From Insights to Actions

Customer Segmentation and Targeted Email Marketing Pipeline (Demo)
Real-time Marketing (Demo)



Customer Segmentation and Targeted Email Marketing Pipeline

Goals: To understand customer segmentation and better target users in engagements

- Sales: can focus on the best possible leads with the right offers
- Marketing: can make more personalized campaign

Customer:



Customer Segmentation Using RFM Analysis

RFM analysis: simple method to quantify customer value based on

- Recency

- Frequency

- Monetary Value

For each dimension, customers are put into several bins of equal population size

Customer value:

- For each dimension, scale from 1 to 5 (if using 5 bins)

- 555: most active

- 111: least active

Computing RFM in Cortana Analytics



The screenshot displays the Cortana Analytics interface. On the left, a workflow diagram shows three components: 'Reader', 'Execute R Script', and 'Writer', all marked with green checkmarks. The 'Execute R Script' component is highlighted with a blue border and contains two numbered ports, 1 and 2. Arrows indicate data flow from 'Reader' to 'Execute R Script' and from 'Execute R Script' to 'Writer'.

On the right, the 'Execute R Script' panel shows the R script used for the computation:

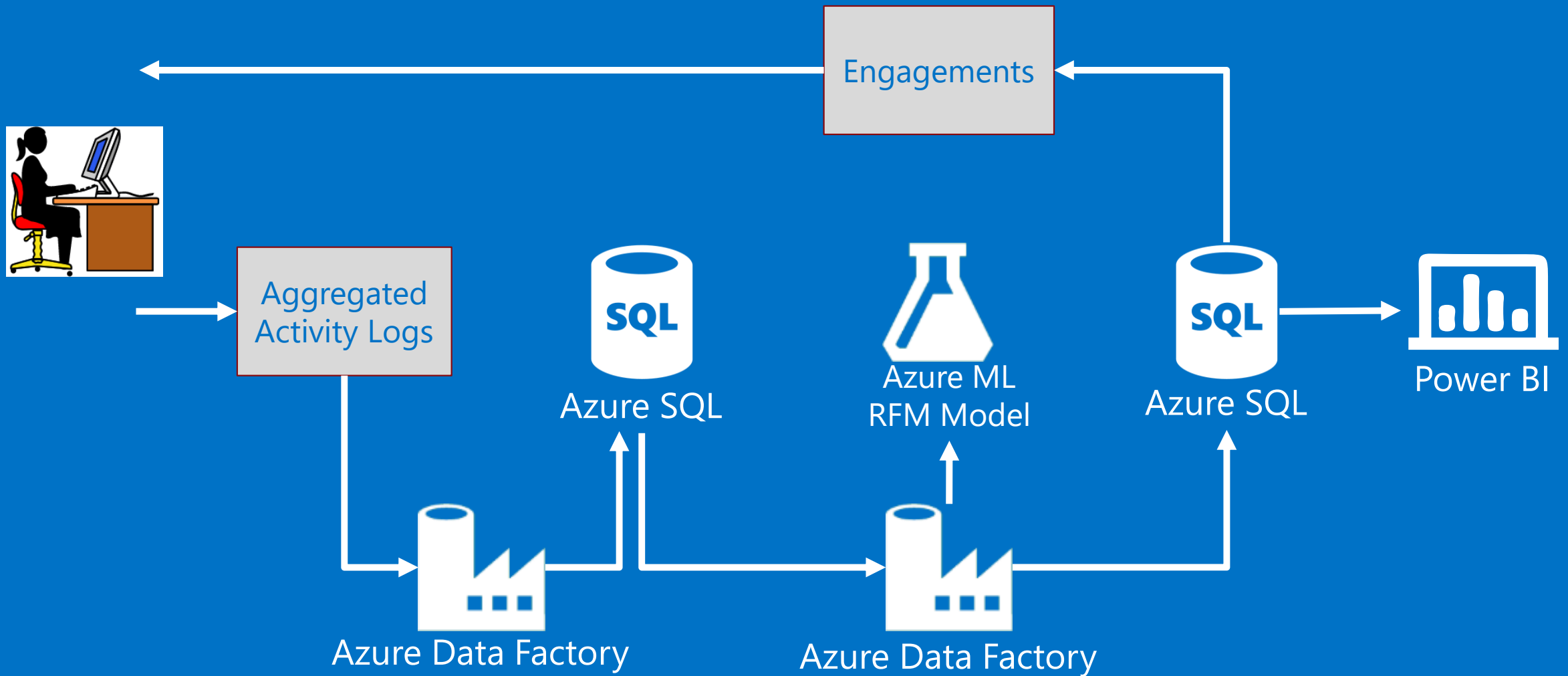
```
R Script
1 dataset <- mam1.mapInputPort(1) # class: data.frame
2
3 #clean up noises in the rows
4 dataset=subset(dataset, !dataset$subscriptionId=='00000000-0
5 dataset[, 'TIMESTAMP'] = as.Date(as.POSIXct(dataset[, "TIMEST
6
```

Below the script, the 'Random Seed' field is empty. The execution details are as follows:

START TIME	9/3/2015 9:28:05 PM
END TIME	9/3/2015 9:28:15 PM
ELAPSED TIME	0:00:09.609
STATUS CODE	Finished
STATUS DETAILS	None

A link to [View output log](#) is provided at the bottom.

The Data Pipeline






RFM Analysis

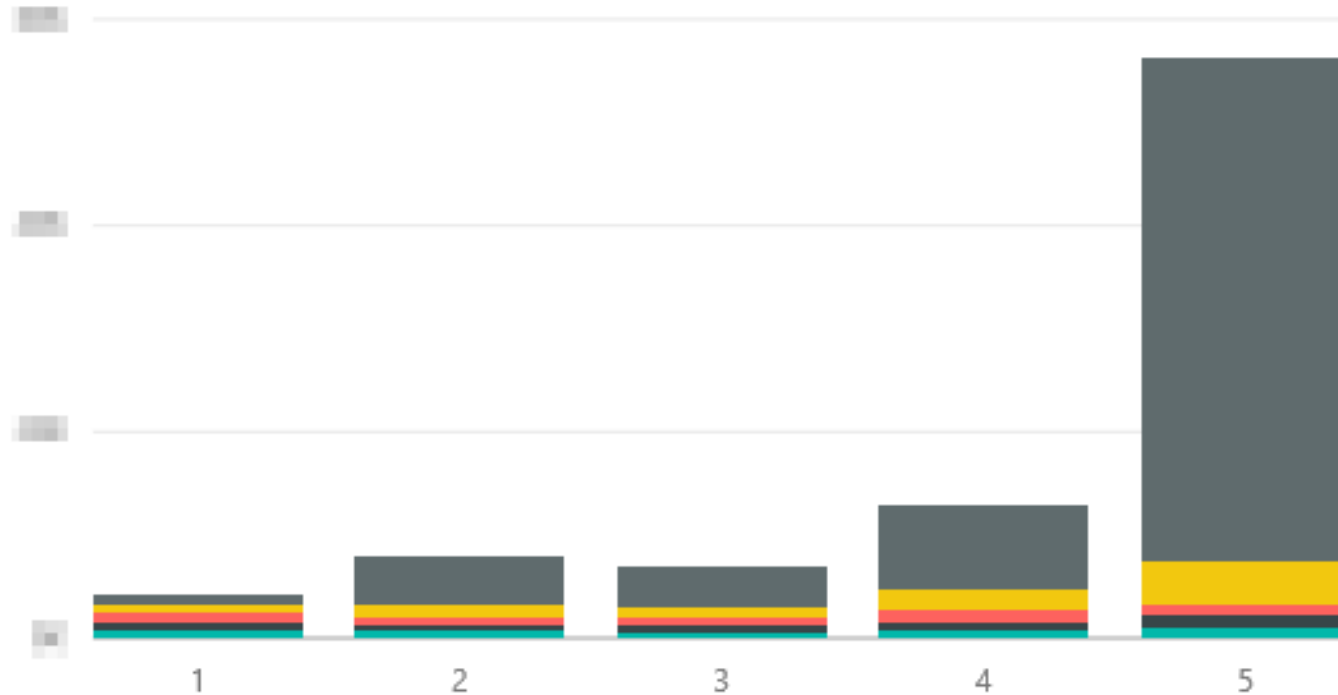


Marketing Automation RFM Share Dashboard

CPU time consumed by different recency groups

BY RECENCY_BIN, FREQUENCY_NESTEDBIN

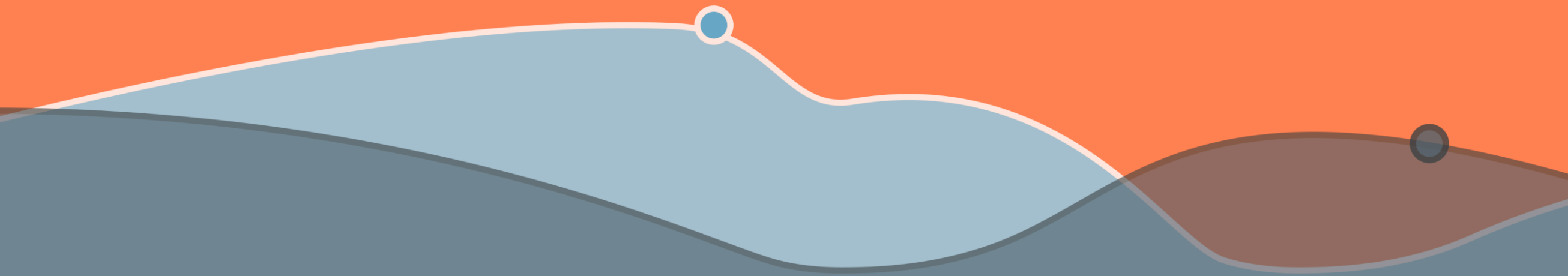
Frequency_Nes...  1  2  3  4  5



Demo: targeted email campaigns

Blog: <http://blogs.technet.com/b/machinelearning/archive/2015/08/26/what-can-data-science-do-for-me.aspx>

Campaign: <http://emailcampaignportaldemo1.azurewebsites.net>





Outlook.com



New

Reply | ▾

Delete

Archive

Junk | ▾

Sweep

Move to ▾

Categories ▾

...



Search email



Folders



Inbox 187

Junk

Drafts

Sent

Deleted

[New folder](#)

Azure ML News



aml-email@microsoft.com (aml-email@microsoft.com)

[Add to contacts](#) 8:33 AM



Actions ▾

To: tao.a.wu@outlook.com

Hi Tao Wu!

We see you've recently started using Azure ML, welcome! We recently published an article that we think might help you get started making the best use of Azure Machine Learning. Click the link below to check it out!

[What Can Data Science Do For Me?](#)

Sincerely,

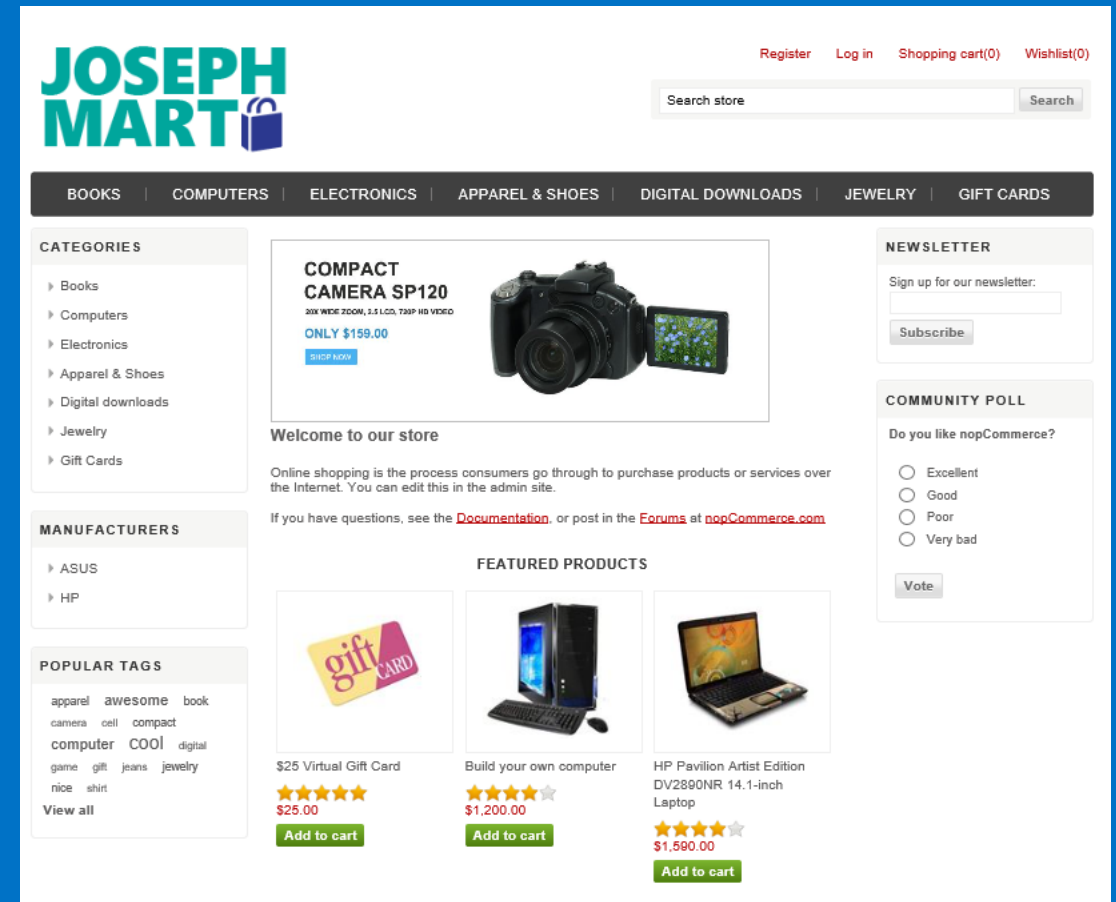
The Azure ML Email Bot

This is an automated email coming from an unmonitored address. Please do not reply to this email.

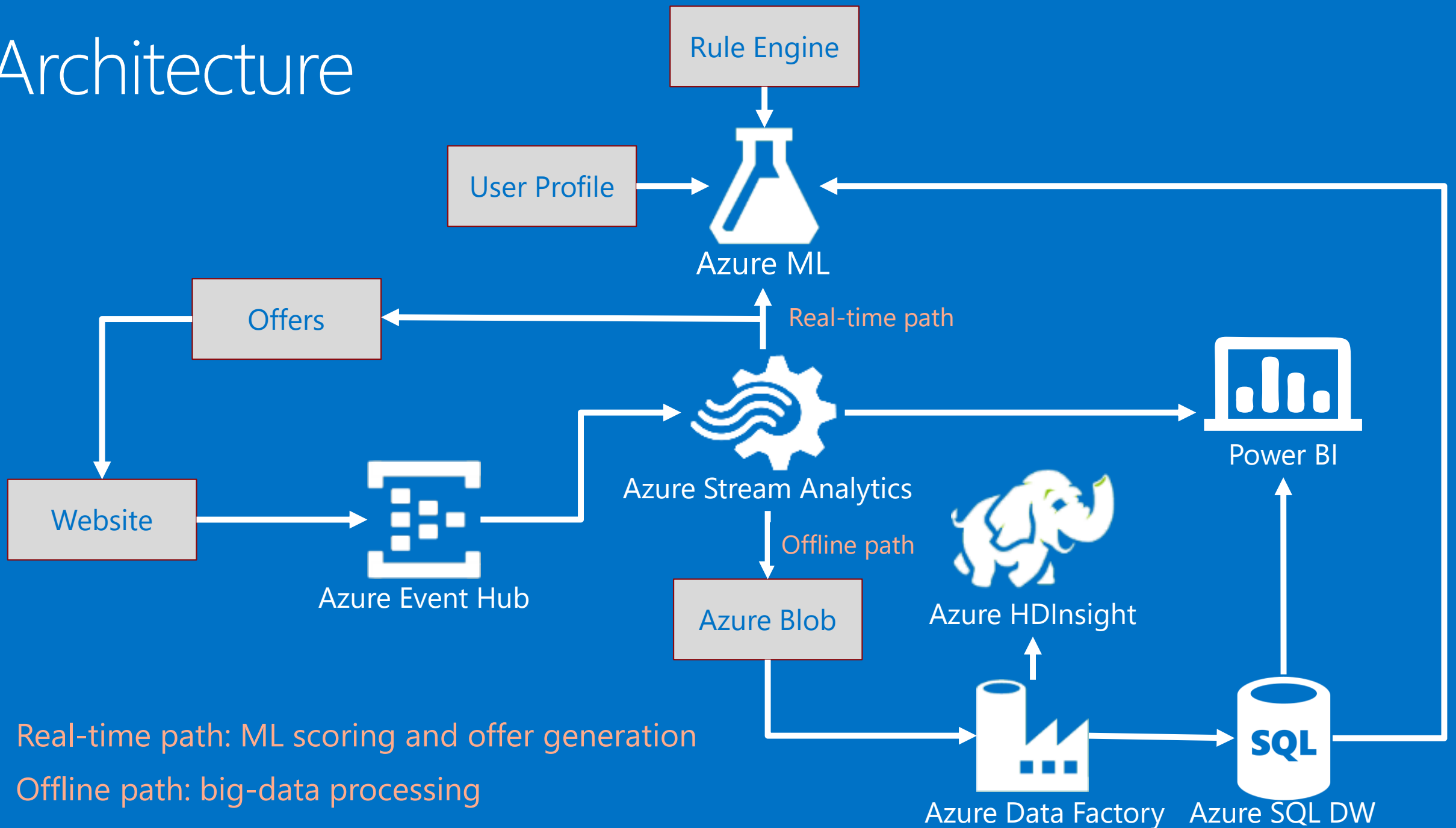
Real-Time Marketing

Goal: To Respond to user activity in real-time

Prototype: Joseph Mart

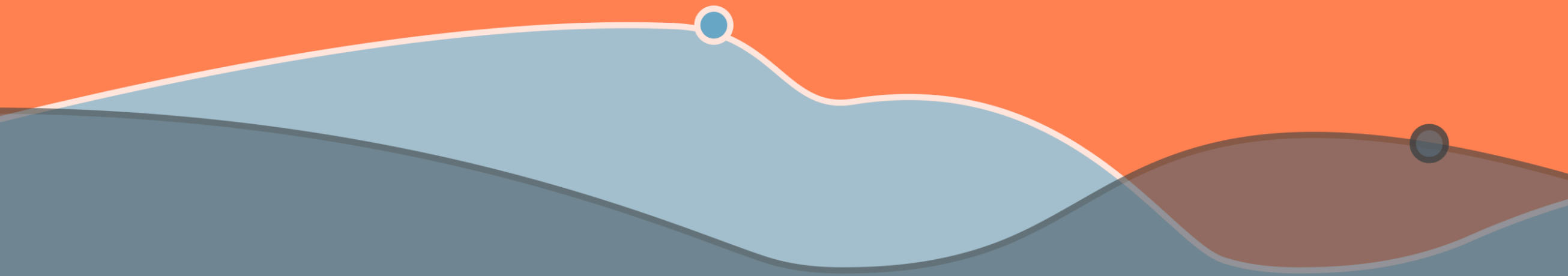


Architecture

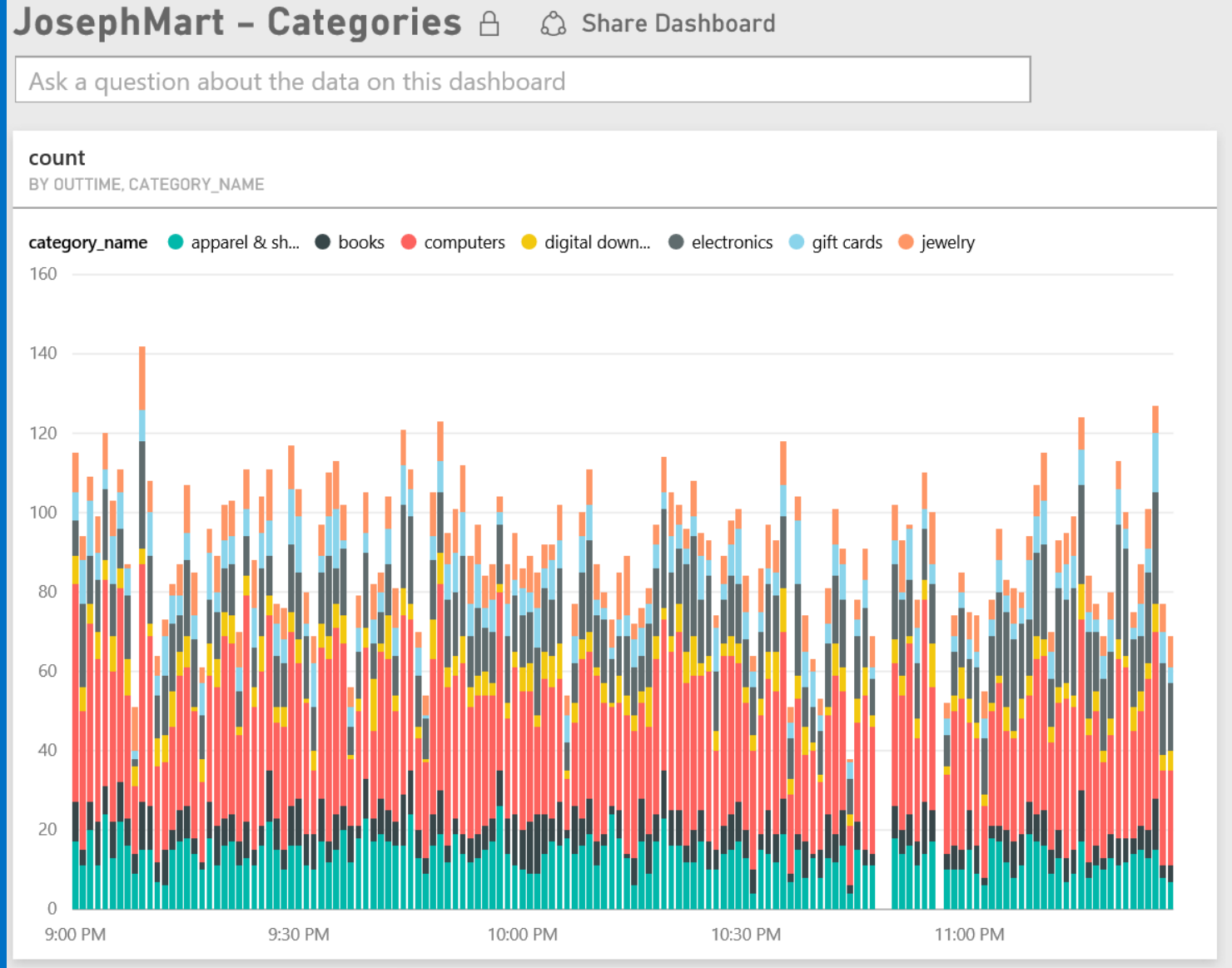


Demo: real-time dashboard

<https://msit.powerbi.com/groups/me/dashboards/e0422de9-1c39-4681-a7fe-b79fbc451934>



Demo: Real-time dashboard



Learning from Clickstream

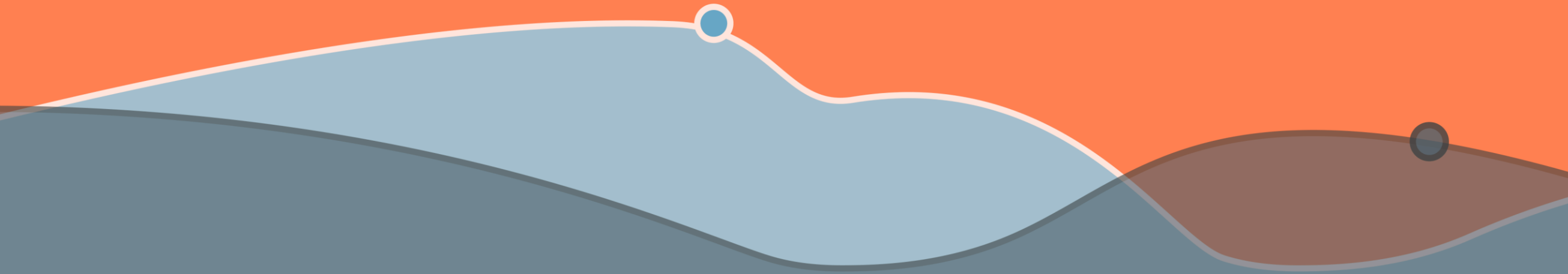
ML output trained from synthetic click streams

Last Viewed Product	Offer Shown
Cook Books/Digital Downloads/Apparel/shoes	1. Travel Points
Computers/electronics/Jewelry	2. Hotel Rewards Credit Card
Gift cards/default	3. Gift card

Note: Offer from ML output shows on NEXT page

Demo: real-time offers

<http://josephmartasa.azurewebsites.net>



CATEGORIES

- ▶ Books
- ▶ Computers
- ▶ Electronics
 - ▶ **Camera, photo**
 - ▶ Cell phones
- ▶ Apparel & Shoes
- ▶ Digital downloads
- ▶ Jewelry
- ▶ Gift Cards

MANUFACTURERS

- ▶ ASUS
- ▶ HP

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Canon Digital SLR Camera

12.2-megapixel CMOS sensor captures enough detail for poster-size, photo-quality prints

Availability: In stock



[Be the first to review this product](#)

\$670.00

Qty:



CATEGORIES

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- Computers
- Electronics
- Apparel & Shoes
- Digital downloads
- Jewelry
- Gift Cards

MANUFACTURERS

- ASUS
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Poker Face

Poker Face by Lady GaGa



1 review(s) | [Add your review](#)

\$2.80

Qty:



0

Original Release Date: October 28, 2008

Release Date: October 28, 2008

Label: Streamline/Interscope/KonLive/Cherrytree

Copyright: (C) 2008 Interscope Records

Product tags

[awesome](#) (20) , [digital](#) (3)

FEATURED ADVERTISEMENT BASED ON YOUR BROWSING HISTORY



**Earn 50,000
Bonus Points**

After you spend \$1,000 in the first 3 months. **Plus, get a free night stay — every year.**

More Complex Azure Stream Analytics Query

Getting machine learning output using all products a user clicked in the last 10 minutes



```
1 WITH
2     allData AS (
3         SELECT System.Timestamp AS ts, product_id, user_id from clickStream
4     ),
5
6     productIds AS (
7         SELECT scorer2(ts, product_id) as results, user_id FROM allData
8             GROUP BY HoppingWindow(minute, 10, 1), user_id
9     )
10
11 SELECT results.scoredLabel as adid, user_id into tableStorage FROM productIds
```

Cortana Analytics Suite

Transform data into intelligent action



Summary

Data, analytics and cloud are driving marketing

From data to insights to actions

- Churn prediction

- Lead scoring

- Targeted email campaign pipeline

- Real-time marketing

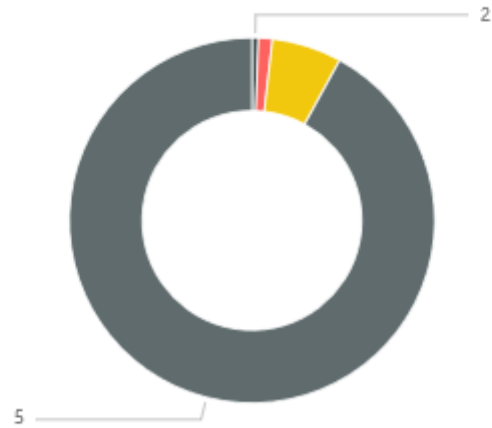
Talk to us about how Cortana Analytics can solve your marketing challenges!

Tao.Wu@Microsoft.com

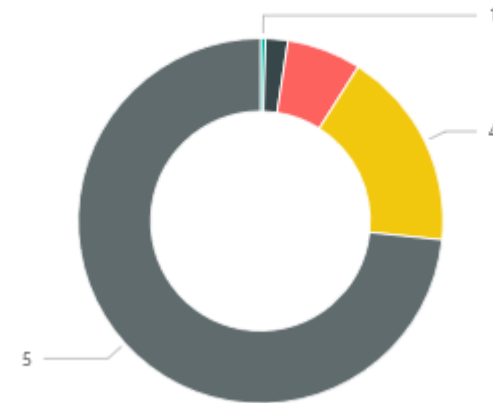
RFM Analysis



TotalFinishedJob By Magnitude Bin
BY MAGNITUDE_BIN



TotalFailedJob by Magnitude
BY MAGNITUDE_BIN





Tao.Wu@Microsoft.com