

Spark for Cloudant Analytics Hands-on-Lab (3305)

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InterConnect
2017



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Cloudant Spark

What is Cloudant?

What is Spark?

What is Data Science Experience?

Hands-on-Lab

Instructions

Python notebook

What is Cloudant? – DBaaS for Web and Mobile Applications

Cloudant delivers a fully-managed database in service to the **Analytics**, **App**, and **API** economy



IBM Cloudant®

A fully-managed NoSQL database layer that can be
developed & deployed in days



- Operational NoSQL JSON store
- Master-less architecture for maximum **scalability & availability**
- Advanced APIs
 - REST (HTTPS) API
 - Replication & synchronization
 - Geo-load balancing
 - Incremental MapReduce indexes
 - Military-grade Geospatial indexes
 - Lucene full-text search
- Offline access to mobile apps & data
- Hybrid Cloud
 - Public | Private | Open Source | Client

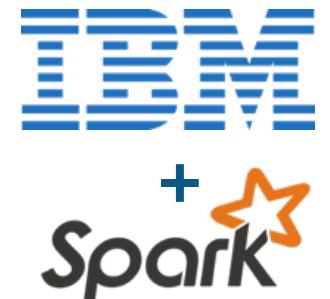
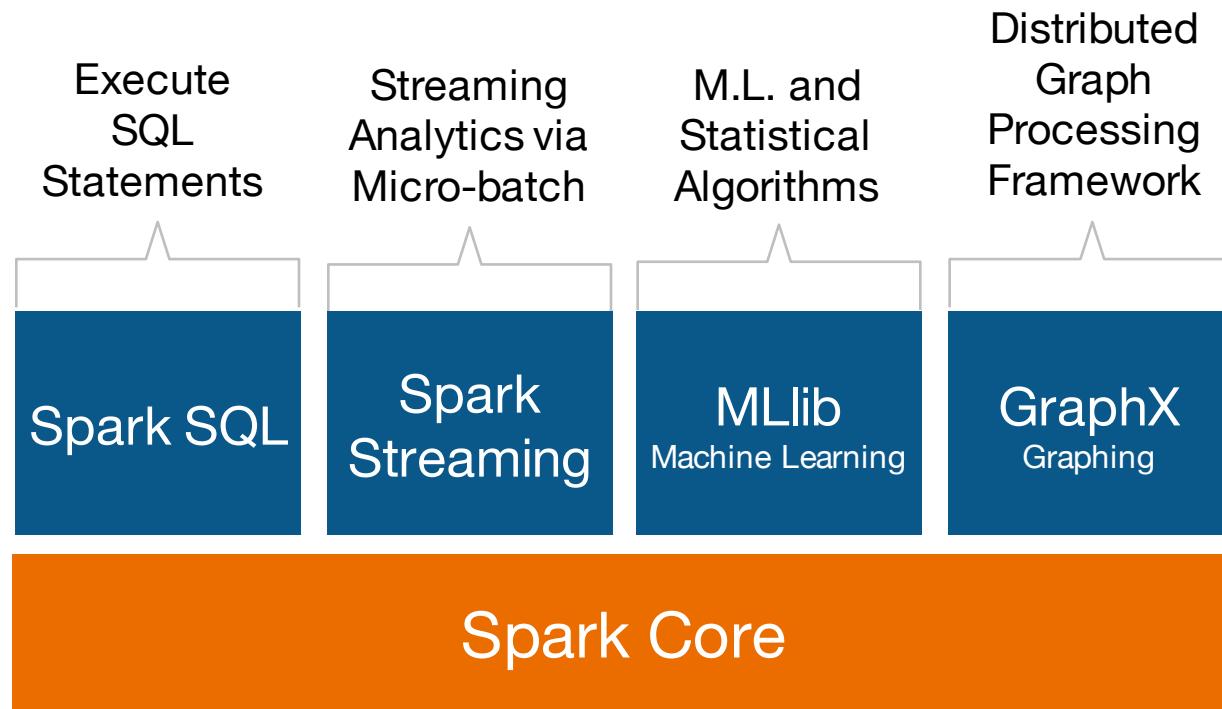
What is Apache Spark?



Spark is an **open** source
in-memory
computing framework for
distributed data processing and
iterative analysis
on **massive** data volumes

Analytics with Apache Spark

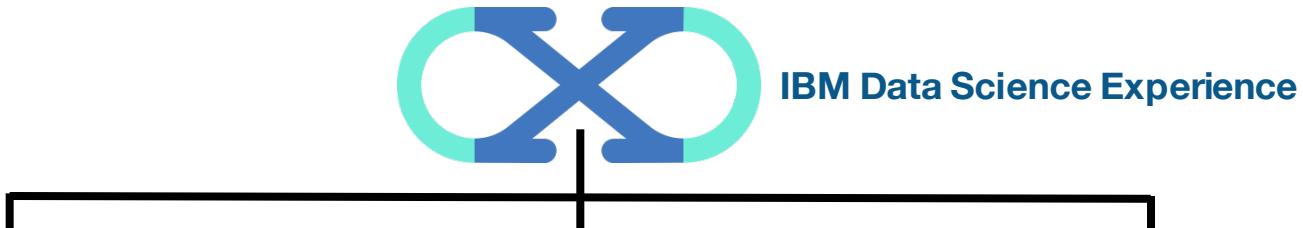
- General compute engine
- Basic I/O functions
- Task dispatching
- Scheduling



Data Sources

IBM Cloud	Public Cloud	Cloud Apps	On-Premises
BigInsights (HDFS) Cloudant (DBaaS) dashDB (Analytics) SQDB (Managed DB2) Swift (Object Storage)	S3 Cassandra mongoDB rackspace MySQL dBase APACHE HBASE	NETSUITE redis Microsoft Azure PostgreSQL HDFS elasticsearch. AVRO	ORACLE SAP IBM DB2. CSV

What is Data Science Experience?



Community

- Find tutorials and datasets
- Connect with Data Scientists
- Ask questions
- Read articles and papers
- Fork and share projects

Open Source

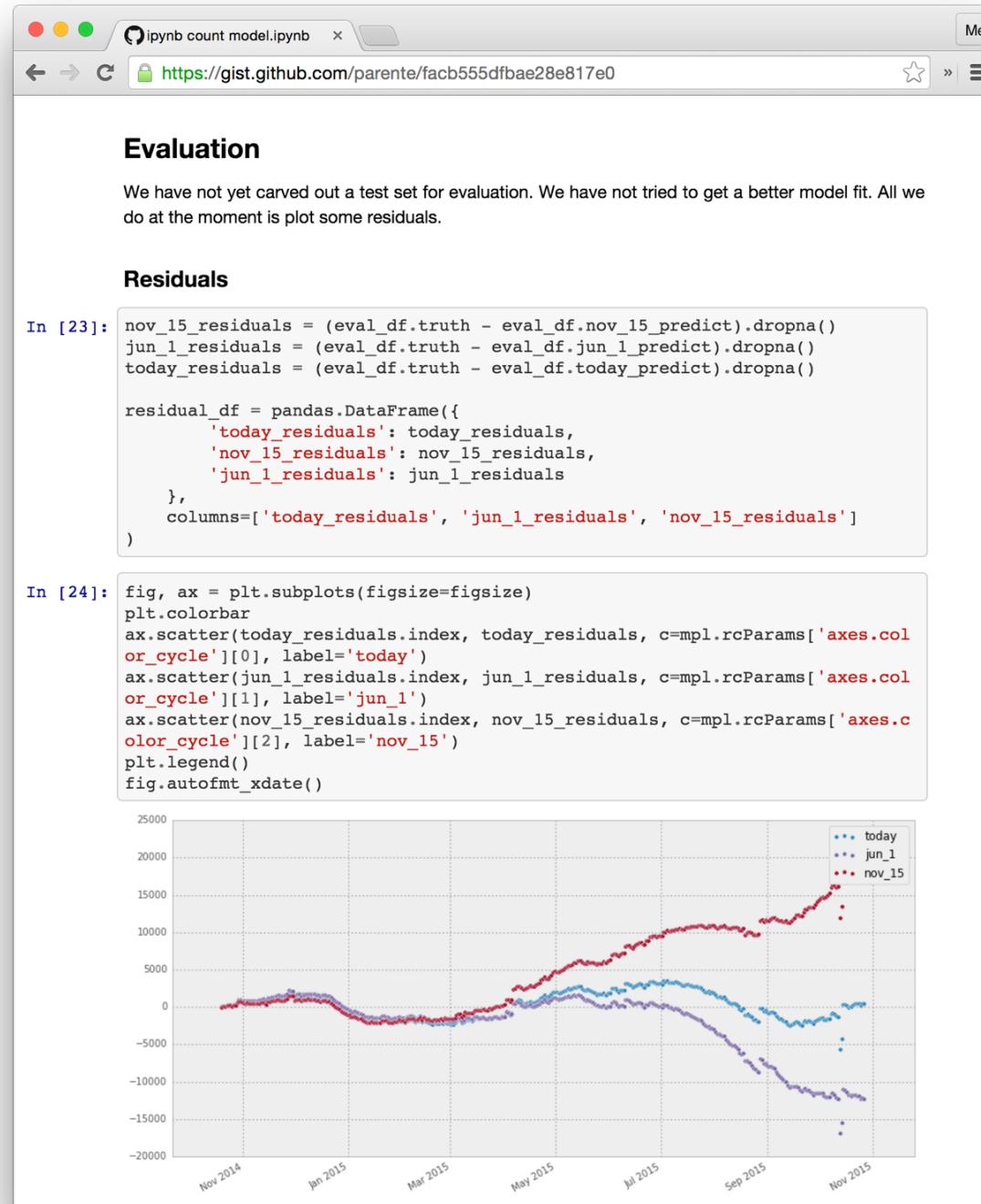
- Code in Scala/Python/R/SQL
- Jupyter Notebooks
- RStudio IDE and Shiny apps
- Apache Spark
- Apache Kafka
- Your favorite libraries

IBM Added Value

- Auto-data preparation and modeling
- Advanced Visualizations
- Model management and deployment
- Spark as a Service
- Streaming Sources

What is a Notebook?

- Web based UI for running apache spark console commands
- Easy, no install spark accelerator
- Best way to start working with Spark



Text, Annotations

Code, Data

Visualizations,
Widgets, Output

Cloudant Spark Connector

Built for Spark versions 1.3 – 2.0

- Tested and documented for Python and Scala
- Easy to deploy on a local Spark cluster

Implements the Spark SQL framework (<http://spark.apache.org/sql/>) and Spark Streaming frameworks (<http://spark.apache.org/streaming/>) with Cloudant specific implementations to

- connect to accounts
- query databases and indexes
- write to databases
- RDDs for analytics in Spark Core
- Dstreams for streaming analytics with Spark Streaming (in Scala only)

Pre-linked with the Spark-as-a-Service on Bluemix (currently at Spark version 1.6)

- available for Jupyter notebooks written in Scala and Python
- available on spark-packages.org for easy load in external Spark deployments

Spark Packages

<https://spark-packages.org/package/cloudant-labs/spark-cloudant>

Cloudant & Spark in Jupyter notebooks

← Analytics Hands on Spark and Cloudant Environment ^

File Edit View Insert Cell Kernel Help Python 2

Format Code CellToolbar

Now you want to create a Spark SQL context object off the given Spark context.

In [1]: `sqlContext = SQLContext(sc)`

The Spark SQL context (sqlContext) is used to read data from the Cloudant database. We use a schema sample size and specified number of partitions to load the data with. For details on these parameters check <https://github.com/cloudant-labs/spark-cloudant#configuration-on-sparkconf>

In [4]: `tweetsDF = sqlContext.read.format("com.cloudant.spark").\n option("cloudant.host",properties['cloudant']['account'].replace('https://','')).\n option("cloudant.username", properties['cloudant']['username']).\n option("cloudant.password", properties['cloudant']['password']).\n option("schemaSampleSize", "-1").\n option("jsonstore.rdd.partitions", "5").\n load(properties['cloudant']['database'])`

In [5]: `tweetsDF.show(5)`

_id	_rev	cde	cdeInternal	message
19e10ed0d84ca4804...	1-9c2f0a4b09ea675...	[[null,[,United S... [null,WrappedArra... [AZ After Party,...		
19e10ed0d84ca4804...	1-d8d702846ed578c...	[[male,[,,],[unk... [null,WrappedArra... [Mormon Democrat...		
19e10ed0d84ca4804...	1-e01013f3b419d3c...	[[unknown,[null,n... [null,WrappedArra... [995mu,1041,94,5...		
19e10ed0d84ca4804...	1-bb2f38a4ced7969...	[[unknown,[,Unite... [null,WrappedArra... [utahpolitics,1,...		
19e10ed0d84ca4804...	1-faa818605292480...	[[male,[Salt Lake... [null,WrappedArra... [Daniel Burton,3...		

only showing top 5 rows

Instance
Apache Spark-ah

Job History

Language
Python 2.7

Spark as a Service
Apache Spark 1.6

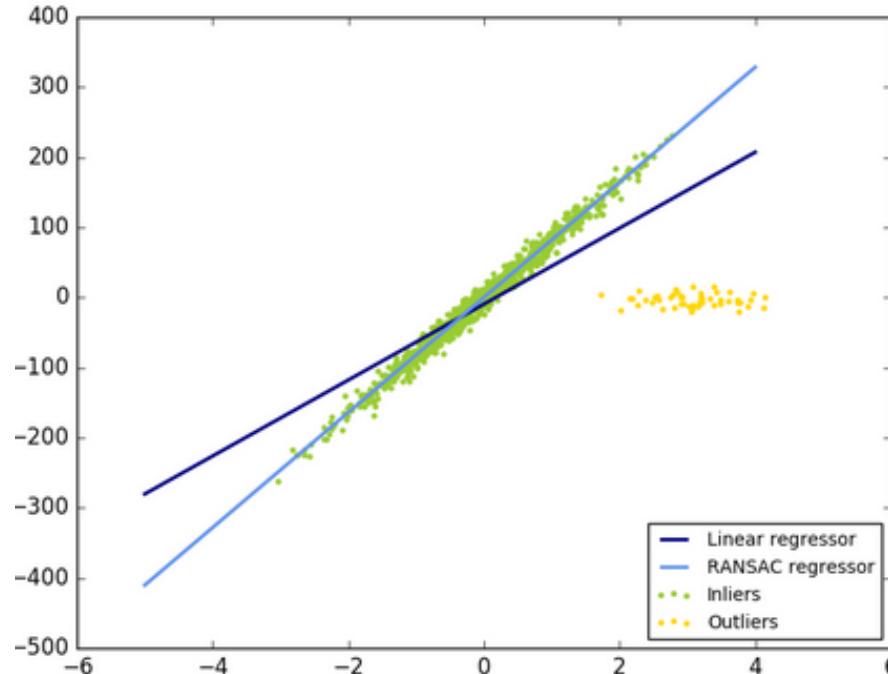
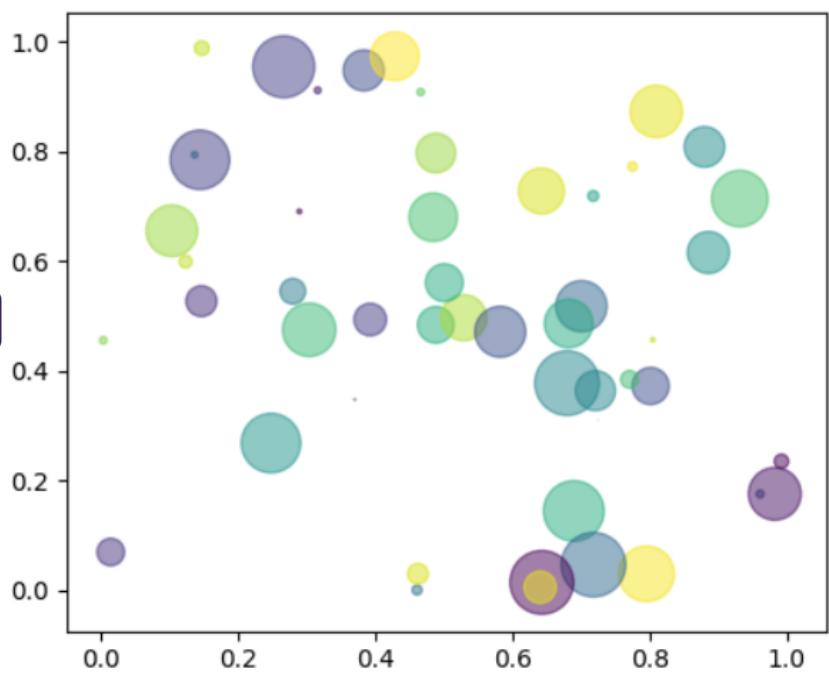
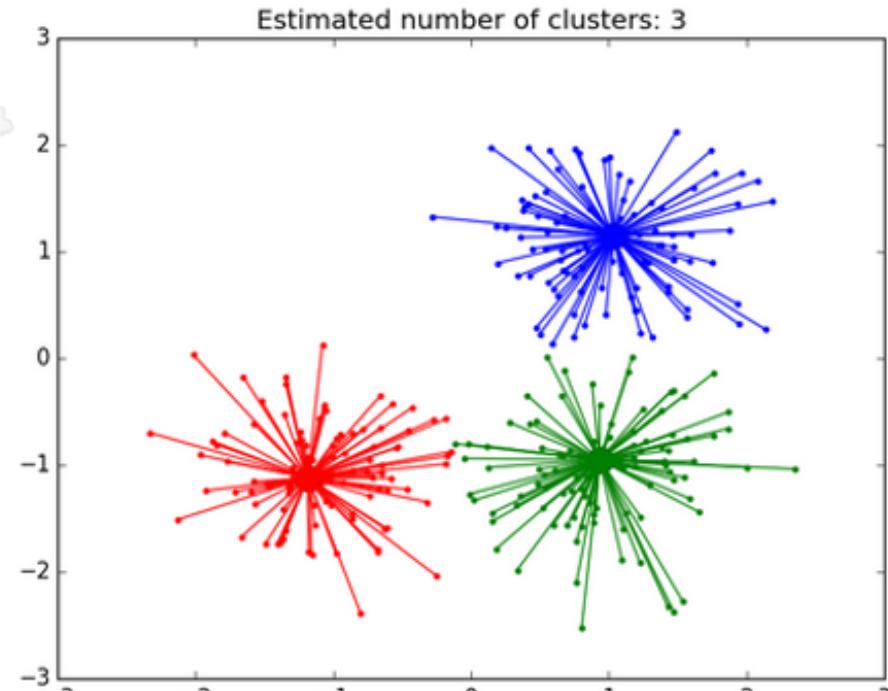
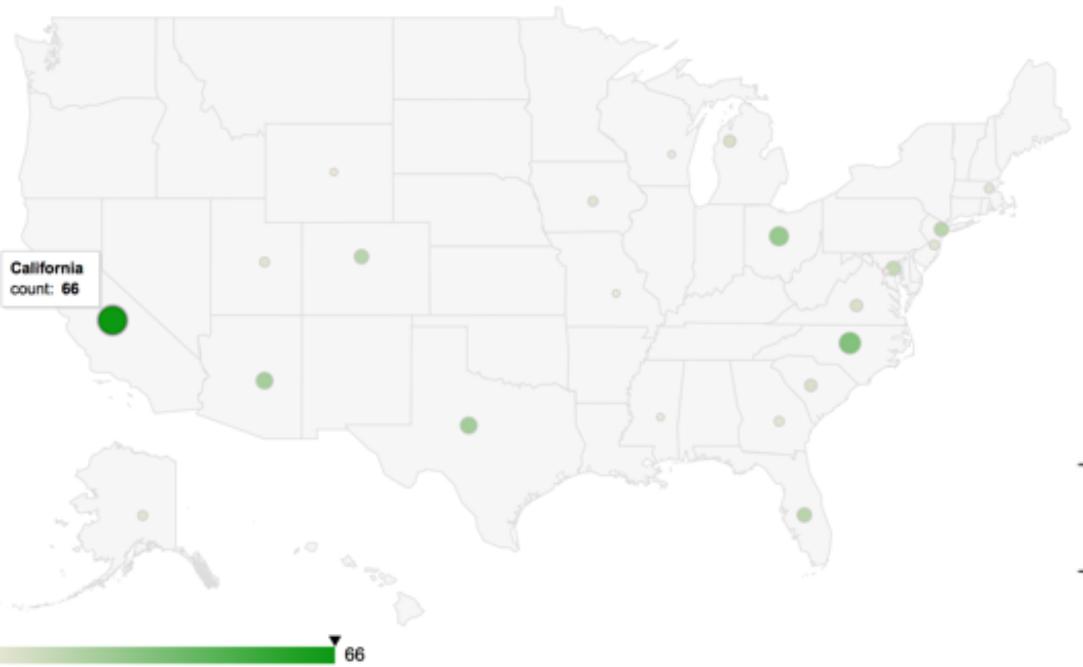
Preinstalled Libraries

- biopython-1.66
- bitarray-0.8.1
- brunel-1.1
- iso8601-0.1.11
- jsonschema-2.5.1
- lxml-3.5.0
- matplotlib-1.5.0
- networkx-1.10
- nose-1.3.7
- numexpr-2.4.6
- numpy-1.10.4
- pandas-0.17.1
- Pillow-3.0.0
- pip-8.1.0
- pyparsing-2.0.6
- pytz-2015.7
- requests-2.9.1
- scikit-learn-0.17

Visualization Libraries

matplotlib
d3py
brunel
scikit-learn

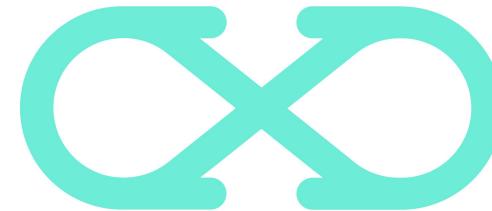
...



Learning Resources

Data Science Experience

- Data Science Experience: <http://datascience.ibm.com/>



Cloudant

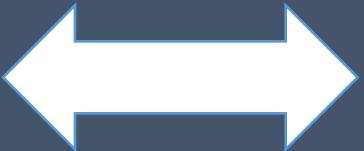
- Blogs: <https://cloudant.com/blog/>
- Docs: <https://docs.cloudant.com/>
- Developer Works: <http://www.ibm.com/developerworks/topics/cloudant/>

Cloudant Spark

- Announcement blog: <https://developer.ibm.com/clouddataservices/2016/03/09/introducing-spark-cloudant-connector/>
- Scala tutorial: <https://developer.ibm.com/clouddataservices/docs/cloudant/integrate/load-cloudant-data-in-apache-spark-using-scala/>
- Python tutorial: <https://developer.ibm.com/clouddataservices/docs/cloudant/integrate/load-cloudant-data-in-apache-spark-using-a-python-notebook/>

Hands-on-Lab

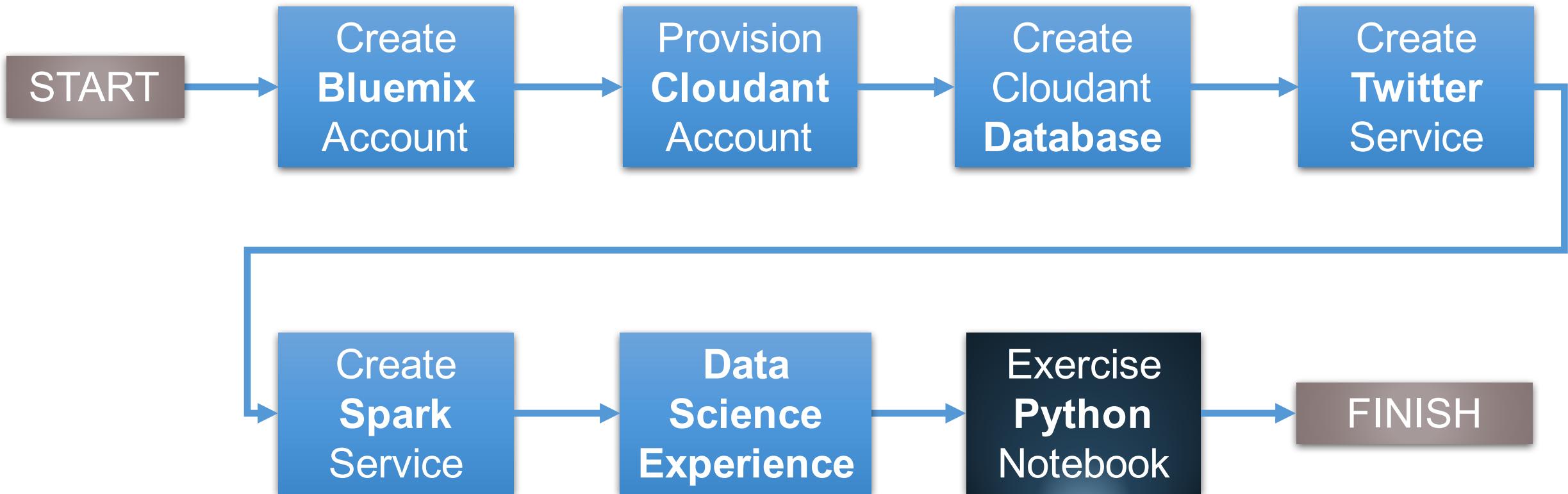
- Instructions
- Bluemix, Cloudant, Twitter, Spark
- Data Science Experience
- Python Notebook



IBM Bluemix™

Instructions

- Bring your own email ID for 30-day trial accounts
- Skip setup steps with existing accounts



Exercise Python Notebook

This GitHub raw file format is important!

https://raw.githubusercontent.com/cloudant-labs/spark-cloudant/master/tutorials/InterConnect2017_Python.ipynb



Screenshot of the Data Science Experience interface showing the "Create Notebook" page. The "From URL" tab is selected. A red arrow points from the GitHub URL above to the "Notebook URL*" input field. Another red arrow points from the Python logo below to the "Spark Service*" dropdown menu.

My Projects > New Notebook

Create Notebook

Blank From File From URL From URL

Name*

Type Notebook Name here

Description

Type your Description here

Notebook URL*

Remote notebook served by HTTP or HTTPS

Project

Default Project

Add the notebook to an existing project.

Spark Service*

Apache Spark-5u

Associate this note book with the IBM Analytics for Apache Spark Service of your choice.

Exercise Python Notebook

```
properties = {
    'twitter': {
        'restAPI': 'https://xxx@cdeservice.mybluemix.net/api/v1/messages/search',
        'username': 'xxx',
        'password': 'xxx'
    },
    'cloudant': {
        'account': 'https://xxx.cloudant.com',
        'username': 'xxx',
        'password': 'xxx',
        'database': 'tweets'
    }
}
```

This is for you to complete

```
query = "#Trump"
count = 300
```

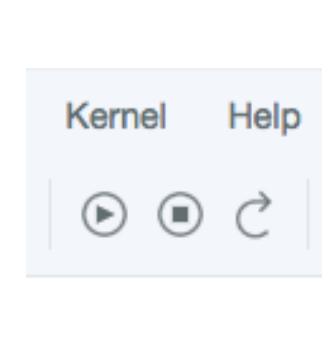
Your choice here but recommend < 3K for good performance!

```
In [6]: TtC = TwitterToCloudant()
TtC.count = count

TtC.query_twitter(properties, None, query, 0)

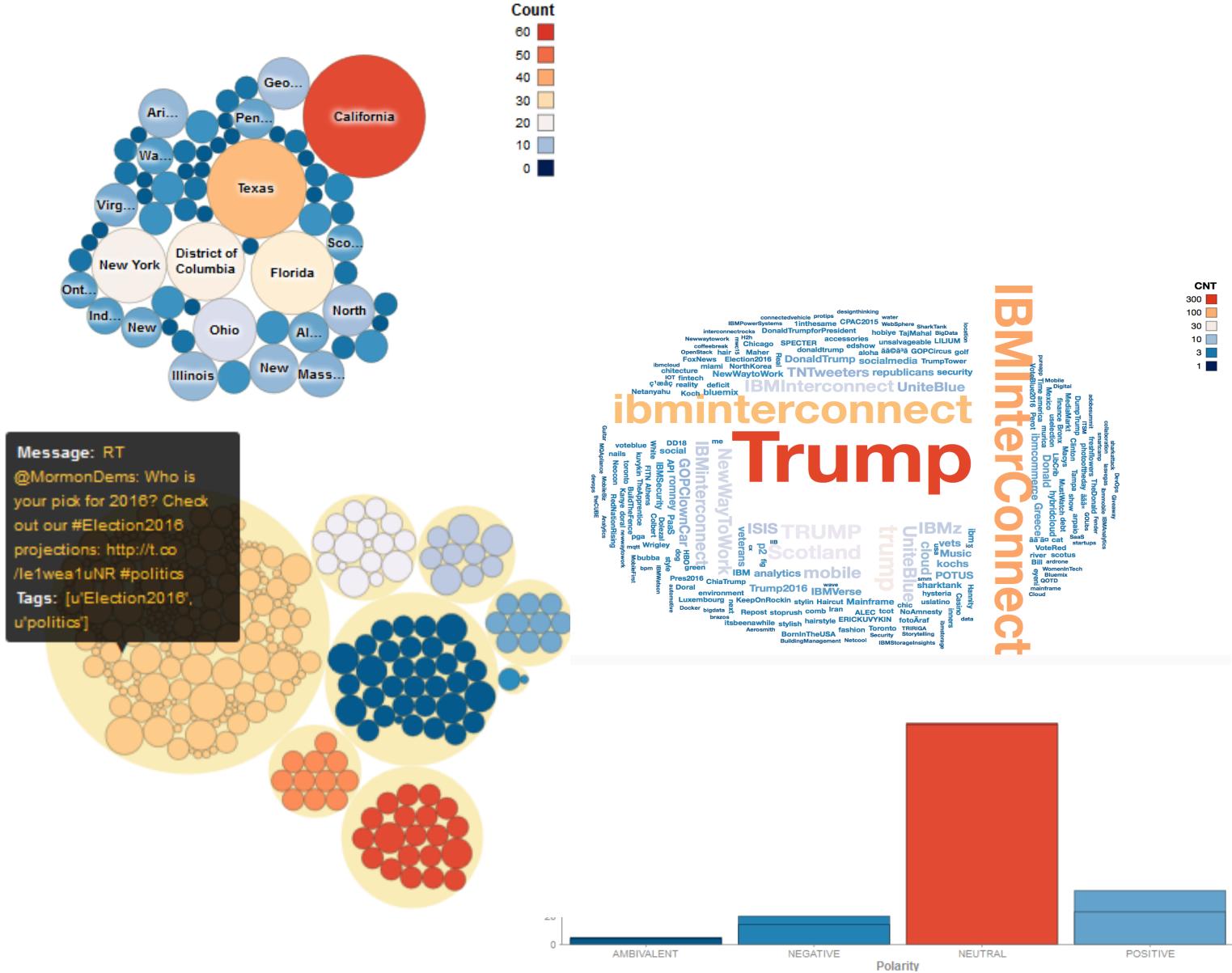
('https://5e2d04c1-cbcd-4159-901d-229e5a8d7054:JoOpVsIDMq@cdeservice.mybluemix.net/api/v1/messages/search', '#election2016')
GET: Tweets from https://5e2d04c1-cbcd-4159-901d-229e5a8d7054:JoOpVsIDMq@cdeservice.mybluemix.net/api/v1/messages/search
Got 200 response
```

If you don't get output, restart the kernel!

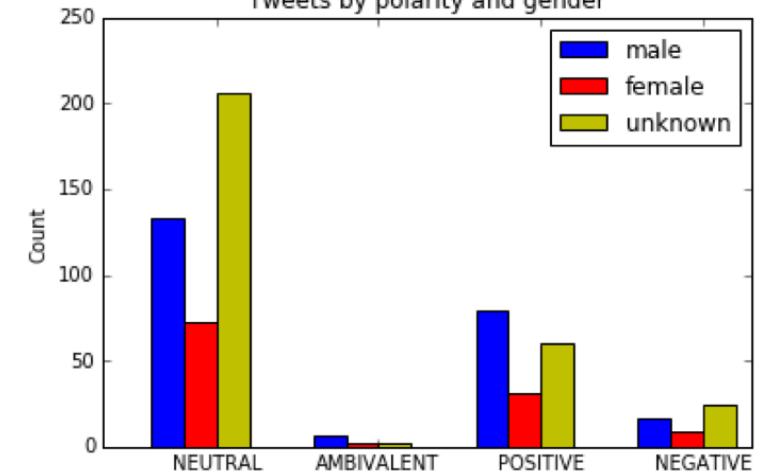


Results

https://github.com/cloudant-labs/spark-cloudant/blob/master/tutorials/InterConnect2017_Python_RESULT.ipynb



polarity	female	male	unknown
0 NEUTRAL	1680	1995	2534
1 AMBIVALENT	63	35	42
2 POSITIVE	217	420	280
3 NEGATIVE	280	455	399



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