OPEN DATA SCIENCE CONFERENCE

Burlingame I November 2nd 2017

@ODSC

@WinVectorLLC

@RStudio

Nov 02
2:00 PM
Room T2

Modeling big data with R, sparklyr, and Apache Spark

BIG DATARINTERMEDIATE

Dr. John Mount
Consulting Algorithmist/Researcher/Principal at Win-Vector LLC and
Co-author of Practical Data Science with R

Part 7: Advanced topics

Plan

- Talk about performance.
- Work through some extra topics
  - Using spark_apply() for R user defined functions
  - Using Spark SQL directly
- Remind you of topics and resources

Performance

- Due to lazy evaluation semantics work is not done until results are *used by a non-lazy operator*.
  - Make timing difficult without explicit compute() steps.
- Queries, not data are collected in dplyr pipelines.
  - Looking at the same result twice may generate the same result twice

Rules for using Sparklyr

- Can not over-emphasize how dependent you are on cluster deployment and configuration.
- Practice/debug on small data
    - But say in the sub-dialect of R/dplyr that works on Spark.
- Long sequences of calculation get expensive
    - Due to “view stacking” or “query nesting”
    - Sparklyr is supplying a “leaky abstraction” that pretends calculations are happening when you issue them (when they are note).
- Try to prefer creating more rows to creating more columns.

Mitigations

- Saving results
    - dplyr::compute()
    - checkpoint (saving data)
    - Need a temporary name management system
        - replyr::makeTempNameGenerator() is one such
- Put starting data in memory
    - tbl_cache()
- Partition
    - sdf_repartition()

Work through markdown together

- Exercises/solutions/06-Spark-Extension.Rmd

What we have achieved in this workshop

- We have worked through `dplyr` in detail.
- We applied `dplyr` data manipulation methods in a big-data environment (`Spark` / `SparklyR`).
- We ran supervised machine learning experiments in big-data environments (`SparkML`).
- We learned how to extend and use `Spark` more directly (`Spark SQL, SparklyR` extensions interface, and even a bit or `SparkR`).

Some links

This material

- https://github.com/WinVector/ODSCWest2017
  - Detailed local install instructions:
    - README.Rmd
    - Exercises/solutions/RsparklingInstall.Rmd

RStudio

- https://www.rstudio.com
- https://www.rstudio.com/products/rstudio-server-pro/
- https://www.rstudio.com/products/connect/
- https://www.rstudio.com/products/shiny-server-pro/
- https://www.rstudio.com/products/shinyapps/
- https://github.com/rstudio/rstudio

RStudio®

Win-Vector

- http://www.win-vector.com
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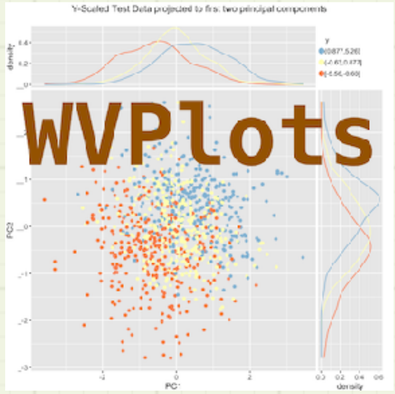

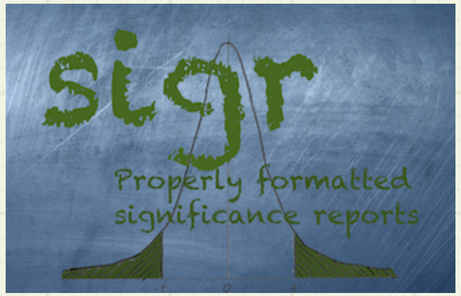

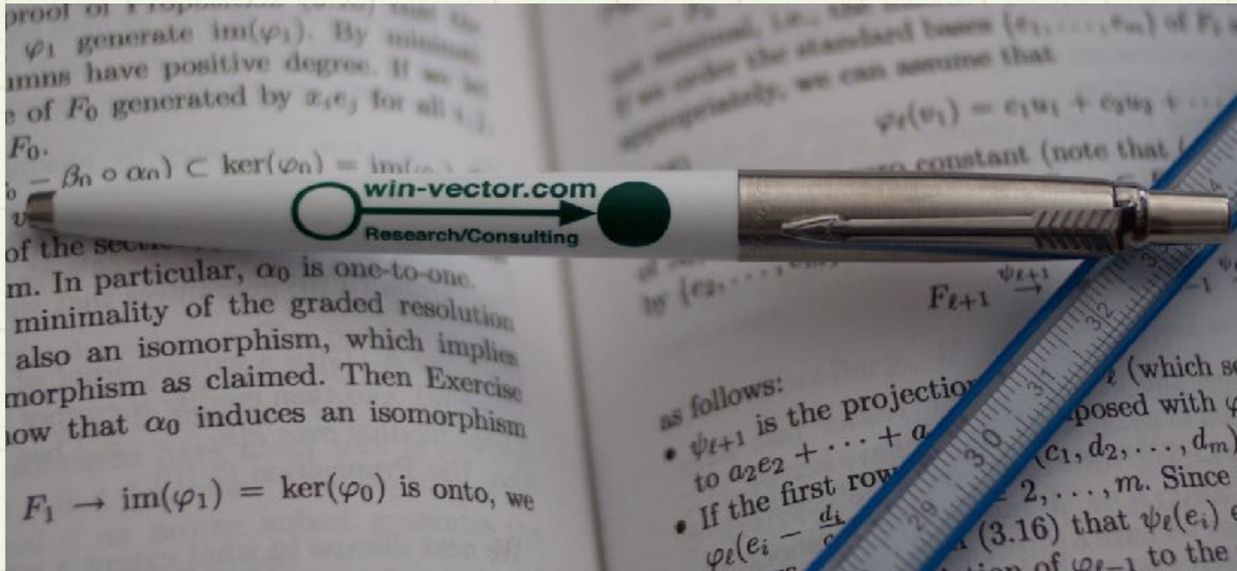

SparklyR

- https://www.rstudio.com/resources/cheatsheets/
- http://spark.rstudio.com
- http://spark.rstudio.com/dplyr.html
- http://spark.rstudio.com/extensions.html

Demos

1. R markdown notebooks with dplyr (NYCFlights13 - Local mode)
   https://beta.rstudioconnect.com/content/1706/

2. Flexdashboard
   http://colorado.rstudio.com:3838/nathan/flights-dash-spark/
   http://colorado.rstudio.com:3838/nathan/flights-dash-rdata/
   https://beta.rstudioconnect.com/content/1439/

3. Comparison of ML classifiers (Titanic - Local mode)
   https://beta.rstudioconnect.com/content/1518/

4. Manipulate data at scale (NYC Taxi - Cluster mode)
   https://beta.rstudioconnect.com/content/1704/

5. End to end analysis (Flights - Cluster mode)
   https://beta.rstudioconnect.com/content/1446/

Thank you!!!!!

Questions? Comments?