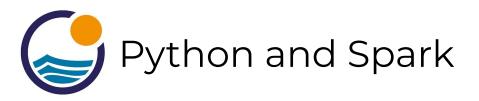


Spark Streaming

Let's learn something!





 Spark Streaming is an extension of the core Spark API that enables scalable, high-throughput, fault-tolerant stream processing of live data streams.





 Data can be ingested from many sources like Kafka, Flume, Kinesis, or TCP sockets, and can be processed using complex algorithms expressed with high-level functions like map, reduce, join and window.











 Internally, Spark Streaming receives live input data streams and divides the data into batches, which are then processed by the Spark engine to generate the final stream of results in batches.







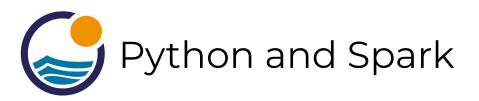


- For this course we will first work through a simple streaming example.
- You will need to simultaneously use jupyter notebook and a terminal for this.
- This is easiest to follow through a local installation using Virtual Box.





- After working through that example we will finish off the course with a Twitter Analysis Project.
- To follow along with this project you'll need to install a few visualization libraries and set up a Twitter Developer Account.



 We'll walk you through all these steps when the time comes during the lectures.



- The various possible data sources (Kafka, Flume, Kinesis, etc...) can not realistically be shown in a single computer setting.
- If your place of work necessitates use of one of these sources, Spark provides full integration guides.



- Keep in mind not every source version is available with the Python API.
- Let's jump to the documentation to show you where you can find additional information on Spark Streaming!



Spark Streaming Example Code Along





- Because we will be using Spark
 Streaming and not structured streaming
 (still experimental and in Alpha) we need to use some older "RDD" syntax.
- This stems from using a SparkContext instead of a SparkSession.





- We will be building a very simple application that connects to a local stream of data (an open terminal) through a socket connection.
- It will then count the words for each line that we type in.



- The steps for streaming will be:
 - Create a SparkContext
 - Create a StreamingContext
 - Create a Socket Text Stream
 - Read in the lines as a "DStream"



- The steps for working with the data:
 - Split the input line into a list of words
 - Map each word to a tuple: (word,1)
 - Then group (reduce) the tuples by the word (key) and sum up the second argument (the number one)





- That will then provide us with a word count in the form ('hello',3) for each line.
- As a quick note, the RDD syntax relies heavily on lambda expressions, which are just quick anonymous functions.





- Fortunately, all the lambda expressions used here are quite simple and basic.
- Let's get started with this simple example!





Spark Streaming Twitter Project Part One





- Now it is time for your final project!
- We'll create a simple application that plots out the popularity of tags associated with incoming tweets streamed live from Twitter.

- We first need to create a Twitter
 Developer Account to get our access codes.
- Then you'll need to install the tweepy library as well as matplotlib and seaborn.
- Let's get started by going to:
 - apps.twitter.com



Spark Streaming Twitter Project Part Two



- Our next task is to write a script that will connect to Twitter for streaming.
- This will be a .py file that we will call later on.
- Let's get started!

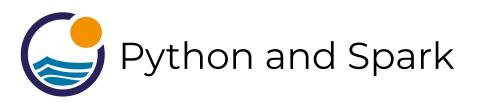


Spark Streaming Twitter Project Part 3

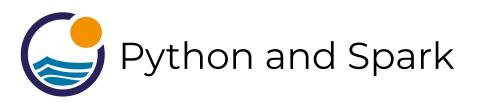


- Now we will finish off our project by setting up a Jupyter Notebook with Spark that will connect to the socket connection created by TweetRead.py!
- Remember to fill in your credentials for everything to work!

- For this lecture I **highly** recommend that you avoid typing out the instructions on your own and instead use the provided notebook:
 - Introduction to Spark Streaming.ipynb



 There are many places where a simple typo can mess everything up, and the nature of SQLContexts and the sockets will require you to restart your VirtualBox to get going again.



 Depending on how many times you run through this exercise, the port you assigned in TweetRead.py may already be in use, we'll go over how to change that port.



- We also need to install one more library called pandas.
 - pip3 install pandas
- Install this at the terminal and then restart you VirtualBox Ubuntu Machine before following along with this lecture.



- Here are the steps we'll take:
 - Quickly review TweetRead.py
 - Open up the provided notebook file
 - Scroll down to the Twitter section
 - Run the .py files and cells in the correct order as we explain what is happening line by line.

- There are many steps that must be done in the exact order for this entire process to work!
- If you do even a single step out of order, you'll need to restart the VirtualBox and start over again.

- Using the provided TweetRead.py and Introduction to Spark Streaming.ipynb will save you a lot of time and frustration!
- Let's get started