Conventional Research at Unconventional Scale

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23 January 2020


jupyter demo Last Checkpoint: 31 minutes ago (unsaved changes)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3
Run
Code
In [ ]: spark
In [ ]: # https://www1.nyc.gov/assets/tlc/downloads/pdf/2018_tlc_factbook.pdf
https://www1.nyc.gov/site/tlc/about/fhv-accessibility.page
https://www1.nyc.gov/site/tlc/passengers/taxi-fare.page
In [ ]: import pyspark.sql.functions as F
import pandas as pd
from pyspark.sql.types import FloatType, StringType
from itertools import chain
def chg_57_to_56_locID(x):
# Both Corona's map to the same name
if x=="57":
return "56"
else:
return x
def get_zones_info(x):
zones = pd.read_csv("supp_docs/taxi_zones_all_data.csv").drop_duplicates(subset="LocationID")[["LocationID",x]]
zones["LocationID"] = zones["LocationID"].astype(str)
dic = zones.set_index("LocationID").T.to_dict('records')[0]
return dic
chg_id_udf = F.udf(lambda z: chg_57_to_56_locID(z), StringType())
service_zones = get_zones_info("service_zone")
service_zones_mapping = F.create_map([F.lit(x) for x in chain(*service_zones.items())])
valid_zones = [str(i) for i in range(1,266)]
def validate_zones(fhv):
fhv = fhv.withColumn("PULocationID", chg_id_udf("PULocationID"))
# drop missing DO/PU, nearly all pre-2018.
fhv = fhv.filter(F.col("PULocationID").isin(valid_zones))
fhv = fhv.withColumn("PUServiceZONE", service_zones_mapping[F.col("PULocationID")])
return fhv
In [ ]: def add_date_columns(fhv_raw):
fhv_raw = fhv_raw.withColumn("Pickup_DateTime", F.to_timestamp("Pickup_DateTime", "yyyy-MM-dd HH:mm:ss"))
fhv_raw = fhv_raw.withColumn("date", F.date_format("Pickup_DateTime", "yyyy-MM-dd"))
fhv_raw = fhv_raw.withColumn("quarter", F.quarter("Pickup_DateTime"))
fhv_raw = fhv_raw.withColumn("year", F.year("Pickup_DateTime"))
fhv = fhv_raw.withColumn("month", F.month("Pickup_DateTime"))
return fhv
In [ ]: import pyspark.sql.functions as F
fhv = (spark
.read.option("header", "true")
.parquet("s3a://dev-719612953376/cruzlili/tripdata/fhv_tripdata_*"))
fhv = add_date_columns(fhv)
fhv = validate_zones(fhv)
In [ ]: fhv.take(1)
In [ ]: fhv.count()
In [ ]: result = fhv.groupBy(['PULocationBORO', 'date']).count()
df = result.toPandas()
In [ ]: len(df)
In [ ]: df.groupby('PULocationBORO').plot()
In [ ]: import matplotlib.pyplot as pp
df.groupby('date').sum().plot(); pp.xticks(rotation=70)
In [ ]:

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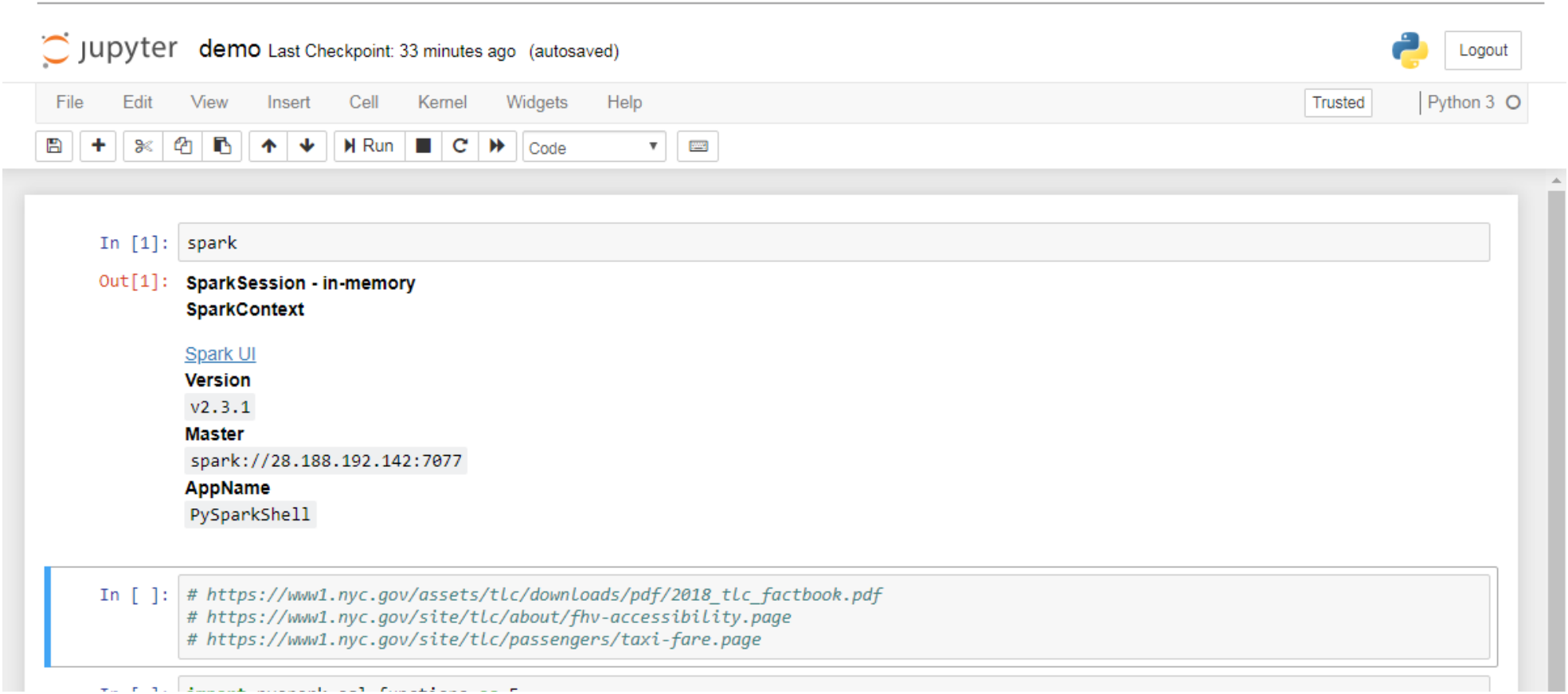

jupyter demo Last Checkpoint: 33 minutes ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3
Run
Code
In [1]: spark
Out[1]: SparkSession - in-memory
SparkContext
Spark UI
Version
v2.3.1
Master
spark://28.188.192.142:7077
AppName
PySparkShell
In [ ]: # https://www1.nyc.gov/assets/tlc/downloads/pdf/2018_tlc_factbook.pdf
https://www1.nyc.gov/site/tlc/about/fhv-accessibility.page
https://www1.nyc.gov/site/tlc/passengers/taxi-fare.page

In [2]:
```
import pyspark.sql.functions as F
import pandas as pd
from pyspark.sql.types import FloatType, StringType
from itertools import chain


def chg_57_to_56_locID(x):
    # Both Corona's map to the same name
    if x=="57":
        return "56"
    else:
        return x


def get_zones_info(x):
    zones = pd.read_csv("supp_docs/taxi_zones_all_data.csv").drop_duplicates(subset="LocationID")[["LocationID",x]]
    zones["LocationID"] = zones["LocationID"].astype(str)
    dic = zones.set_index("LocationID").T.to_dict('records')[0]
    return dic


chg_id_udf = F.udf(lambda z:  chg_57_to_56_locID(z), StringType())

service_zones = get_zones_info("service_zone")
service_zones_mapping = F.create_map([F.lit(x) for x in chain(*service_zones.items())])

valid_zones = [str(i) for i in range(1,266)]

def validate_zones(fhv):
    fhv = fhv.withColumn("PULocationID", chg_id_udf("PULocationID"))
    # drop missing DO/PU, nearly all pre-2018.
    fhv = fhv.filter(F.col("PULocationID").isin(valid_zones))
    fhv = fhv.withColumn("PUServiceZONE", service_zones_mapping[F.col("PULocationID")])
    return fhv
```

In [3]:
```
def add_date_columns(fhv_raw):
    fhv_raw = fhv_raw.withColumn("Pickup_DateTime", F.to_timestamp("Pickup_DateTime", "yyyy-MM-dd HH:mm:ss"))
    fhv_raw = fhv_raw.withColumn("date", F.date_format("Pickup_DateTime", "yyyy-MM-dd"))
    fhv_raw = fhv_raw.withColumn("quarter", F.quarter("Pickup_DateTime"))
    fhv_raw = fhv_raw.withColumn("year", F.year("Pickup_DateTime"))
    fhv = fhv_raw.withColumn("month", F.month("Pickup_DateTime"))
    return fhv
```

In [4]:
```
import pyspark.sql.functions as F


fhv = (spark
         .read.option("header", "true")
         .parquet("s3a://dev-719612953376/cruzlili/tripdata/fhv_tripdata_*"))

fhv = add_date_columns(fhv)
fhv = validate_zones(fhv)
```

In [5]:
```
fhv.take(1)
```

Out[5]:
```
[Row(Pickup_DateTime=datetime.datetime(2018, 4, 17, 19, 11, 10), DropOff_datetime='2018-04-17 19:28:36', SR_Flag=None, Dispatch
ing_base_number='B02887', PULocationID='88', PULocationZONE='Financial District South', PULocationBORO='Manhattan', DOLocationI
D='137', DOLocationZONE='Kips Bay', DOLocationBORO='Manhattan', date='2018-04-17', quarter=2, year=2018, month=4, PUServiceZONE
='Yellow Zone')]
```

In [6]:
```
fhv.count()
```

Out[6]:
```
642968481
```

In [*]:
```
result = fhv.groupBy(['PULocationBORO', 'date']).count()
df = result.toPandas()
```

Spark 2.3.1 | Jobs | Stages | Storage | Environment | Executors | SQL | PySparkShell application UI

Spark Jobs (?)

User: kellehad
Total Uptime: 6.8 min
Scheduling Mode: FIFO
Active Jobs: 1
Completed Jobs: 3

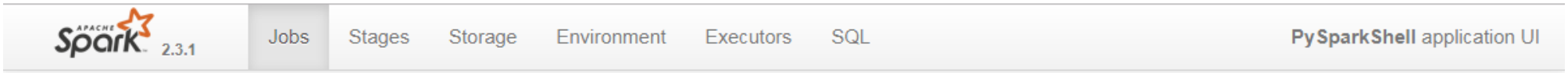
▸ Event Timeline

Active Jobs (1)

Job Id ▾	Description	Submitted	Duration	Stages: Succeeded/Total	Tasks (for all stages): Succeeded/Total
3	toPandas at <ipython-input-7-a3b57236b255>:2 toPandas at <ipython-input-7-a3b57236b255>:2 (kill)	2020/01/21 22:53:04	22 s	0/2	0/312

Completed Jobs (3)

Job Id ▾	Description	Submitted	Duration	Stages: Succeeded/Total	Tasks (for all stages): Succeeded/Total
2	count at NativeMethodAccessorImpl.java:0 count at NativeMethodAccessorImpl.java:0	2020/01/21 22:50:56	39 s	2/2	113/113
1	take at <ipython-input-5-8979246dceab>:1 take at <ipython-input-5-8979246dceab>:1	2020/01/21 22:50:54	2 s	1/1	1/1
0	parquet at NativeMethodAccessorImpl.java:0 parquet at NativeMethodAccessorImpl.java:0	2020/01/21 22:50:51	2 s	1/1	1/1



Details for Job 3

Status: RUNNING
Active Stages: 1
Pending Stages: 1

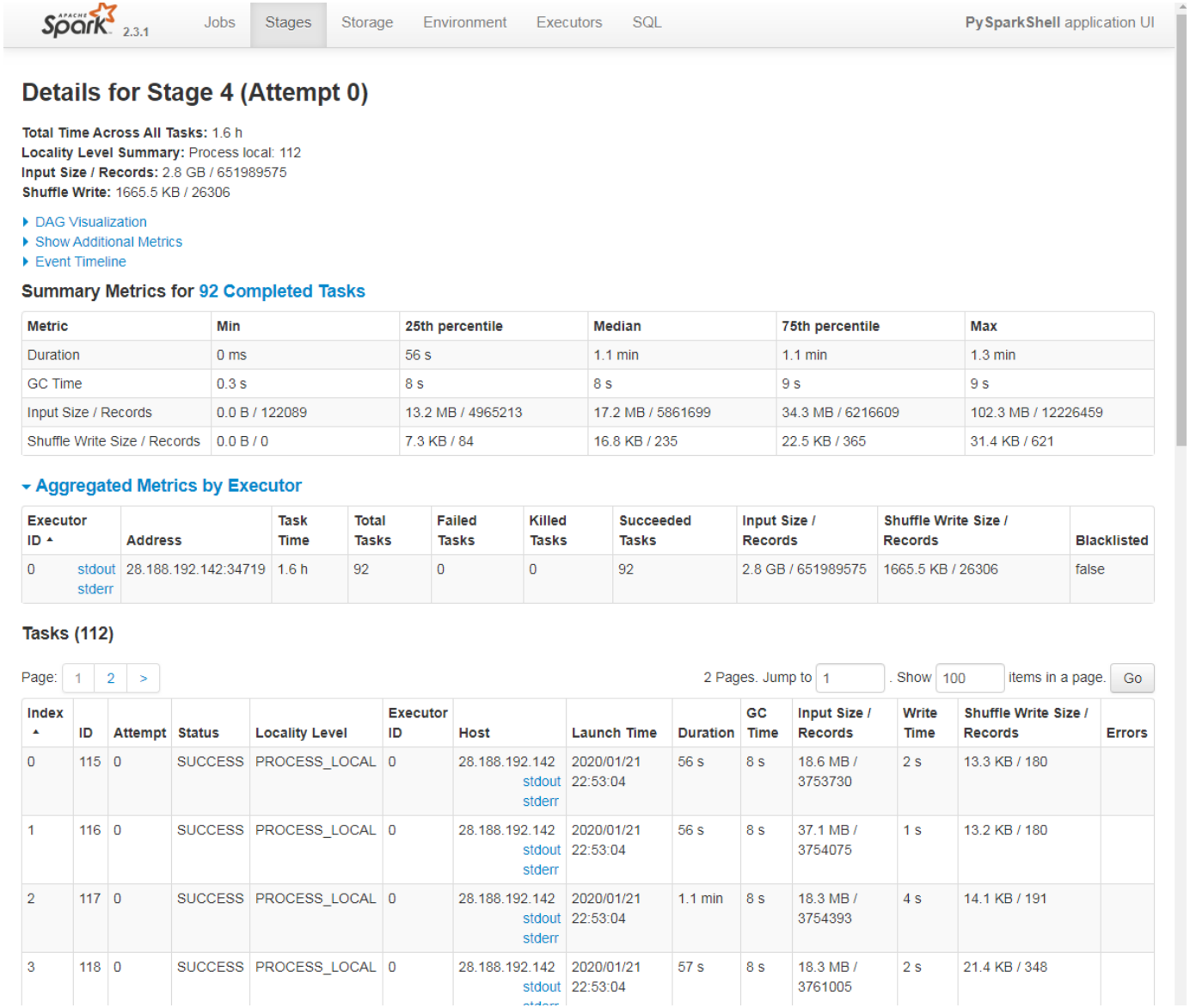
- Event Timeline
- DAG Visualization

Active Stages (1)

Stage Id	Description	Submitted	Duration	Tasks: Succeeded/Total	Input	Output	Shuffle Read	Shuffle Write
4	toPandas at <ipython-input-7-a3b57236b255>:2 (kill) +details	2020/01/21 22:53:04	50 s	0/112 (96 running)	5.4 GB			

Pending Stages (1)

Stage Id	Description	Submitted	Duration	Tasks: Succeeded/Total	Input	Output	Shuffle Read	Shuffle Write
5	toPandas at <ipython-input-7-a3b57236b255>:2 +details	Unknown	Unknown	0/200				



Spark 2.3.1 Jobs Stages Storage Environment Executors SQL PySparkShell application UI

Details for Stage 4 (Attempt 0)

Total Time Across All Tasks: 1.6 h
Locality Level Summary: Process local: 112
Input Size / Records: 2.8 GB / 651989575
Shuffle Write: 1665.5 KB / 26306

- DAG Visualization
- Show Additional Metrics
- Event Timeline

Summary Metrics for 92 Completed Tasks

Metric	Min	25th percentile	Median	75th percentile	Max
Duration	0 ms	56 s	1.1 min	1.1 min	1.3 min
GC Time	0.3 s	8 s	8 s	9 s	9 s
Input Size / Records	0.0 B / 122089	13.2 MB / 4965213	17.2 MB / 5861699	34.3 MB / 6216609	102.3 MB / 12226459
Shuffle Write Size / Records	0.0 B / 0	7.3 KB / 84	16.8 KB / 235	22.5 KB / 365	31.4 KB / 621

Aggregated Metrics by Executor

Executor ID	Address	Task Time	Total Tasks	Failed Tasks	Killed Tasks	Succeeded Tasks	Input Size / Records	Shuffle Write Size / Records	Blacklisted
0 stdout stderr	28.188.192.142:34719	1.6 h	92	0	0	92	2.8 GB / 651989575	1665.5 KB / 26306	false

Tasks (112)

Page: 1 2 > 2 Pages. Jump to 1 . Show 100 items in a page. Go

Index	ID	Attempt	Status	Locality Level	Executor ID	Host	Launch Time	Duration	GC Time	Input Size / Records	Write Time	Shuffle Write Size / Records	Errors
0	115	0	SUCCESS	PROCESS_LOCAL	0	28.188.192.142 stdout stderr	2020/01/21 22:53:04	56 s	8 s	18.6 MB / 3753730	2 s	13.3 KB / 180	
1	116	0	SUCCESS	PROCESS_LOCAL	0	28.188.192.142 stdout stderr	2020/01/21 22:53:04	56 s	8 s	37.1 MB / 3754075	1 s	13.2 KB / 180	
2	117	0	SUCCESS	PROCESS_LOCAL	0	28.188.192.142 stdout stderr	2020/01/21 22:53:04	1.1 min	8 s	18.3 MB / 3754393	4 s	14.1 KB / 191	
3	118	0	SUCCESS	PROCESS_LOCAL	0	28.188.192.142 stdout	2020/01/21 22:53:04	57 s	8 s	18.3 MB / 3761005	2 s	21.4 KB / 348	

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In [7]:
```
result = fhv.groupBy(['PULocationBORO', 'date']).count()
df = result.toPandas()
```

In [8]:
```
len(df)
```

Out[8]: 11421

In [11]:
```
df.groupby('PULocationBORO').sum()
```

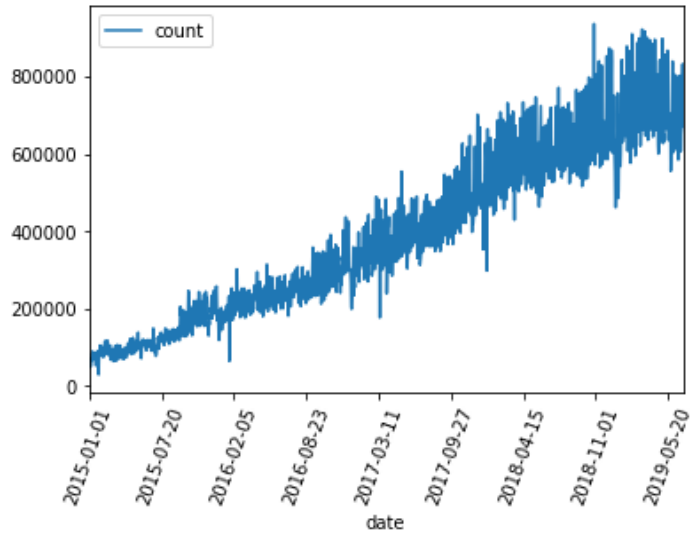
Out[11]:

PULocationBORO	count
Bronx	53889463
Brooklyn	159329886
EWR	96518
Manhattan	319466907
NaN	3944659
Queens	101033591
Staten Island	5207457

In [12]:
```
import matplotlib.pyplot as pp


df.groupby('date').sum().plot(); pp.xticks(rotation=70)
```

Out[12]:
```
(array([   0.,  200.,  400.,  600.,  800., 1000., 1200., 1400., 1600.,
        1800.]), <a list of 10 Text xticklabel objects>)
```



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