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# Spark by {Example sparkh typ (ntt/ps:t/aptalkbyexample becom/) m/)

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PySpark Tutorial For Beginners (https://sparkbyexamples.com/pyspark-tutorial/)			, горанко у схант <u>р</u>	оо.оот русратк
<u>PySpark – Features</u> (https://sparkbyexamples.com/ pyspark-tutorial/#features)	Hive	(https://sp	arkbyexamples.c	com/apache-hive
PySpark – Advantages (https://sparkbyexamples.com/ pyspark-tutorial/#advantages)	utorial/	).		
PySpark – Modules & Packages (https://sparkbyexamples.com/ pyspark-tutorial/#modules- packages)		Loop	dik – dik – Iterate Igh Rows	
PySpark – Cluster Managers (https://sparkbyexamples.com/ pyspark-tutorial/#cluster- manager)		<b>Data</b> E	rame	
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PySpark – Web/Application UI (https://sparkbyexamples.com/spark/spark-web-ui-understanding/)		PySpark pompersition (15/) rows in RD	rovides map(), ons() to loop/iterate DD/DataFrame to p	te through perform the
PySpark - SparkSession (https://sparkbyexamples.com/ pyspark/pyspark-what-is- sparksession/)	More	returns the (https:/ in the origi number of	ansformations, an same number of /sparkbyexample nal DataFrame bu columns could be	records as es.com/) t the
PySpark - RDD (https://sparkbyexamples.com/ pyspark-rdd)		(after add/	update).	
PySpark – Parallelize (https://sparkbyexamples.com/ pyspark/pyspark-parallelize- create-rdd/)				
PySpark - repartition() vs coalesce() (https://sparkbyexamples.com/ pyspark/pyspark-repartition- vs-coalesce/)			Learn more	
PySpark – Broadcast Variables (https://sparkbyexamples.com/			lso provides forea	``

loop/iterate through each Row in a DataFrame but these two returns

pyspark/pyspark-broadcast-

variables/)

<u>PySpark – Accumulator</u> (https://sparkbyexamples.com/ <u>pyspark/pyspark-accumulator-with-example/)</u>

#### **PySpark DataFrame**

<u>PySpark – Create a</u> <u>DataFrame</u>

(https://sparkbyexamples.com/ pyspark/different-ways-tocreate-dataframe-in-pyspark/)

<u>PySpark – Create an empty</u> <u>DataFrame</u>

(https://sparkbyexamples.com/ pyspark/pyspark-create-anempty-dataframe/)

<u>PySpark – Convert RDD to</u> <u>DataFrame</u>

(https://sparkbyexamples.com/ pyspark/convert-pyspark-rddto-dataframe/)

<u>PySpark – Convert DataFrame</u> to Pandas

(https://sparkbyexamples.com/ pyspark/convert-pysparkdataframe-to-pandas/)

<u>PySpark – show()</u>
(https://sparkbyexamples.com/
<u>pyspark/pyspark-show-display-</u>
dataframe-contents-in-table/)

<u>PySpark – StructType & StructField</u>
(https://sparkbyexamples.com/pyspark/pyspark-structtype-and-structfield/)</u>

<u>PySpark – Row Class</u> (https://sparkbyexamples.com/ <u>pyspark/pyspark-row-using-rdd-dataframe/)</u>

<u>PySpark – Column Class</u> (https://sparkbyexamples.com/ <u>pyspark/pyspark-column-</u> functions/)

<u>PySpark – select()</u>
(https://sparkbyexamples.com/
pyspark/select-columns-frompyspark-dataframe/)</u>

<u>PySpark – collect()</u>
(https://sparkbyexamples.com/
pyspark/pyspark-collect/)</u>

<u>PySpark – withColumn()</u> (https://sparkbyexamples.com/ pyspark/pyspark-withcolumn/)</u> nothing, In this article, I will explain how to use these methods to get DataFrame column values and process.

- Using map() to loop through
   DataFrame
- Using foreach() to loop through DataFrame
- Using pandas() to Iterate
- Collect Data As List and Loop
  Through in Python

# PySpark Loop Through Rows in DataFrame Examples

In order to explain with examples, let's create a DataFrame

```
from pyspark.sql import SparkSe
spark = SparkSession.builder.ap
data = [('James', 'Smith', 'M', 30
  ('Robert', 'Williams', 'M', 62),
1
columns = ["firstname","lastname
df = spark.createDataFrame(data
df.show()
+-----
|firstname|lastname|gender|sala
    James
             Smith
                        M
                        F
     Anna
             Rose
   Robert | Williams |
                        МΙ
```

Mostly for simple computations, instead of iterating through using map() and foreach(), you should use either DataFrame select()

(https://sparkbyexamples.com/pyspark/s elect-columns-from-pyspark-dataframe/) or DataFrame withColumn() (https://sparkbyexamples.com/pyspark/pyspark-withcolumn/) in conjunction with PySpark SQL functions.

<u>PySpark –</u>
withColumnRenamed()
(https://sparkbyexamples.com/
pyspark/pyspark-renamedataframe-column/)

<u>PySpark – where() & filter()</u> (https://sparkbyexamples.com/ pyspark/pyspark-where-filter/)

PySpark – drop() & dropDuplicates(). (https://sparkbyexamples.com/pyspark/pyspark-distinct-to-drop-duplicates/).

<u>PySpark – orderBy() and sort()</u> (https://sparkbyexamples.com/ <u>pyspark/pyspark-orderby-and-</u> sort-explained/)

<u>PySpark – groupBy()</u>
(https://sparkbyexamples.com/
pyspark/pyspark-groupbyexplained-with-example/)</u>

<u>PySpark – join()</u>
(https://sparkbyexamples.com/
<u>pyspark/pyspark-join-</u>
explained-with-examples/)

<u>PySpark – union() & unionAll()</u> (https://sparkbyexamples.com/ <u>pyspark/pyspark-union-and-unionall/)</u>

<u>PySpark – unionByName()</u>
(https://sparkbyexamples.com/
spark/spark-merge-twodataframes-with-differentcolumns/)

PySpark – UDF (User Defined Function)
(https://sparkbyexamples.com/pyspark/pyspark-udf-user-defined-function/)

<u>PySpark – map()</u>
(https://sparkbyexamples.com/
<u>pyspark/pyspark-map-</u>
<u>transformation/)</u>

<u>PySpark – flatMap()</u>
(<u>https://sparkbyexamples.com/pyspark/pyspark-flatmap-</u>
transformation/)

pyspark – foreach() (https://sparkbyexamples.com/ pyspark/pyspark-loop-iteratethrough-rows-indataframe/#use-foreach-loopthrough-dataframe)

<u>PySpark – sample() vs</u> <u>sampleBy()</u>

<pre>from pyspark.sql.functions impo df.select(concat_ws(",",df.firs</pre>
+
James,Smith  M    Anna,Rose  F   Robert,Williams  M
+++

Below I have map() example to achieve same output as above.

Average User Earns \$50/Month

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# Using map() to Loop Through Rows in

# **DataFrame**

PySpark map() Transformation (https://sparkbyexamples.com/pyspark/ pyspark-map-transformation/) is used to loop/iterate through the PySpark DataFrame/RDD by applying the transformation function (lambda) on every element (Rows and Columns) of RDD/DataFrame. PySpark doesn't have a map() in DataFrame instead it's in RDD hence we need to convert DataFrame to RDD first and then use the map(). It returns an RDD and you should Convert RDD to PySpark DataFrame (https://sparkbyexamples.com/pyspark/c onvert-pyspark-rdd-to-dataframe/) if needed.

If you have a heavy initialization use PySpark mapPartitions() transformation instead of map(), as with



(https://sparkbyexamples.com/ pyspark/pyspark-samplingexample/)

PySpark – fillna() & fill() (https://sparkbyexamples.com/ pyspark/pyspark-fillna-fillreplace-null-values/)

<u>PySpark – pivot() (Row to</u> Column)

(https://sparkbyexamples.com/ pyspark/pyspark-pivot-andunpivot-dataframe/)

<u>PySpark – partitionBy()</u>
(https://sparkbyexamples.com/
<u>pyspark/pyspark-partitionby-example/)</u>

<u>PySpark – ArrayType Column</u> (<u>Array)</u>

(https://sparkbyexamples.com/ pyspark/pyspark-arraytypecolumn-with-examples/)

PySpark — MapType
(Map/Dict)
(https://sparkbyexamples.com/
pyspark/pyspark-maptype-dict-examples/).

# **PySpark SQL Functions**

<u>PySpark – Aggregate Functions</u> (<u>https://sparkbyexamples.com/pyspark/pyspark-aggregate-functions/</u>)

<u>PySpark – Window Functions</u> (<u>https://sparkbyexamples.com/pyspark/pyspark-window-functions/</u>)

<u>PySpark – Date and Timestamp</u> <u>Functions</u>

(https://sparkbyexamples.com/py spark/pyspark-sql-date-andtimestamp-functions/)

<u>PySpark – JSON Functions</u> (<u>https://sparkbyexamples.com/pyspark/pyspark-json-functions-with-examples/</u>)

#### **PySpark Datasources**

<u>PySpark – Read & Write CSV</u> <u>File</u>

(https://sparkbyexamples.com/ pyspark/pyspark-read-csv-fileinto-dataframe/)

<u>PySpark – Read & Write</u> <u>Parquet File</u> (https://sparkbyexamples.com/ mapPartitions() heavy initialization executes only once for each partition instead of every record.

```
# Refering columns by index.
rdd=df.rdd.map(lambda x:
    (x[0]+","+x[1],x[2],x[3]*2)
    )
df2=rdd.toDF(["name","gender","df2.show()
```

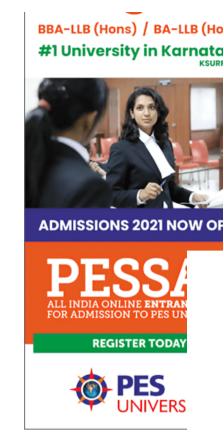
The above example iterates through every row in a DataFrame by applying transformations to the data, since I need a DataFrame back, I have converted the result of RDD to DataFrame with new column names. Note that here I have used index to get the column values, alternatively, you can also refer to the DataFrame column names while iterating.

```
# Referring Column Names
rdd2=df.rdd.map(lambda x:
    (x["firstname"]+","+x["last
    )
```

Another alternative

```
# Referring Column Names
rdd2=df.rdd.map(lambda x:
    (x.firstname+","+x.lastname
    )
```

You can also create a custom function to perform an operation. Below func1() function executes for every DataFrame row from the lambda function.



<u>pyspark/pyspark-read-and-write-parquet-file/)</u>

PySpark - Read & Write JSON file

(https://sparkbyexamples.com/ pyspark/pyspark-read-jsonfile-into-dataframe/)

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```
# By Calling function
def func1(x):
    firstName=x.firstname
    lastName=x.lastName
    name=firstName+","+lastName
    gender=x.gender.lower()
    salary=x.salary*2
    return (name,gender,salary)

rdd2=df.rdd.map(lambda x: func1
```

# Using foreach() to Loop

# **Through Rows in**

# **DataFrame**

Similar to map(), foreach() also applied to every row of DataFrame, the difference being foreach() is an action and it returns nothing. Below are some examples to iterate through DataFrame using for each.

```
# Foreach example
def f(x): print(x)
df.foreach(f)

# Another example
df.foreach(lambda x:
    print("Data ==>"+x["firstnam")
```

# Using pandas() to Iterate

If you have a small dataset, you can also Convert PySpark DataFrame to Pandas

# PySpark Built-In Functions

<u>PySpark – when()</u> (https://sparkbyexamples.com/py spark/pyspark-when-otherwise/)</u>

<u>PySpark – expr()</u>
(https://sparkbyexamples.com/py
spark/pyspark-sql-exprexpression-function/)

PySpark - lit()

(https://sparkbyexamples.com/py spark/pyspark-lit-add-literalconstant/)

PySpark - split()

(https://sparkbyexamples.com/py spark/pyspark-convert-string-toarray-column/)

PySpark – concat\_ws() (https://sparkbyexamples.com/pyspark/pyspark-convert-array-column-to-string-column/)

<u>Pyspark – substring()</u>
(https://sparkbyexamples.com/pyspark/pyspark-substring-from-a-column/)

PySpark – translate() (https://sparkbyexamples.com/py spark/pyspark-replace-columnvalues/#translate-replacecharacter-by-character)

PySpark - regexp\_replace()
(https://sparkbyexamples.com/py
spark/pyspark-replace-columnvalues/#regexp\_replace-replacestring-columns)

PySpark – overlay() (https://sparkbyexamples.com/py spark/pyspark-replace-columnvalues/#overlay-function)

PySpark – to\_timestamp() (https://sparkbyexamples.com/spark/pyspark-to\_timestampconvert-string-to-timestamptype/)

PySpark – to\_date() (https://sparkbyexamples.com/pyspark/pyspark-to\_date-convert-timestamp-to-date/)

PySpark – date\_format() (https://sparkbyexamples.com/py spark/pyspark-date\_formatconvert-date-to-string-format/)

PySpark – datediff() (https://sparkbyexamples.com/py spark/pyspark-differencebetween-two-dates-daysmonths-years/#datediff)

PySpark – months\_between()
(https://sparkbyexamples.com/py
spark/pyspark-differencebetween-two-dates-daysmonthsyears/#months\_between())

(https://sparkbyexamples.com/pyspark/convert-pyspark-dataframe-to-pandas/) and use pandas to iterate through. Use spark.sql.execution.arrow.enabled config to enable Apache Arrow with Spark. Apache Spark uses Apache Arrow which is an in-memory columnar format to transfer the data between Python and JVM.

```
# Using pandas
import pandas as pd
spark.conf.set("spark.sql.execur
pandasDF = df.toPandas()
for index, row in pandasDF.iter
    print(row['firstname'], row
```

# **Collect Data As List and**

# **Loop Through**

You can also Collect the PySpark

DataFrame to Driver

(https://sparkbyexamples.com/pyspark/
pyspark-collect/) and iterate through

Python, you can also use

toLocalIterator().

```
# Collect the data to Python Light
dataCollect = df.collect()
for row in dataCollect:
    print(row['firstname'] + ",

#Using toLocalIterator()
dataCollect=df.rdd.toLocalIterator
for row in dataCollect:
    print(row['firstname'] + ",
```

# Conclusion

In this article, you have learned iterating/loop through Rows of PySpark DataFrame could be done using map(), foreach(), converting to Pandas, and finally converting DataFrame to Python List. If you want to do simile computations, use either select or withColumn().

<u>PySpark - explode()</u>
(https://sparkbyexamples.com/py
spark/pyspark-explode-nestedarray-into-rows/)

PySpark – array\_contains() (https://sparkbyexamples.com/pyspark/pyspark-arraytype-column-with-examples/#array\_contains)

PySpark – array() (https://sparkbyexamples.com/pyspark/pyspark-arraytype-column-with-examples/#array)

<u>PySpark – collect\_list()</u>
(https://sparkbyexamples.com/py
spark/pyspark-aggregatefunctions/#collect-list)

<u>PySpark – collect\_set()</u>
(https://sparkbyexamples.com/py
spark/pyspark-aggregatefunctions/#collect-set)

PySpark - create\_map() (https://sparkbyexamples.com/py spark/pyspark-convertdataframe-columns-to-maptypedict/)

<u>PySpark – map\_keys()</u>
(https://sparkbyexamples.com/py
spark/pyspark-maptype-dictexamples/#map\_keys)

PySpark - map\_values() (https://sparkbyexamples.com/py spark/pyspark-maptype-dictexamples/#map\_values)

PySpark – struct().
(https://sparkbyexamples.com/pyspark/pyspark-structtype-and-structfield/#update-struct-function).

<u>PySpark – countDistinct()</u>
(https://sparkbyexamples.com/py
spark/pyspark-count-distinctfrom-dataframe/)

PySpark – sum(), avg()
(https://sparkbyexamples.com/py
spark/pyspark-dataframegroupby-and-sort-bydescending-order/)

<u>PySpark - row\_number()</u>
(https://sparkbyexamples.com/py
spark/pyspark-windowfunctions/#row\_number)

PySpark - rank() (https://sparkbyexamples.com/py spark/pyspark-windowfunctions/#rank) Happy Learning !!

#### References

 https://spark.apache.org/docs/2.2.0/a pi/python/pyspark.sql.html#pyspark.s ql.DataFrame.foreach (https://spark.apache.org/docs/2.2.0/api/python/pyspark.sql.html#pyspark.sql.DataFrame.foreach)

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(HTTPS://SPARKBYEXAMPLES.COM/TAG/FOREACH/). MAP()

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PySpark – dense\_rank() (https://sparkbyexamples.com/pyspark/pyspark-window-functions/#dense\_rank)

PySpark – percent rank()
(https://sparkbyexamples.com/py
spark/pyspark-windowfunctions/#percent rank)

PySpark - typedLit()
(https://sparkbyexamples.com/py
spark/pyspark-lit-add-literalconstant/#typedlit)

PySpark – from\_json() (https://sparkbyexamples.com/pyspark/pyspark-json-functions-with-examples/#from\_json)

PySpark – to\_json()
(https://sparkbyexamples.com/py
spark/pyspark-json-functionswith-examples/#to\_json)

PySpark – json\_tuple() (https://sparkbyexamples.com/py spark/pyspark-json-functionswith-examples/#json\_tuple)

PySpark – get json object()
(https://sparkbyexamples.com/py
spark/pyspark-json-functionswith-examples/#get json object)

PySpark – schema\_of\_json() (https://sparkbyexamples.com/py spark/pyspark-json-functionswithexamples/#schema\_of\_json).

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ark-using-length-size-of-a-dataframecolumn/)

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