Data Engineering Batch 1 **Day 13:06/02/2024**

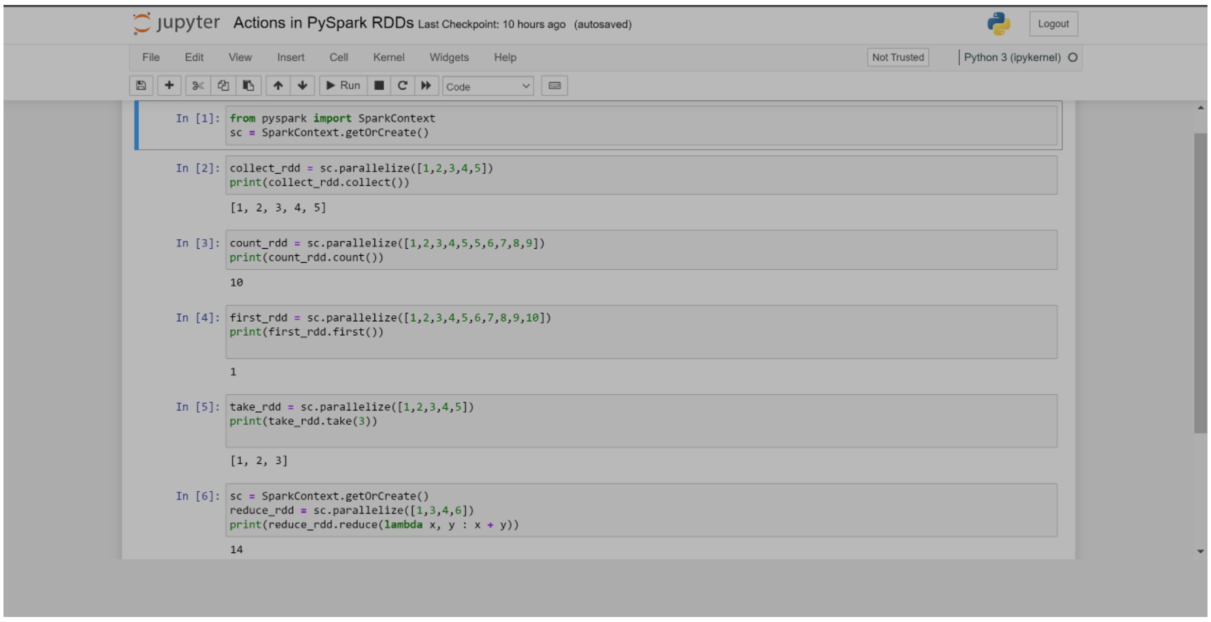
Name: Pradip Bochare

PySpark RDD Operations

- Transformations: Transformations are a kind of operation that takes an RDD as input and produces another RDD as output. Once a transformation is applied to an RDD, it returns a new RDD, the original RDD remains the same and thus are immutable.

- Actions: Actions are a kind of operation which are applied on an RDD to produce a single value. These methods are applied on a resultant RDD and produces a non-RDD value

❖ Actions in PySpark RDDs


jupyter Actions in PySpark RDDs Last Checkpoint: 10 hours ago (autosaved)
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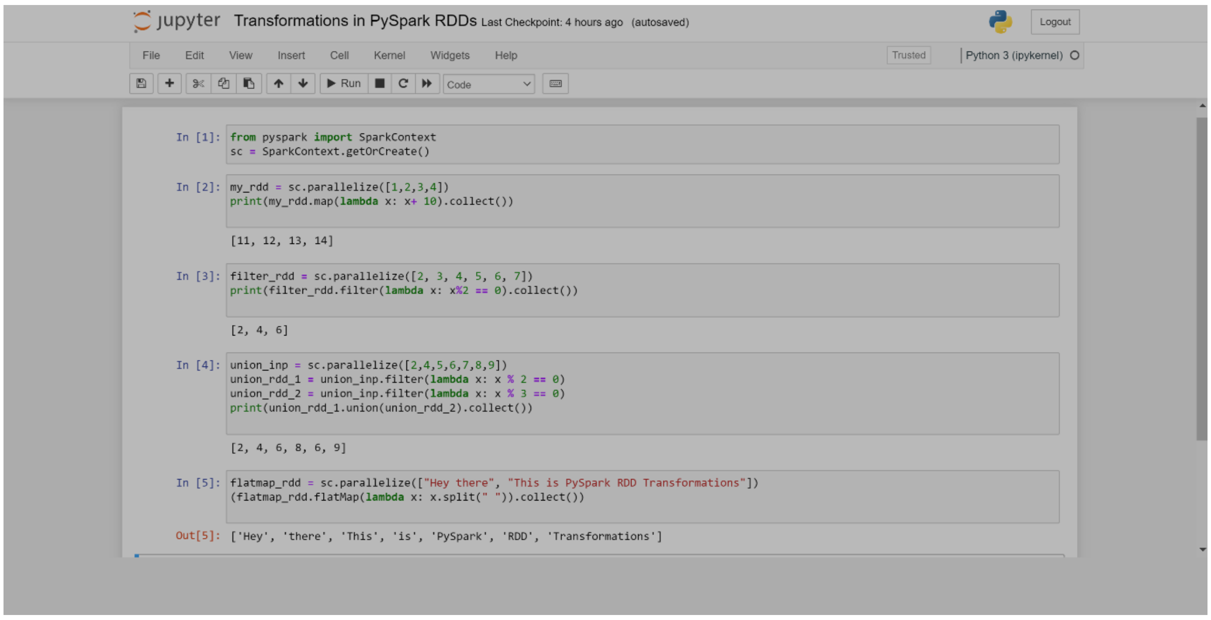
Python 3 (ipykernel)
Run
Code

```
In [1]: from pyspark import SparkContext
        sc = SparkContext.getOrCreate()

In [2]: collect_rdd = sc.parallelize([1,2,3,4,5])
        print(collect_rdd.collect())

        [1, 2, 3, 4, 5]

In [3]: count_rdd = sc.parallelize([1,2,3,4,5,5,6,7,8,9])
        print(count_rdd.count())

        10

In [4]: first_rdd = sc.parallelize([1,2,3,4,5,6,7,8,9,10])
        print(first_rdd.first())

        1

In [5]: take_rdd = sc.parallelize([1,2,3,4,5])
        print(take_rdd.take(3))

        [1, 2, 3]

In [6]: sc = SparkContext.getOrCreate()
        reduce_rdd = sc.parallelize([1,3,4,6])
        print(reduce_rdd.reduce(lambda x, y : x + y))

        14
```

❖ Transformations in PySpark RDDs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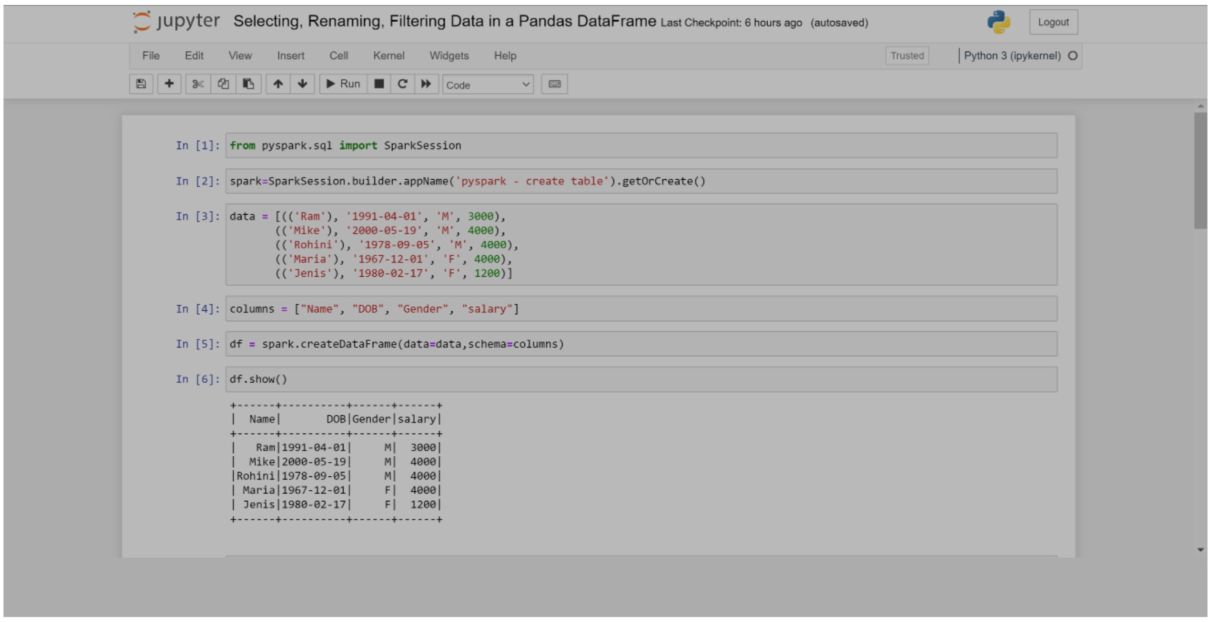
Python 3 (ipykernel)
Run
Code

```
In [1]: from pyspark import SparkContext
        sc = SparkContext.getOrCreate()

In [2]: my_rdd = sc.parallelize([1,2,3,4])
        print(my_rdd.map(lambda x: x+ 10).collect())

        [11, 12, 13, 14]

In [3]: filter_rdd = sc.parallelize([2, 3, 4, 5, 6, 7])
        print(filter_rdd.filter(lambda x: x%2 == 0).collect())

        [2, 4, 6]

In [4]: union_inp = sc.parallelize([2,4,5,6,7,8,9])
        union_rdd_1 = union_inp.filter(lambda x: x % 2 == 0)
        union_rdd_2 = union_inp.filter(lambda x: x % 3 == 0)
        print(union_rdd_1.union(union_rdd_2).collect())

        [2, 4, 6, 8, 6, 9]

In [5]: flatmap_rdd = sc.parallelize(["Hey there", "This is PySpark RDD Transformations"])
        (flatmap_rdd.flatMap(lambda x: x.split(" ")).collect())

Out[5]: ['Hey', 'there', 'This', 'is', 'PySpark', 'RDD', 'Transformations']
```

Selecting, Renaming, Filtering Data in a Pandas DataFrame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Run
Code

```
In [1]: from pyspark.sql import SparkSession

In [2]: spark=SparkSession.builder.appName('pyspark - create table').getOrCreate()

In [3]: data = [(('Ram'), '1991-04-01', 'M', 3000),
               (('Mike'), '2000-05-19', 'M', 4000),
               (('Rohini'), '1978-09-05', 'M', 4000),
               (('Maria'), '1967-12-01', 'F', 4000),
               (('Jenis'), '1980-02-17', 'F', 1200)]

In [4]: columns = ["Name", "DOB", "Gender", "salary"]

In [5]: df = spark.createDataFrame(data=data,schema=columns)

In [6]: df.show()

        +------+----------+------+------+
        |  Name|       DOB|Gender|salary|
        +------+----------+------+------+
        |   Ram|1991-04-01|     M|  3000|
        |  Mike|2000-05-19|     M|  4000|
        |Rohini|1978-09-05|     M|  4000|
        | Maria|1967-12-01|     F|  4000|
        | Jenis|1980-02-17|     F|  1200|
        +------+----------+------+------+
```

Method 1: Using withColumnRenamed()

We will use of withColumnRenamed() method to change the column names of pyspark data frame.

Syntax: DataFrame.withColumnRenamed(existing, new)

Parameters

- existingstr: Existing column name of data frame to rename.
- newstr: New column name.

Returns type: Returns a data frame by renaming an existing column.

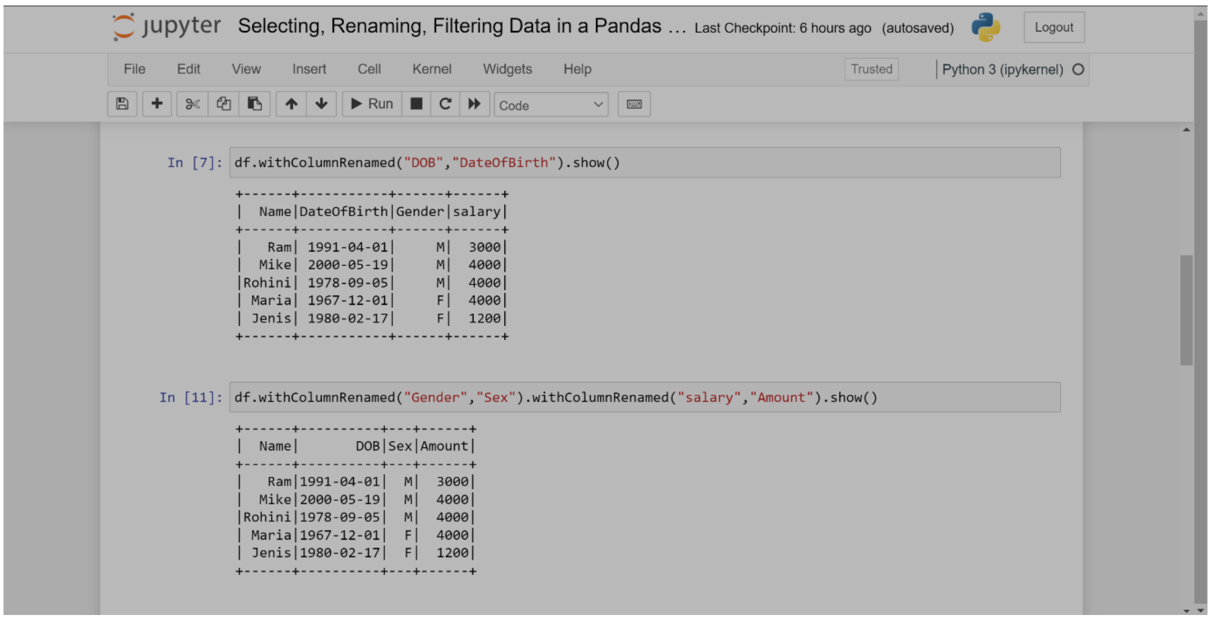
Method 2: Using selectExpr()

Renaming the column names using selectExpr() method

Syntax : DataFrame.selectExpr(expr)

Parameters :

expr : It's an SQL expression.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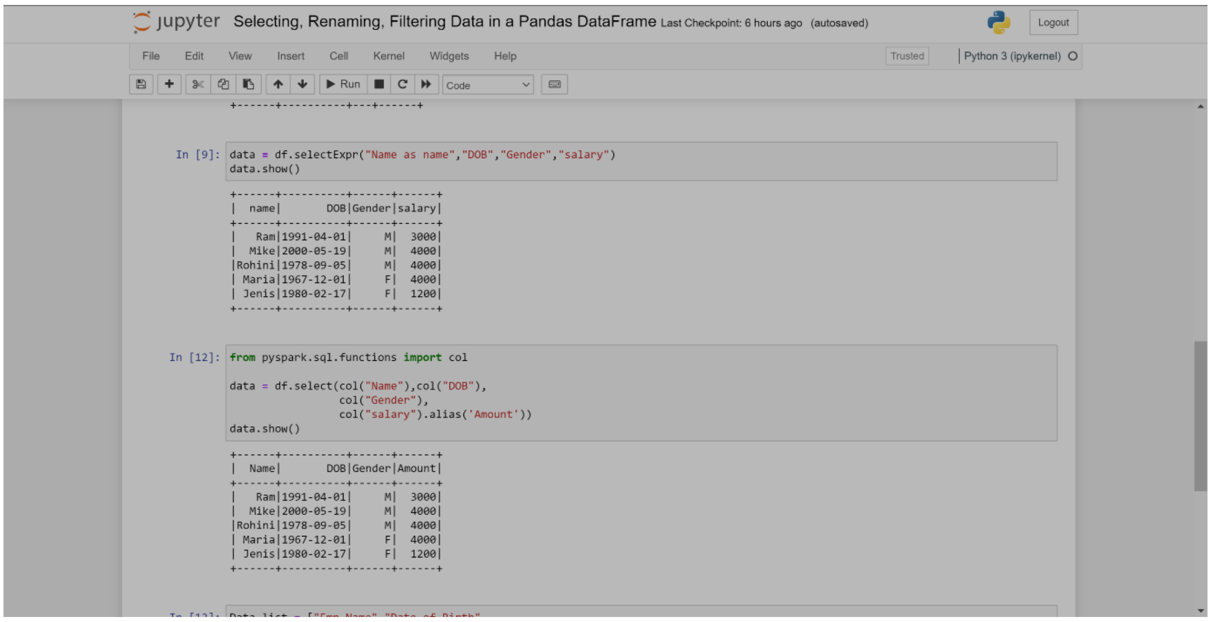
```
In [7]: df.withColumnRenamed("DOB","DateOfBirth").show()

+------+-----------+------+------+
|  Name|DateOfBirth|Gender|salary|
+------+-----------+------+------+
|   Ram| 1991-04-01|     M|  3000|
|  Mike| 2000-05-19|     M|  4000|
|Rohini| 1978-09-05|     M|  4000|
| Maria| 1967-12-01|     F|  4000|
| Jenis| 1980-02-17|     F|  1200|
+------+-----------+------+------+

In [11]: df.withColumnRenamed("Gender","Sex").withColumnRenamed("salary","Amount").show()

+------+----------+---+------+
|  Name|       DOB|Sex|Amount|
+------+----------+---+------+
|   Ram|1991-04-01|  M|  3000|
|  Mike|2000-05-19|  M|  4000|
|Rohini|1978-09-05|  M|  4000|
| Maria|1967-12-01|  F|  4000|
| Jenis|1980-02-17|  F|  1200|
+------+----------+---+------+
```

Method 3: Using select() method
Syntax: DataFrame.select(cols)
Parameters :
cols: List of column names as strings.
Return type: Selects the cols in the dataframe and returns a new DataFrame.

Method 4: Using toDF()
This function returns a new DataFrame that with new specified column names.
Syntax: toDF(*col)
Where, col is a new column name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```
+------+----------+---+------+
```

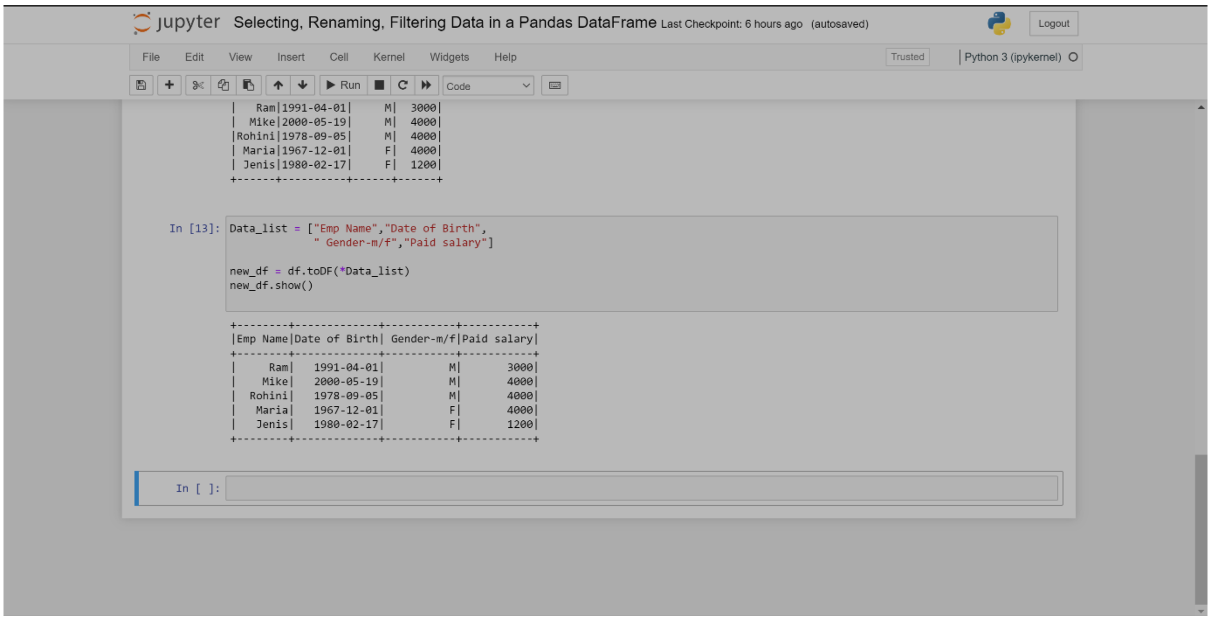
In [9]:
```
data = df.selectExpr("Name as name","DOB","Gender","salary")
data.show()
```

```
+------+----------+------+------+
|  name|       DOB|Gender|salary|
+------+----------+------+------+
|   Ram|1991-04-01|     M|  3000|
|  Mike|2000-05-19|     M|  4000|
|Rohini|1978-09-05|     M|  4000|
| Maria|1967-12-01|     F|  4000|
| Jenis|1980-02-17|     F|  1200|
+------+----------+------+------+
```

In [12]:
```
from pyspark.sql.functions import col

data = df.select(col("Name"),col("DOB"),
                 col("Gender"),
                 col("salary").alias('Amount'))
data.show()
```

```
+------+----------+------+------+
|  Name|       DOB|Gender|Amount|
+------+----------+------+------+
|   Ram|1991-04-01|     M|  3000|
|  Mike|2000-05-19|     M|  4000|
|Rohini|1978-09-05|     M|  4000|
| Maria|1967-12-01|     F|  4000|
| Jenis|1980-02-17|     F|  1200|
+------+----------+------+------+
```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```
|   Ram|1991-04-01|     M|  3000|
|  Mike|2000-05-19|     M|  4000|
|Rohini|1978-09-05|     M|  4000|
| Maria|1967-12-01|     F|  4000|
| Jenis|1980-02-17|     F|  1200|
+------+----------+------+------+
```

In [13]:

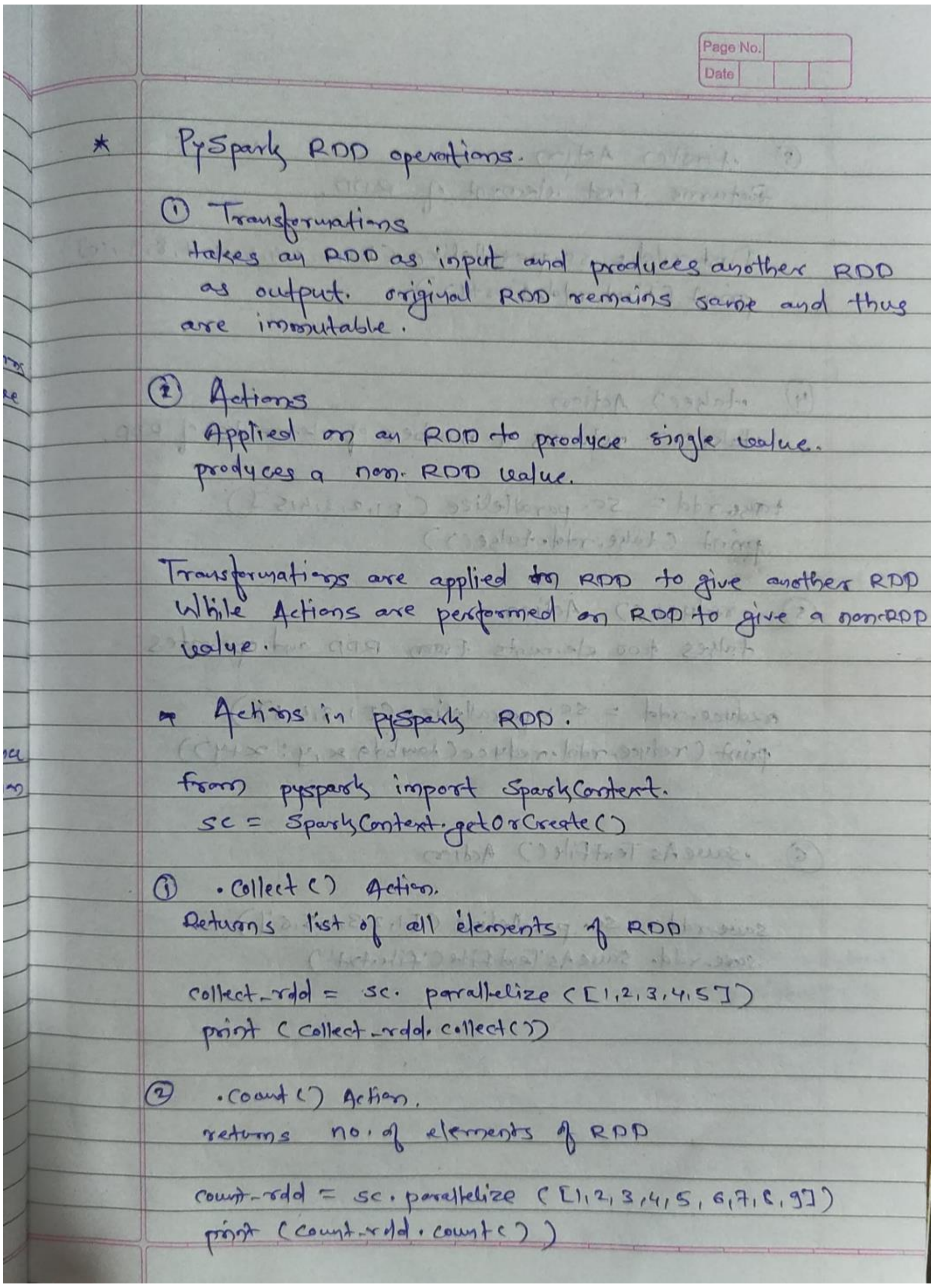
```
Data_list = ["Emp Name","Date of Birth",
             " Gender-m/f","Paid salary"]

new_df = df.toDF(*Data_list)
new_df.show()
```

```
+--------+-------------+-----------+-----------+
|Emp Name|Date of Birth| Gender-m/f|Paid salary|
+--------+-------------+-----------+-----------+
|     Ram|   1991-04-01|          M|       3000|
|    Mike|   2000-05-19|          M|       4000|
|  Rohini|   1978-09-05|          M|       4000|
|   Maria|   1967-12-01|          F|       4000|
|   Jenis|   1980-02-17|          F|       1200|
+--------+-------------+-----------+-----------+
```

In [ ]:

Notes



★ PySpark RDD operations.

① Transformations
takes an RDD as input and produces another RDD as output. original RDD remains same and thus are immutable.

② Actions
Applied on an RDD to produce single value.
produces a non. RDD value.

Transformations are applied ~~to~~ on RDD to give another RDD While Actions are performed on RDD to give a non-RDD value.

* Actions in pyspark RDD.

```
from pyspark import SparkContext.
sc = SparkContext.getOrCreate()
```

① .collect() Action.
Returns list of all elements of RDD

```
collect_rdd = sc. parallelize([1,2,3,4,5])
print(collect_rdd.collect())
```

② .count() Action.
returns no. of elements of RDD

```
count_rdd = sc. parallelize([1,2,3,4,5,6,7,8,9])
print(count_rdd.count())
```

Page No.
Date

③ .first() Action
Returns first element of RDD.

```
first-rdd = sc.parallelize ([1,2,3,4,5,6,7,8,9,10])
print (first-rdd.first())
```

④ .take() Action
.take(n) returns n number of elements of RDD.

```
take-rdd = sc. parallelize ([1,2,3,4,5])
print (take-rdd. take())
```

⑤ .reduce() Action
takes two elements from RDD and operates.

```
reduce-rdd = sc. parallelize ([1,3,4,6])
print (reduce-rdd.reduce(lambda x,y : x+y))
```

⑥ .saveAsTextFile() Action

```
save-rdd = sc. parallelize ([1,2,3,4,5,6])
save-rdd. saveAsTextFile('file.txt')
```

* Transformations in PySpark RDD

① .map()

maps value to elements of RDD

```
my-rdd = sc.parallelize([1,2,3,4])
print (my-rdd.map(lambda x:x+10).collect())
```

② .filter()

filtering elements from RDD

```
filter_rdd = sc.parallelize([2,3,4,5,6,7])
print ( filter_rdd.filter(lambda x:x%2==0).collect())
```

③ .union()

```
union_inp= sc.parallelize([2,4,5,6,7,8,9])
union_rdd_1 = union_inp.filter (lambda x:x%2==0)
union_rdd.2 = union_inp.filter(lambda x:x%3==0)
print (union_rdd_1.union (union_rdd_2).collect())
```

④ . .flat Map()

```
Flatmap_rdd = sc.parallelize (["Hey there", "This is PySpark"])
(flatmap_rdd.flatMap(lambda x:x.split(" ")).collect() )
```