BIG DATA HADOOP AND SPARK DEVLOPMENT

CASE STUDY IV

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BIG DATA HADOOPAND SPARK DEVELOPMENT

1. Introduction

In this case study, the given tasks are performed and Output of the tasks are recorded in the form of Screenshots.

2. Objective

This case study consolidates the deeper understanding of the Sessions

3. Problem Statement

- Task 1
  - Objective 1
    - Load file into spark
  - Objective 2
    - What is the average amount of AverageCoveredCharges per State.
    - Find out the AverageTotalPayments charges per state
    - Find out the AverageMedicarePayments charges per state.
  - Objective 3
    - Find out the total number of Discharges per state and for each disease
    - Sort the output in descending order of totalDischarges

4. Expected Output

- Task 1

Hospital Case Study

Dataset Description DRG Definition:

The code and description identifying the MS-DRG. MS-DRGs are a classification system that groups similar clinical conditions (diagnoses) and procedures furnished by the hospital during their stay.

Provider Id:
The CMS Certification Number (CCN) assigned to the Medicare-certified hospital facility.

Provider Name:
The name of the provider. Provider Street Address: The provider's street address.

Provider City:
The city where the provider is located. Provider State: The state where the provider is located.

Provider Zip Code:
The provider's zip code. Provider HRR: The Hospital Referral Region (HRR) where the provider is located.

Total Discharges:
The number of discharges billed by the provider for inpatient hospital services.

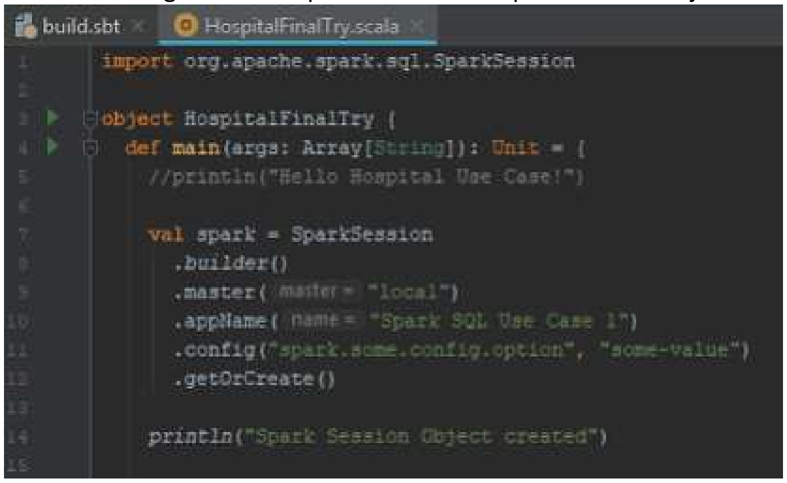
Average Covered Charges:
The provider's average charge for services covered by Medicare for all discharges in the MS-DRG. These will vary from hospital to hospital because of the differences in hospital charge structures.

Average Total Payments:
The average total payments to all providers for the MS-DRG including the MSDRG amount, teaching, disproportionate share, capital, and outlier payments for all cases. Also included in the average total payments are co-payment and deductible amounts that the patient is responsible for and any additional payments by third parties for coordination of benefits.

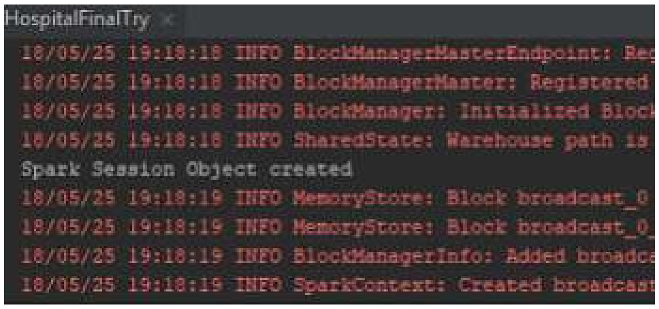
Average Medicare Payments:
The average amount that Medicare pays to the provider for Medicare's share of the MS-DRG. Average Medicare payment amounts include the MS-DRG amount, teaching, disproportionate share, capital, and outlier payments for all cases. Medicare payments DO NOT include beneficiary co-payments and deductible amounts nor any additional payments from third parties for coordination of benefits.
You can download the dataset used in this spark SQL use case from below link.
https://drive.google.com/open?id=13_YDmwENxOQI5asLRa6tOP8FgiqqM9jc

Objective – 1:
Load file into spark.
Solution – 1:

Prior to loading the file in Spark we create a Spark Session Object.

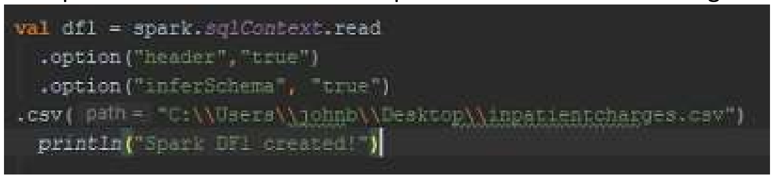


```
import org.apache.spark.sql.SparkSession

object HospitalFinalTry {
  def main(args: Array[String]): Unit = {
    //println("Hello Hospital Use Case!")

    val spark = SparkSession
      .builder()
      .master( master = "local")
      .appName( name = "Spark SQL Use Case 1")
      .config("spark.some.config.option", "some-value")
      .getOrCreate()

    println("Spark Session Object created")
```

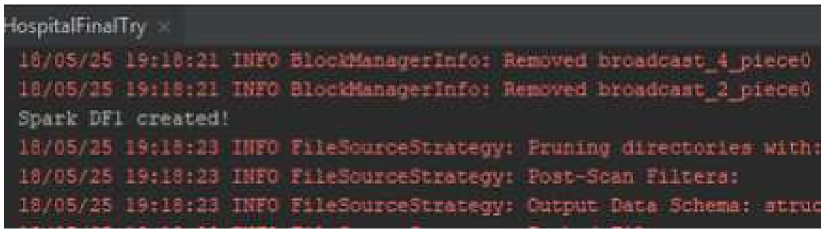


```
18/05/25 19:18:18 INFO BlockManagerMasterEndpoint: Reg
18/05/25 19:18:18 INFO BlockManagerMaster: Registered
18/05/25 19:18:18 INFO BlockManager: Initialized Block
18/05/25 19:18:18 INFO SharedState: Warehouse path is
Spark Session Object created
18/05/25 19:18:19 INFO MemoryStore: Block broadcast_0
18/05/25 19:18:19 INFO MemoryStore: Block broadcast_0_
18/05/25 19:18:19 INFO BlockManagerInfo: Added broadca
18/05/25 19:18:19 INFO SparkContext: Created broadcast
```

Now proceed to load the file into Spark and here we are loading into Data Frame.

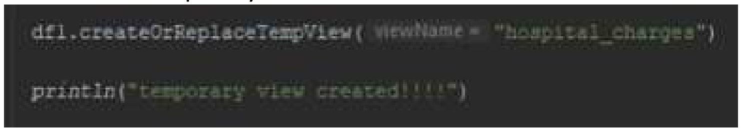


```
val df1 = spark.sqlContext.read
  .option("header","true")
  .option("inferSchema", "true")
.csv( path = "C:\\Users\\johnb\\Desktop\\inpatientcharges.csv")
  println("Spark DF1 created!")
```

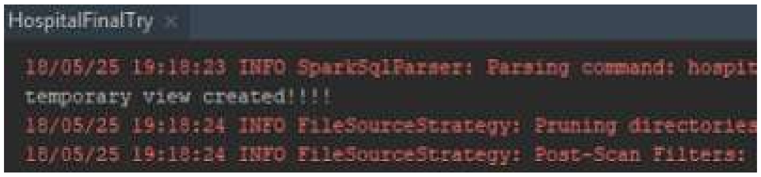


```
18/05/25 19:18:21 INFO BlockManagerInfo: Removed broadcast_4_piece0
18/05/25 19:18:21 INFO BlockManagerInfo: Removed broadcast_2_piece0
Spark DF1 created!
18/05/25 19:18:23 INFO FileSourceStrategy: Pruning directories with:
18/05/25 19:18:23 INFO FileSourceStrategy: Post-Scan Filters:
18/05/25 19:18:23 INFO FileSourceStrategy: Output Data Schema: struc
```

Now create temporary view for the Dataframe.

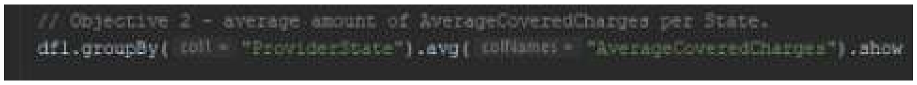


```
df1.createOrReplaceTempView( viewName = "hospital_charges")

println("temporary view created!!!!")
```

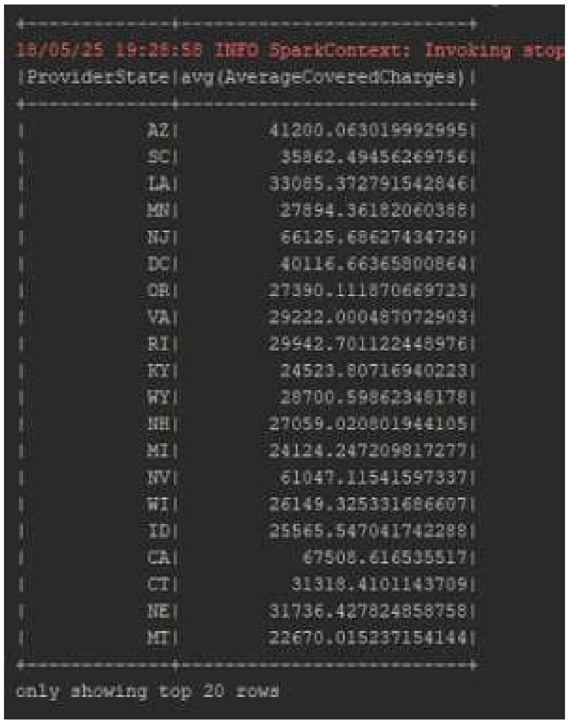


```
HospitalFinalTry ×
18/05/25 19:18:23 INFO SparkSqlParser: Parsing command: hospit
temporary view created!!!!
18/05/25 19:18:24 INFO FileSourceStrategy: Pruning directories
18/05/25 19:18:24 INFO FileSourceStrategy: Post-Scan Filters:
```

Objective – 2:
What is the average amount of AverageCoveredCharges per State.

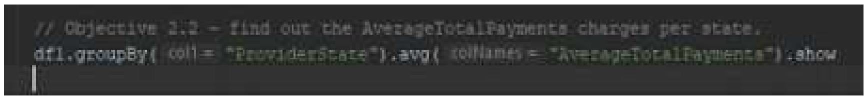


```
// Objective 2 - average amount of AverageCoveredCharges per State.
df1.groupBy( col1 = "ProviderState").avg( colNames = "AverageCoveredCharges").show
```

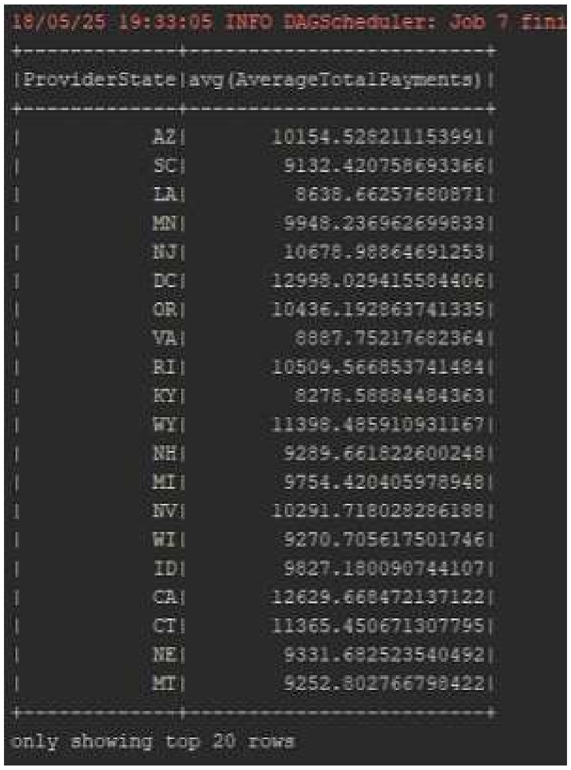


```
+-------------+--------------------------+
18/05/25 19:28:58 INFO SparkContext: Invoking stop
|ProviderState|avg(AverageCoveredCharges)|
+-------------+--------------------------+
|           AZ|        41200.063019992995|
|           SC|         35862.49456269756|
|           LA|        33085.372791542846|
|           MN|         27894.36182060388|
|           NJ|         66125.68627434729|
|           DC|         40116.66365800864|
|           OR|        27390.111870669723|
|           VA|        29222.000487072903|
|           RI|        29942.701122448976|
|           KY|         24523.80716940223|
|           WY|         28700.59862348178|
|           NH|        27059.020801944105|
|           MI|        24124.247209817277|
|           NV|         61047.11541597337|
|           WI|        26149.325331686607|
|           ID|        25565.547041742288|
|           CA|           67508.616535517|
|           CT|          31318.4101143709|
|           NE|        31736.427824858758|
|           MT|        22670.015237154144|
+-------------+--------------------------+
only showing top 20 rows
```

Find out the AverageTotalPayments charges per state

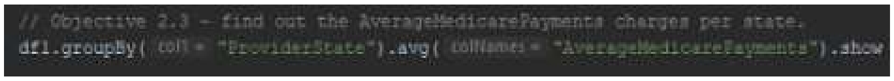


```
// Objective 2.2 - find out the AverageTotalPayments charges per state.
df1.groupBy( col1 = "ProviderState").avg( colNames = "AverageTotalPayments").show
```

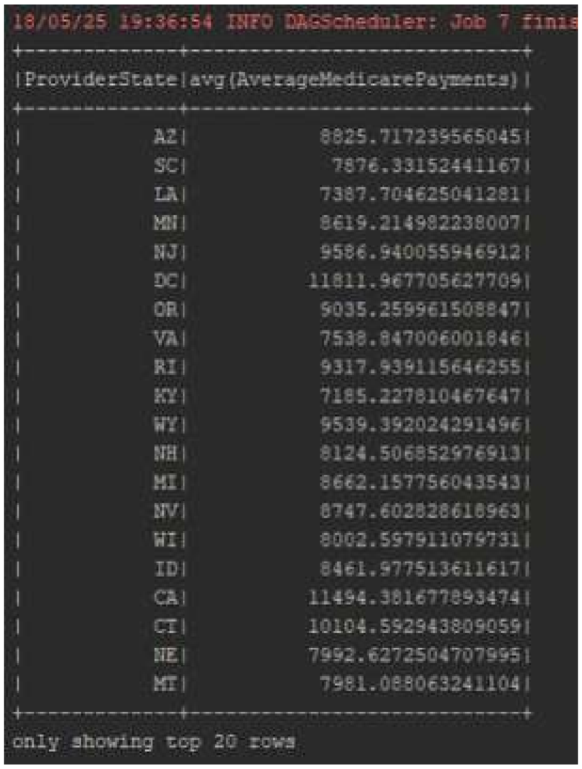


```
18/05/25 19:33:05 INFO DAGScheduler: Job 7 fini
+-------------+------------------------+
|ProviderState|avg(AverageTotalPayments)|
+-------------+------------------------+
|           AZ|       10154.526211153991|
|           SC|        9132.420758693366|
|           LA|         8638.66257680871|
|           MN|        9948.236962699833|
|           NJ|        10678.98864691253|
|           DC|       12998.029415584406|
|           OR|       10436.192863741335|
|           VA|         8887.75217682364|
|           RI|       10509.566853741484|
|           KY|         8278.58884484363|
|           WY|       11398.485910931167|
|           NH|        9289.661822600248|
|           MI|        9754.420405978948|
|           NV|       10291.718028286188|
|           WI|        9270.705617501746|
|           ID|        9827.180090744107|
|           CA|       12629.668472137122|
|           CT|       11365.450671307795|
|           NE|        9331.682523540492|
|           MT|        9252.802766798422|
+-------------+------------------------+
only showing top 20 rows
```

Find out the AverageMedicarePayments charges per state.



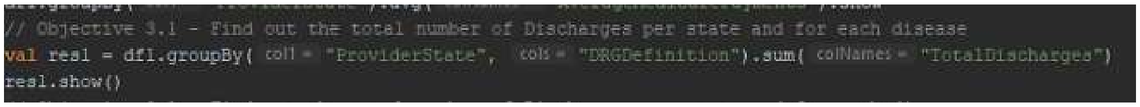
```
// Objective 2.3 - find out the AverageMedicarePayments charges per state.
dfl.groupBy( col1 = "ProviderState").avg( colNames = "AverageMedicarePayments").show
```



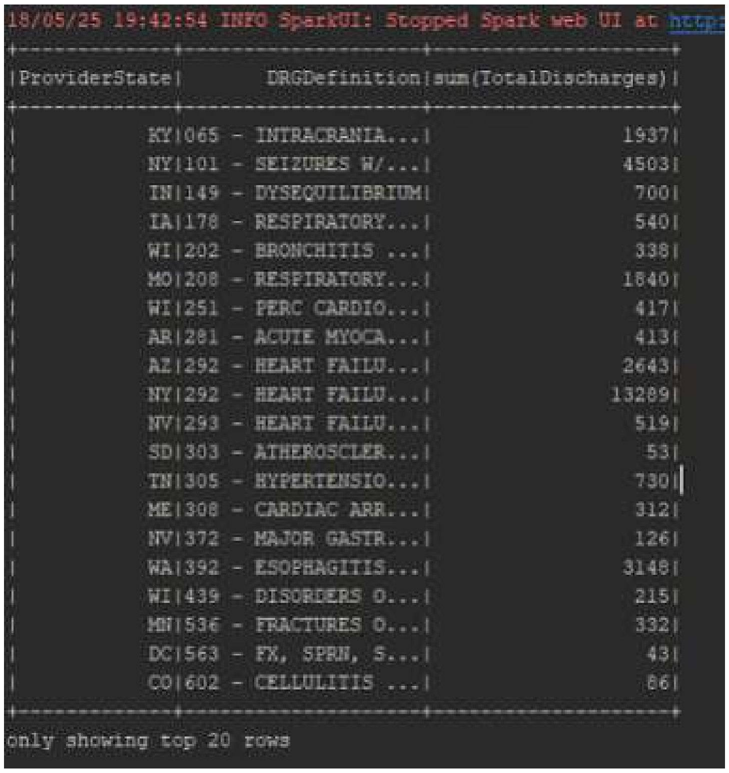
```
18/05/25 19:36:54 INFO DAGScheduler: Job 7 finis
+-------------+----------------------------+
|ProviderState|avg(AverageMedicarePayments)|
+-------------+----------------------------+
|           AZ|           8825.717239565045|
|           SC|            7876.33152441167|
|           LA|           7387.704625041281|
|           MN|           8619.214982238007|
|           NJ|           9586.940055946912|
|           DC|          11811.967705627709|
|           OR|           9035.259961508847|
|           VA|           7538.847006001846|
|           RI|           9317.939115646255|
|           KY|           7185.227810467647|
|           WY|           9539.392024291496|
|           NH|           8124.506852976913|
|           MI|           8662.157756043543|
|           NV|           8747.602828618963|
|           WI|           8002.597911079731|
|           ID|           8461.977513611617|
|           CA|          11494.381677893474|
|           CT|          10104.592943809059|
|           NE|          7992.6272504707995|
|           MT|           7981.088063241104|
+-------------+----------------------------+
only showing top 20 rows
```

Objective- 3:

Find out the total number of Discharges per state and for each disease

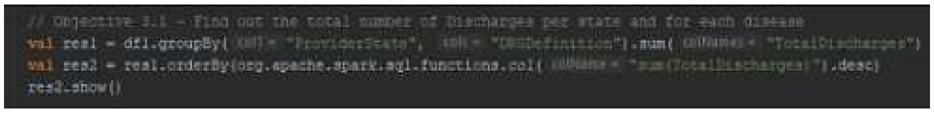


```
// Objective 3.1 - Find out the total number of Discharges per state and for each disease
val res1 = df1.groupBy( col1 = "ProviderState",  cols = "DRGDefinition").sum( colNames = "TotalDischarges")
res1.show()
```

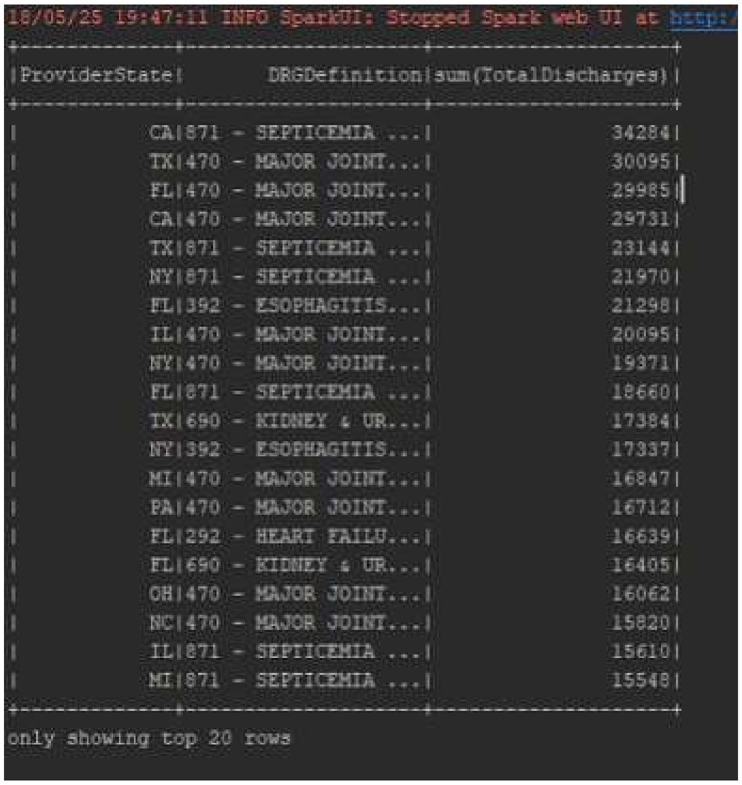


```
18/05/25 19:42:54 INFO SparkUI: Stopped Spark web UI at http:
+-------------+--------------------+--------------------+
|ProviderState|       DRGDefinition|sum(TotalDischarges)|
+-------------+--------------------+--------------------+
|           KY|065 - INTRACRANIA...|                1937|
|           NY|101 - SEIZURES W/...|                4503|
|           IN|149 - DYSEQUILIBRIUM|                 700|
|           IA|178 - RESPIRATORY...|                 540|
|           WI|202 - BRONCHITIS ...|                 338|
|           MO|208 - RESPIRATORY...|                1840|
|           WI|251 - PERC CARDIO...|                 417|
|           AR|281 - ACUTE MYOCA...|                 413|
|           AZ|292 - HEART FAILU...|                2643|
|           NY|292 - HEART FAILU...|               13289|
|           NV|293 - HEART FAILU...|                 519|
|           SD|303 - ATHEROSCLER...|                  53|
|           TN|305 - HYPERTENSIO...|                 730|
|           ME|308 - CARDIAC ARR...|                 312|
|           NV|372 - MAJOR GASTR...|                 126|
|           WA|392 - ESOPHAGITIS...|                3148|
|           WI|439 - DISORDERS O...|                 215|
|           MN|536 - FRACTURES O...|                 332|
|           DC|563 - FX, SPRN, S...|                  43|
|           CO|602 - CELLULITIS ...|                  86|
+-------------+--------------------+--------------------+
only showing top 20 rows
```

Sort the output in descending order of totalDischarges



```
// Objective 3.1 - Find out the total number of Discharges per state and for each disease
val res1 = df1.groupBy( col1 = "ProviderState",  cols = "DRGDefinition").sum( colNames = "TotalDischarges")
val res2 = res1.orderBy(org.apache.spark.sql.functions.col( colName = "sum(TotalDischarges)").desc)
res2.show()
```



```
18/05/25 19:47:11 INFO SparkUI: Stopped Spark web UI at http:/
+-------------+--------------------+--------------------+
|ProviderState|       DRGDefinition|sum(TotalDischarges)|
+-------------+--------------------+--------------------+
|           CA|871 - SEPTICEMIA ...|               34284|
|           TX|470 - MAJOR JOINT...|               30095|
|           FL|470 - MAJOR JOINT...|               29985|
|           CA|470 - MAJOR JOINT...|               29731|
|           TX|871 - SEPTICEMIA ...|               23144|
|           NY|871 - SEPTICEMIA ...|               21970|
|           FL|392 - ESOPHAGITIS...|               21298|
|           IL|470 - MAJOR JOINT...|               20095|
|           NY|470 - MAJOR JOINT...|               19371|
|           FL|871 - SEPTICEMIA ...|               18660|
|           TX|690 - KIDNEY & UR...|               17384|
|           NY|392 - ESOPHAGITIS...|               17337|
|           MI|470 - MAJOR JOINT...|               16847|
|           PA|470 - MAJOR JOINT...|               16712|
|           FL|292 - HEART FAILU...|               16639|
|           FL|690 - KIDNEY & UR...|               16405|
|           OH|470 - MAJOR JOINT...|               16062|
|           NC|470 - MAJOR JOINT...|               15820|
|           IL|871 - SEPTICEMIA ...|               15610|
|           MI|871 - SEPTICEMIA ...|               15548|
+-------------+--------------------+--------------------+
only showing top 20 rows
```