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ФАКУЛЬТЕТ ИНФОРМАТИКА И СИСТЕМЫ УПРАВЛЕНИЯ

КАФЕДРА КОМПЬЮТЕРНЫЕ СИСТЕМЫ И СЕТИ (ИУ6)

НАПРАВЛЕНИЕ ПОДГОТОВКИ 09.04.01 Информатика и вычислительная техника

**МАГИСТЕРСКАЯ ПРОГРАММА 09.04.01/07 Интеллектуальные системы анализа,
обработки и интерпретации больших данных**

О Т Ч Е Т

по лабораторной работе № 10

Вариант № 6

Название лабораторной работы: Spark

Дисциплина: Языки программирования для работы с большими данными

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Введение

Целью лабораторной работы является приобретение навыков работы со Spark на языке программирования Java.

Практическая часть

Задание 1

1) Выбрать любой датасет на kaggle.com

2) Сделать 10 выборки данных по выбранной предметной области Код написанной программы представлен в листинге 1.

Листинг 1 – Программа для первого задания

```
package org.example;

import org.apache.spark.sql.Dataset;
import org.apache.spark.sql.Row;
import org.apache.spark.sql.SparkSession;

public class Main {

    public static void main(String[] args) {
        SparkSession spark = SparkSession.builder()
            .appName("Lab10")
            .master("local")
            .getOrCreate();

        Dataset<Row> flights = spark.read()
            .option("header", true)
            .option("inferSchema", true)
            .csv("/Users/ivangorshkov/Documents/BMSTU/BigDataJava/Java-IU6-12M/Lab10/russian_air_service_CARGO_AND_PARCELS.csv");
        flights.createOrReplaceTempView("flights");

        spark.sql("SELECT * FROM flights").show();
        spark.sql("select * from flights where Year = '2020'").show();
        spark.sql("select * from flights where Year = '2010'").show();
        spark.sql("select * from flights where May <
September").show();
        spark.sql("select * from flights where AirportName =
'Trip'").show();
        spark.sql("select AirportName, Year from flights order by
February desc").show();
        spark.sql("select AirportName, Year, March from flights where
January > 150.0 order by November desc").show();
        spark.sql("select AirportName, Year, April from flights order
by May desc").show();
        spark.sql("select AirportName, Year, May, June from flights
where Year = '2014' and AirportName = 'Trip' order by May
desc").show();
        spark.sql("select avg(January) from flights").show();
        spark.stop();
    }
}
```

Результат выполнения программы показан на рисунке 1.

AirportName	Year	January	February	March	April	May	June	July	August	September	October	November	December	Whole year	Airport coordinates
Abakan[2020]	43.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('91.3997...))
Aikhal[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('111.543...))
Loss[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('125.398...))
Anderna[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('61.5774...))
Anadry (Carbon)[2020]	122.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('177.738...))
Anapa (Vitjazovo)[2020]	49.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('37.3415...))
Apatite (Khbinsy)[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('33.5819...))
Arkhangelsk (Vask...)[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('40.7067...))
Arkhangelsk (Talagy)[2020]	96.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('40.7148...))
Astrakhan (Narima...)[2020]	53.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('47.9998...))
Trip[2020]	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Baykit[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('96.3667...))
Barnaul (Titov Name)[2020]	163.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('83.5477...))
In Salah[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('130.399...))
white Mountain[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('146.228...))
Belgorod[2020]	5.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('36.5705...))
Novy Urengoy[2020]	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('66.6945...))
Belushi[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('47.6234...))
Usinsk[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('65.0461...))
Beringovskiy[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('179.293...))

only showing top 20 rows

AirportName	Year	January	February	March	April	May	June	July	August	September	October	November	December	Whole year	Airport coordinates
Abakan[2010]	35.1	192.2	55.2	108.7	118.0	69.3	87.7	77.0	101.4	80.5	83.3	118.6	1207.0	0.0	0.0(Decimal('91.3997...))
Aikhal[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('111.543...))
Loss[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('125.398...))
Anderna[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('61.5774...))
Anadry [2010]	84.0	119.0	154.0	277.0	213.0	170.0	135.0	80.0	130.0	191.0	147.0	352.0	2052.0	0.0	0.0(Decimal('177.738...))
Anapa (Vitjazovo)[2010]	14.62	21.43	25.1	25.25	34.66	59.19	09.76	91.2	62.42	47.53	31.6	29.72	532.40	0.0	0.0(Decimal('37.3415...))
Antypayutal[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Not found
Apatite (Khbinsy)[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('33.5819...))
Arkhangelsk (Vask...)[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('40.7067...))
Arkhangelsk (Talagy)[2010]	122.0	156.0	181.0	230.5	403.2	191.7	263.4	153.5	200.22	191.3	353.9	479.2	3015.52	0.0	0.0(Decimal('40.7148...))
Astrakhan (Narima...)[2010]	55.41	41.91	52.75	71.97	51.71	50.99	68.19	63.94	76.19	71.23	63.54	71.06	738.09	0.0	0.0(Decimal('47.9998...))
Achinsk[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('90.5664...))
Trip[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Auctions[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('133.479...))
Baykit[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('96.3667...))
Barnaul (Titov Name)[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('83.5477...))
In Salah[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('130.399...))
white Mountain[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('146.228...))
Belgorod[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('36.5705...))
Novy Urengoy[2010]	15.5	15.1	16.7	47.7	66.9	52.7	49.1	43.2	57.0	54.0	85.0	55.1	559.6	0.0	0.0(Decimal('66.6945...))

only showing top 20 rows

AirportName	Year	January	February	March	April	May	June	July	August	September	October	November	December	Whole year	Airport coordinates
Abakan[2020]	43.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('91.3997...))
Aikhal[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('111.543...))
Loss[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('125.398...))
Anderna[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('61.5774...))
Anadry (Carbon)[2020]	122.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('177.738...))
Anapa (Vitjazovo)[2020]	49.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('37.3415...))
Apatite (Khbinsy)[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('33.5819...))
Arkhangelsk (Vask...)[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('40.7067...))
Arkhangelsk (Talagy)[2020]	96.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('40.7148...))
Astrakhan (Narima...)[2020]	53.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('47.9998...))
Trip[2020]	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Baykit[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('96.3667...))
Barnaul (Titov Name)[2020]	163.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('83.5477...))
In Salah[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('130.399...))
white Mountain[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('146.228...))
Belgorod[2020]	5.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('36.5705...))
Novy Urengoy[2020]	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('66.6945...))
Belushi[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('47.6234...))
Usinsk[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('65.0461...))
Beringovskiy[2020]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('179.293...))

only showing top 20 rows

AirportName	Year	January	February	March	April	May	June	July	August	September	October	November	December	Whole year	Airport coordinates
Trip[2020]	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2019]	1.36	2.7	3.52	3.42	12.09	2.42	11.79	2.00	3.81	3.46	1.94	1.54	30.13	0.0	0.0(Decimal('138.042...))
Trip[2018]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.54	2.32	4.89	5.2	0.0	0.0	0.0(Decimal('138.042...))
Trip[2017]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2016]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2015]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2014]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2013]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2012]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2011]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2010]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2009]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2008]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))
Trip[2007]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0(Decimal('138.042...))

	AirportName\Year	January	February	March	April	May	June	July	August	September	October	November	December	Whole year	Airport coordinates		
	Anapa (Vitjazovo)	2019	45.92	53.15	54.0	54.72	52.0	67.45	172.31	72.57	70.0	63.0	69.0	82.1	856.22	0.0(Decimal('37.3415...))	
	Astrakhan (Narima...)	2019	51.75	61.00	65.6	71.84	71.30	63.95	164.06	79.46	85.21	87.23	70.66	99.16	989.50	0.0(Decimal('47.9998...))	
	Trin	2019	1.36	2.71	3.52	4.22	2.89	2.42	1.79	2.08	3.16	3.46	1.94	1.54	39.13	0.0(Decimal('138.842...))	
	Barnaul (Tsitov Name)	2019	157.3	283.6	226.1	227.4	195.4	232.8	221.2	232.98	243.9	271.4	253.86	389.6	2774.74	0.0(Decimal('38.5477...))	
	Belgorod	2019	2.47	5.07	4.13	4.29	4.93	3.24	3.29	2.99	1.61	6.36	8.85	6.09	7.83	123.87	0.0(Decimal('34.5795...))
	Blagoveshchensk (...)	2019	163.6	224.5	286.4	285.0	213.9	212.8	243.6	267.3	272.2	279.3	243.8	289.4	2980.8	0.0(Decimal('127.407...))	
	Bogodol'skoye	2019	0.84	0.11	0.82	0.89	0.85	0.8	0.22	0.82	0.11	0.81	0.14	1.2	2.8	0.0(Decimal('148.465...))	
	Vladivostok (Knev...)	2019	1368.77	1587.26	1737.37	1687.58	1614.61	1515.94	1380.42	1794.15	1932.64	2082.59	1962.91	2286.11	21441.61	0.0(Decimal('132.165...))	
	Volgograd (Gumrak)	2019	58	63.8	78.0	78.8	67.8	68.0	68.0	74.0	77.8	82.0	83.0	75.0	85.0	872.0	0.0(Decimal('44.3567...))
	Voronezh (Chertkov...)	2019	12.94	17.92	15.4	19.88	17.25	18.2	23.35	28.94	22.56	25.77	45.04	26.76	264.99	0.0(Decimal('39.2253...))	
	Ekatereburg (Gol...)	2019	93.24	103.29	93.24	103.29	93.24	103.29	93.24	103.29	93.24	103.29	93.24	103.29	93.24	103.29	0.0(Decimal('56.8922...))
	Ivanovo (Vozhny)	2019	7.22	38.39	27.53	52.34	16.47	71.14	83.24	42.46	96.81	38.71	70.32	33.29	545.97	0.0(Decimal('48.9437...))	
	Irkutsk	2019	44.16	548.35	683.79	745.31	785.44	687.77	802.78	899.59	882.47	771.89	988.22	851.82	8839.98	0.0(Decimal('104.355...))	
	Kaliningrad (Hrab...)	2019	479.36	585.72	579.71	535.25	486.92	524.89	491.82	512.67	617.83	646.28	626.82	740.46	6848.71	0.0(Decimal('28.5858...))	
	Kaluga (Grabetsky)	2019	0.8	0.7	0.57	0.71	1.71	0.97	0.31	10.91	11.33	2.7	0.8	4.18	2.21	41.89	0.0(Decimal('36.3669...))
	Kemerovo	2019	79.14	109.81	110.0	109.69	96.21	109.81	111.65	114.85	186.18	186.57	117.67	155.12	1325.9	0.0(Decimal('86.1188...))	
	Kirov (Pobedilov)	2019	4.7	5.9	5.2	6.8	5.8	7.4	6.3	6.2	7.6	11.5	11.8	11.2	89.6	0.0(Decimal('49.3647...))	
	Kogalym	2019	2.47	3.11	4.47	3.47	3.6	6.8	5.1	4.65	3.84	3.99	3.64	5.68	58.72	0.0(Decimal('74.5295...))	
	Krasnodar (Pasko...)	2019	312.87	407.07	558.88	561.64	545.96	572.67	546.62	623.35	647.8	633.24	614.26	639.68	6657.24	0.0(Decimal('39.1396...))	
	Kursk (Eastern)	2019	0.1	0.2	0.1	0.21	0.21	0.2	0.1	0.4	0.3	0.21	0.21	0.21	2.2	0.0(Decimal('36.2824...))	

```
+-----+
|      AirportName|Year|
+-----+
|Moscow (Sheremety...|2012|
|Moscow (Sheremety...|2019|
|Moscow (Sheremety...|2018|
|Moscow (Sheremety...|2017|
|Moscow (Sheremety...|2011|
|Moscow (Sheremety...|2016|
|Moscow (Sheremety...|2013|
|Moscow (Sheremety...|2014|
|Moscow (Sheremety...|2008|
| Moscow (Domodedovo)|2013|
|Moscow (Sheremety...|2010|
| Moscow (Domodedovo)|2011|
|Moscow (Sheremety...|2007|
| Moscow (Domodedovo)|2014|
| Moscow (Domodedovo)|2012|
|Moscow (Sheremety...|2015|
| Moscow (Domodedovo)|2018|
| Moscow (Domodedovo)|2008|
| Moscow (Domodedovo)|2015|
|Moscow (Sheremety...|2009|
+-----+
```

only showing top 20 rows

```
+-----+
|      AirportName|Year| March|
+-----+
|Moscow (Sheremety...|2019| 26703.6|
|Moscow (Sheremety...|2017| 25153.5|
|Moscow (Sheremety...|2018| 24478.7|
|Moscow (Sheremety...|2011| 22120.1|
|Moscow (Sheremety...|2010| 14919.0|
|Moscow (Sheremety...|2016| 17486.6|
|Moscow (Sheremety...|2013| 19005.2|
|Moscow (Sheremety...|2014| 21639.4|
|Moscow (Sheremety...|2012| 27617.9|
|Moscow (Sheremety...|2015| 14128.3|
|Moscow (Sheremety...|2009| 11742.7|
| Moscow (Domodedovo)|2012| 13593.3|
| Moscow (Domodedovo)|2013|14225.51|
| Moscow (Domodedovo)|2011|13339.73|
|Moscow (Sheremety...|2007| 13362.5|
|Moscow (Sheremety...|2008| 14409.4|
| Moscow (Domodedovo)|2014|14015.58|
| Moscow (Domodedovo)|2010|11290.43|
| Moscow (Domodedovo)|2007| 8754.34|
| Moscow (Domodedovo)|2009| 8011.42|
+-----+
```

only showing top 20 rows

```
+-----+
|      AirportName|Year| April|
+-----+
|Moscow (Sheremety...|2012| 25020.2|
|Moscow (Sheremety...|2019| 28634.2|
|Moscow (Sheremety...|2018| 24709.4|
|Moscow (Sheremety...|2017| 23304.6|
|Moscow (Sheremety...|2011| 20935.6|
|Moscow (Sheremety...|2013| 18592.5|
|Moscow (Sheremety...|2016| 19383.1|
|Moscow (Sheremety...|2010| 15065.7|
|Moscow (Sheremety...|2014| 16924.1|
|Moscow (Sheremety...|2015| 15026.4|
| Moscow (Domodedovo)|2013|13922.46|
|Moscow (Sheremety...|2008| 14101.0|
| Moscow (Domodedovo)|2011|13999.56|
| Moscow (Domodedovo)|2012|14119.27|
| Moscow (Domodedovo)|2014|14121.12|
|Moscow (Sheremety...|2007| 12591.7|
| Moscow (Domodedovo)|2008|11837.18|
| Moscow (Domodedovo)|2018| 9397.39|
|Moscow (Sheremety...|2009| 11585.2|
| Moscow (Domodedovo)|2017|10918.44|
+-----+
```

only showing top 20 rows

```
+-----+
|AirportName|Year|May|June|
+-----+
|      Trip|2014|0.0| 0.0|
+-----+
```

```
+-----+
|      avg(January) |
+-----+
|146.47392072708885|
+-----+
```

Рисунок 1 – Результат выполнения программы

Вывод: В результате выполнения лабораторной работы были приобретены навыки работы со Spark на языке программирования Java.

Репозитории по ссылке <https://github.com/IvanGorshkov/Java-IU6-12M>.