me19b190-ass9-dl-final

April 9, 2023

Install Dependencies and Import Required Packages

```
[1]: !sudo add-apt-repository ppa:openjdk-r/ppa
     !sudo apt-get install openjdk-11-jdk
     # To Oracke JDK varsion 8
     # !sudo add-apt-repository ppa:webupd8team/java
     # !sudo apt-get install oracle-java8-installer
     !sudo apt install -y openjdk-8-jdk
```

```
 More info: https://launchpad.net/~openjdk-r/+archive/ubuntu/ppa
Press [ENTER] to continue or Ctrl-c to cancel adding it.

Hit:1 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu focal InRelease
Hit:2 http://archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 https://cloud.r-project.org/bin/linux/ubuntu focal-cran40/ InRelease
[3,622 B]
Hit:6 http://ppa.launchpad.net/cran/libgit2/ubuntu focal InRelease
Hit:7 http://ppa.launchpad.net/deadsnakes/ppa/ubuntu focal InRelease
Get:8 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:9 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2004/x86_64
InRelease [1,581 B]
Hit:10 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu focal InRelease
Get:11 http://ppa.launchpad.net/openjdk-r/ppa/ubuntu focal InRelease [23.8 kB]
Hit:12 http://ppa.launchpad.net/ubuntugis/ppa/ubuntu focal InRelease
Get:13 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64
Packages [28.5 kB]
Get:14 http://security.ubuntu.com/ubuntu focal-security/restricted amd64
Packages [2,060 kB]
Get:15 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3,069
kB]
Get:16 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages
[1,324 kB]
Get:17 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages
[2,199 kB]
Get:18 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages
```

```
[31.3 kB]
Get:19
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2004/x86_64
Packages [972 kB]
Get:20 http://ppa.launchpad.net/openjdk-r/ppa/ubuntu focal/main amd64 Packages
[16.5 kB]
Fetched 10.1 MB in 1s (7,514 kB/s)
Reading package lists… Done
Reading package lists… Done
Building dependency tree
Reading state information… Done
The following additional packages will be installed:
  fonts-dejavu-core fonts-dejavu-extra libatk-wrapper-java
  libatk-wrapper-java-jni libfontenc1 libxkbfile1 libxtst6 libxxf86dga1
  openjdk-11-jre x11-utils
Suggested packages:
  openjdk-11-demo openjdk-11-source visualvm mesa-utils
The following NEW packages will be installed:
  fonts-dejavu-core fonts-dejavu-extra libatk-wrapper-java
  libatk-wrapper-java-jni libfontenc1 libxkbfile1 libxtst6 libxxf86dga1
  openjdk-11-jdk openjdk-11-jre x11-utils
0 upgraded, 11 newly installed, 0 to remove and 24 not upgraded.
Need to get 5,128 kB of archives.
After this operation, 13.9 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 fonts-dejavu-core all
2.37-1 [1,041 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal/main amd64 fonts-dejavu-extra all
2.37-1 [1,953 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal/main amd64 libfontenc1 amd64
1:1.1.4-0ubuntu1 [14.0 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal/main amd64 libxkbfile1 amd64
1:1.1.0-1 [65.3 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal/main amd64 libxtst6 amd64 2:1.2.3-1
[12.8 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal/main amd64 libxxf86dga1 amd64
2:1.1.5-0ubuntu1 [12.0 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal/main amd64 x11-utils amd64 7.7+5
[199 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal/main amd64 libatk-wrapper-java all
0.37.1-1 [53.0 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal/main amd64 libatk-wrapper-java-jni
amd64 0.37.1-1 [45.1 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 openjdk-11-jre
amd64 11.0.18+10-0ubuntu1~20.04.1 [175 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 openjdk-11-jdk
amd64 11.0.18+10-0ubuntu1~20.04.1 [1,559 kB]
Fetched 5,128 kB in 0s (33.8 MB/s)
debconf: unable to initialize frontend: Dialog
```

```
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 76,
<> line 11.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (This frontend requires a controlling tty.)
debconf: falling back to frontend: Teletype
dpkg-preconfigure: unable to re-open stdin:
Selecting previously unselected package fonts-dejavu-core.
(Reading database … 122349 files and directories currently installed.)
Preparing to unpack …/00-fonts-dejavu-core_2.37-1_all.deb …
Unpacking fonts-dejavu-core (2.37-1) …
Selecting previously unselected package fonts-dejavu-extra.
Preparing to unpack …/01-fonts-dejavu-extra_2.37-1_all.deb …
Unpacking fonts-dejavu-extra (2.37-1) …
Selecting previously unselected package libfontenc1:amd64.
Preparing to unpack …/02-libfontenc1_1%3a1.1.4-0ubuntu1_amd64.deb …
Unpacking libfontenc1:amd64 (1:1.1.4-0ubuntu1) …
Selecting previously unselected package libxkbfile1:amd64.
Preparing to unpack …/03-libxkbfile1_1%3a1.1.0-1_amd64.deb …
Unpacking libxkbfile1:amd64 (1:1.1.0-1) …
Selecting previously unselected package libxtst6:amd64.
Preparing to unpack …/04-libxtst6_2%3a1.2.3-1_amd64.deb …
Unpacking libxtst6:amd64 (2:1.2.3-1) …
Selecting previously unselected package libxxf86dga1:amd64.
Preparing to unpack …/05-libxxf86dga1_2%3a1.1.5-0ubuntu1_amd64.deb …
Unpacking libxxf86dga1:amd64 (2:1.1.5-0ubuntu1) …
Selecting previously unselected package x11-utils.
Preparing to unpack …/06-x11-utils_7.7+5_amd64.deb …
Unpacking x11-utils (7.7+5) …
Selecting previously unselected package libatk-wrapper-java.
Preparing to unpack …/07-libatk-wrapper-java_0.37.1-1_all.deb …
Unpacking libatk-wrapper-java (0.37.1-1) …
Selecting previously unselected package libatk-wrapper-java-jni:amd64.
Preparing to unpack …/08-libatk-wrapper-java-jni_0.37.1-1_amd64.deb …
Unpacking libatk-wrapper-java-jni:amd64 (0.37.1-1) …
Selecting previously unselected package openjdk-11-jre:amd64.
Preparing to unpack …/09-openjdk-11-jre_11.0.18+10-0ubuntu1~20.04.1_amd64.deb
…
Unpacking openjdk-11-jre:amd64 (11.0.18+10-0ubuntu1~20.04.1) …
Selecting previously unselected package openjdk-11-jdk:amd64.
Preparing to unpack …/10-openjdk-11-jdk_11.0.18+10-0ubuntu1~20.04.1_amd64.deb
…
Unpacking openjdk-11-jdk:amd64 (11.0.18+10-0ubuntu1~20.04.1) …
Setting up libxtst6:amd64 (2:1.2.3-1) …
Setting up libxxf86dga1:amd64 (2:1.1.5-0ubuntu1) …
Setting up openjdk-11-jre:amd64 (11.0.18+10-0ubuntu1~20.04.1) …
Setting up libfontenc1:amd64 (1:1.1.4-0ubuntu1) …
```

```
Setting up fonts-dejavu-core (2.37-1) …
Setting up fonts-dejavu-extra (2.37-1) …
Setting up openjdk-11-jdk:amd64 (11.0.18+10-0ubuntu1~20.04.1) …
update-alternatives: using /usr/lib/jvm/java-11-openjdk-amd64/bin/jconsole to
provide /usr/bin/jconsole (jconsole) in auto mode
Setting up libxkbfile1:amd64 (1:1.1.0-1) …
Setting up x11-utils (7.7+5) …
Setting up libatk-wrapper-java (0.37.1-1) …
Setting up libatk-wrapper-java-jni:amd64 (0.37.1-1) …
Processing triggers for mime-support (3.64ubuntu1) …
Processing triggers for hicolor-icon-theme (0.17-2) …
Processing triggers for libc-bin (2.31-0ubuntu9.9) …
Processing triggers for man-db (2.9.1-1) …
Processing triggers for fontconfig (2.13.1-2ubuntu3) …
Reading package lists… Done
Building dependency tree
Reading state information… Done
The following additional packages will be installed:
  libgail-common libgail18 libgtk2.0-0 libgtk2.0-bin libgtk2.0-common
  openjdk-8-jdk-headless openjdk-8-jre openjdk-8-jre-headless
Suggested packages:
  gvfs openjdk-8-demo openjdk-8-source visualvm libnss-mdns
  fonts-ipafont-gothic fonts-ipafont-mincho fonts-wqy-microhei
  fonts-wqy-zenhei fonts-indic
The following NEW packages will be installed:
  libgail-common libgail18 libgtk2.0-0 libgtk2.0-bin libgtk2.0-common
  openjdk-8-jdk openjdk-8-jdk-headless openjdk-8-jre openjdk-8-jre-headless
0 upgraded, 9 newly installed, 0 to remove and 24 not upgraded.
Need to get 42.6 MB of archives.
After this operation, 155 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 libgtk2.0-common all
2.24.32-4ubuntu4 [126 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal/main amd64 libgtk2.0-0 amd64
2.24.32-4ubuntu4 [1,791 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal/main amd64 libgail18 amd64
2.24.32-4ubuntu4 [14.7 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal/main amd64 libgail-common amd64
2.24.32-4ubuntu4 [116 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal/main amd64 libgtk2.0-bin amd64
2.24.32-4ubuntu4 [7,728 B]
Get:6 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64
openjdk-8-jre-headless amd64 8u362-ga-0ubuntu1~20.04.1 [28.2 MB]
Get:7 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64
openjdk-8-jre amd64 8u362-ga-0ubuntu1~20.04.1 [69.9 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64
openjdk-8-jdk-headless amd64 8u362-ga-0ubuntu1~20.04.1 [8,282 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64
openjdk-8-jdk amd64 8u362-ga-0ubuntu1~20.04.1 [3,962 kB]
```

```
Fetched 42.6 MB in 1s (80.8 MB/s)
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 76,
<> line 9.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (This frontend requires a controlling tty.)
debconf: falling back to frontend: Teletype
dpkg-preconfigure: unable to re-open stdin:
Selecting previously unselected package libgtk2.0-common.
(Reading database … 122522 files and directories currently installed.)
Preparing to unpack …/0-libgtk2.0-common_2.24.32-4ubuntu4_all.deb …
Unpacking libgtk2.0-common (2.24.32-4ubuntu4) …
Selecting previously unselected package libgtk2.0-0:amd64.
Preparing to unpack …/1-libgtk2.0-0_2.24.32-4ubuntu4_amd64.deb …
Unpacking libgtk2.0-0:amd64 (2.24.32-4ubuntu4) …
Selecting previously unselected package libgail18:amd64.
Preparing to unpack …/2-libgail18_2.24.32-4ubuntu4_amd64.deb …
Unpacking libgail18:amd64 (2.24.32-4ubuntu4) …
Selecting previously unselected package libgail-common:amd64.
Preparing to unpack …/3-libgail-common_2.24.32-4ubuntu4_amd64.deb …
Unpacking libgail-common:amd64 (2.24.32-4ubuntu4) …
Selecting previously unselected package libgtk2.0-bin.
Preparing to unpack …/4-libgtk2.0-bin_2.24.32-4ubuntu4_amd64.deb …
Unpacking libgtk2.0-bin (2.24.32-4ubuntu4) …
Selecting previously unselected package openjdk-8-jre-headless:amd64.
Preparing to unpack …/5-openjdk-8-jre-
headless_8u362-ga-0ubuntu1~20.04.1_amd64.deb …
Unpacking openjdk-8-jre-headless:amd64 (8u362-ga-0ubuntu1~20.04.1) …
Selecting previously unselected package openjdk-8-jre:amd64.
Preparing to unpack …/6-openjdk-8-jre_8u362-ga-0ubuntu1~20.04.1_amd64.deb …
Unpacking openjdk-8-jre:amd64 (8u362-ga-0ubuntu1~20.04.1) …
Selecting previously unselected package openjdk-8-jdk-headless:amd64.
Preparing to unpack …/7-openjdk-8-jdk-
headless_8u362-ga-0ubuntu1~20.04.1_amd64.deb …
Unpacking openjdk-8-jdk-headless:amd64 (8u362-ga-0ubuntu1~20.04.1) …
Selecting previously unselected package openjdk-8-jdk:amd64.
Preparing to unpack …/8-openjdk-8-jdk_8u362-ga-0ubuntu1~20.04.1_amd64.deb …
Unpacking openjdk-8-jdk:amd64 (8u362-ga-0ubuntu1~20.04.1) …
Setting up openjdk-8-jre-headless:amd64 (8u362-ga-0ubuntu1~20.04.1) …
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/orbd to
provide /usr/bin/orbd (orbd) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/servertool
to provide /usr/bin/servertool (servertool) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/tnameserv
to provide /usr/bin/tnameserv (tnameserv) in auto mode
Setting up libgtk2.0-common (2.24.32-4ubuntu4) …
```

```
Setting up libgtk2.0-0:amd64 (2.24.32-4ubuntu4) …
Setting up openjdk-8-jre:amd64 (8u362-ga-0ubuntu1~20.04.1) …
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/policytool
to provide /usr/bin/policytool (policytool) in auto mode
Setting up openjdk-8-jdk-headless:amd64 (8u362-ga-0ubuntu1~20.04.1) …
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/idlj to provide
/usr/bin/idlj (idlj) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/wsimport to
provide /usr/bin/wsimport (wsimport) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jsadebugd to
provide /usr/bin/jsadebugd (jsadebugd) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/native2ascii to
provide /usr/bin/native2ascii (native2ascii) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/javah to
provide /usr/bin/javah (javah) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/hsdb to provide
/usr/bin/hsdb (hsdb) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/clhsdb to
provide /usr/bin/clhsdb (clhsdb) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/xjc to provide
/usr/bin/xjc (xjc) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/schemagen to
provide /usr/bin/schemagen (schemagen) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/extcheck to
provide /usr/bin/extcheck (extcheck) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jhat to provide
/usr/bin/jhat (jhat) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/wsgen to
provide /usr/bin/wsgen (wsgen) in auto mode
Setting up libgail18:amd64 (2.24.32-4ubuntu4) …
Setting up libgtk2.0-bin (2.24.32-4ubuntu4) …
Setting up openjdk-8-jdk:amd64 (8u362-ga-0ubuntu1~20.04.1) …
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/appletviewer to
provide /usr/bin/appletviewer (appletviewer) in auto mode
Setting up libgail-common:amd64 (2.24.32-4ubuntu4) …
Processing triggers for man-db (2.9.1-1) …
Processing triggers for mime-support (3.64ubuntu1) …
Processing triggers for hicolor-icon-theme (0.17-2) …
Processing triggers for libc-bin (2.31-0ubuntu9.9) …
```

```
[2]: !wget -q https://downloads.apache.org/spark/spark-3.2.3/spark-3.2.3-bin-hadoop3.
     ↪2.tgz
     !tar xvzf spark-3.2.3-bin-hadoop3.2.tgz
     !pip install pyspark
     !pip install -q findspark
     !pip install pyarrow
     try:
```

```
  # %tensorflow_version only exists in Colab.
  !pip install  tf-estimator-nightly==2.8.0.dev2021122109
except Exception:
  pass
```

```
spark-3.2.3-bin-hadoop3.2/
spark-3.2.3-bin-hadoop3.2/LICENSE
spark-3.2.3-bin-hadoop3.2/NOTICE
spark-3.2.3-bin-hadoop3.2/R/
spark-3.2.3-bin-hadoop3.2/R/lib/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/DESCRIPTION
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/INDEX
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/Rd.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/features.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/hsearch.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/links.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/nsInfo.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/package.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/Meta/vignette.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/NAMESPACE
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/R/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/R/SparkR
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/R/SparkR.rdb
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/R/SparkR.rdx
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/doc/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/doc/index.html
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/doc/sparkr-vignettes.R
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/doc/sparkr-vignettes.Rmd
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/doc/sparkr-vignettes.html
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/help/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/help/AnIndex
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/help/SparkR.rdb
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/help/SparkR.rdx
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/help/aliases.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/help/paths.rds
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/html/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/html/00Index.html
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/html/R.css
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/profile/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/profile/general.R
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/profile/shell.R
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/tests/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/tests/testthat/
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/tests/testthat/test_basic.R
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/worker/
```

```
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/worker/daemon.R
spark-3.2.3-bin-hadoop3.2/R/lib/SparkR/worker/worker.R
spark-3.2.3-bin-hadoop3.2/R/lib/sparkr.zip
spark-3.2.3-bin-hadoop3.2/README.md
spark-3.2.3-bin-hadoop3.2/RELEASE
spark-3.2.3-bin-hadoop3.2/bin/
spark-3.2.3-bin-hadoop3.2/bin/beeline
spark-3.2.3-bin-hadoop3.2/bin/beeline.cmd
spark-3.2.3-bin-hadoop3.2/bin/docker-image-tool.sh
spark-3.2.3-bin-hadoop3.2/bin/find-spark-home
spark-3.2.3-bin-hadoop3.2/bin/find-spark-home.cmd
spark-3.2.3-bin-hadoop3.2/bin/load-spark-env.cmd
spark-3.2.3-bin-hadoop3.2/bin/load-spark-env.sh
spark-3.2.3-bin-hadoop3.2/bin/pyspark
spark-3.2.3-bin-hadoop3.2/bin/pyspark.cmd
spark-3.2.3-bin-hadoop3.2/bin/pyspark2.cmd
spark-3.2.3-bin-hadoop3.2/bin/run-example
spark-3.2.3-bin-hadoop3.2/bin/run-example.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-class
spark-3.2.3-bin-hadoop3.2/bin/spark-class.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-class2.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-shell
spark-3.2.3-bin-hadoop3.2/bin/spark-shell.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-shell2.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-sql
spark-3.2.3-bin-hadoop3.2/bin/spark-sql.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-sql2.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-submit
spark-3.2.3-bin-hadoop3.2/bin/spark-submit.cmd
spark-3.2.3-bin-hadoop3.2/bin/spark-submit2.cmd
spark-3.2.3-bin-hadoop3.2/bin/sparkR
spark-3.2.3-bin-hadoop3.2/bin/sparkR.cmd
spark-3.2.3-bin-hadoop3.2/bin/sparkR2.cmd
spark-3.2.3-bin-hadoop3.2/conf/
spark-3.2.3-bin-hadoop3.2/conf/fairscheduler.xml.template
spark-3.2.3-bin-hadoop3.2/conf/log4j.properties.template
spark-3.2.3-bin-hadoop3.2/conf/metrics.properties.template
spark-3.2.3-bin-hadoop3.2/conf/spark-defaults.conf.template
spark-3.2.3-bin-hadoop3.2/conf/spark-env.sh.template
spark-3.2.3-bin-hadoop3.2/conf/workers.template
spark-3.2.3-bin-hadoop3.2/data/
spark-3.2.3-bin-hadoop3.2/data/graphx/
spark-3.2.3-bin-hadoop3.2/data/graphx/followers.txt
spark-3.2.3-bin-hadoop3.2/data/graphx/users.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/
spark-3.2.3-bin-hadoop3.2/data/mllib/als/
spark-3.2.3-bin-hadoop3.2/data/mllib/als/sample_movielens_ratings.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/als/test.data
```

```
spark-3.2.3-bin-hadoop3.2/data/mllib/gmm_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/images/
spark-3.2.3-bin-hadoop3.2/data/mllib/images/license.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/kittens/
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/origin/kittens/29.5.a_b_EGDP022204.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/kittens/54893.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/kittens/DP153539.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/kittens/DP802813.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/kittens/not-image.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/license.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/multi-channel/
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/multi-channel/BGRA.png
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/multi-
channel/BGRA_alpha_60.png
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/multi-channel/chr30.4.184.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/origin/multi-channel/grayscale.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/cls=kittens/
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-01/
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-01
/29.5.a_b_EGDP022204.jpg
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-01/not-image.txt
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-02/
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-02/54893.jpg
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-02/DP153539.jpg
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=kittens/date=2018-02/DP802813.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/cls=multichannel/
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=multichannel/date=2018-01/
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=multichannel/date=2018-01/BGRA.png
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/cls=multichannel/date=20
18-01/BGRA_alpha_60.png
spark-3.2.3-bin-
hadoop3.2/data/mllib/images/partitioned/cls=multichannel/date=2018-02/
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/cls=multichannel/date=20
18-02/chr30.4.184.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/images/partitioned/cls=multichannel/date=20
18-02/grayscale.jpg
spark-3.2.3-bin-hadoop3.2/data/mllib/iris_libsvm.txt
```

```
spark-3.2.3-bin-hadoop3.2/data/mllib/kmeans_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/pagerank_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/pic_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/ridge-data/
spark-3.2.3-bin-hadoop3.2/data/mllib/ridge-data/lpsa.data
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_binary_classification_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_fpgrowth.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_isotonic_regression_libsvm_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_kmeans_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_lda_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_lda_libsvm_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_libsvm_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_linear_regression_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_movielens_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_multiclass_classification_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/sample_svm_data.txt
spark-3.2.3-bin-hadoop3.2/data/mllib/streaming_kmeans_data_test.txt
spark-3.2.3-bin-hadoop3.2/data/streaming/
spark-3.2.3-bin-hadoop3.2/data/streaming/AFINN-111.txt
spark-3.2.3-bin-hadoop3.2/examples/
spark-3.2.3-bin-hadoop3.2/examples/jars/
spark-3.2.3-bin-hadoop3.2/examples/jars/scopt_2.12-3.7.1.jar
spark-3.2.3-bin-hadoop3.2/examples/jars/spark-examples_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/examples/src/
spark-3.2.3-bin-hadoop3.2/examples/src/main/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaHdfsLR.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaLogQuery.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaPageRank.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaSparkPi.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaS
tatusTrackerDemo.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaTC.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/JavaWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaAFTSurvivalRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
```

```
vaALSExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaBinarizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaBisectingKMeansExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaBucketedRandomProjectionLSHExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaBucketizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaChiSqSelectorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaChiSquareTestExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaCorrelationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaCountVectorizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaDCTExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaDecisionTreeClassificationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaDecisionTreeRegressionExample.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/JavaDocument.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaElementwiseProductExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaEstimatorTransformerParamExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaFMClassifierExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaFMRegressorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaFPGrowthExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaFeatureHasherExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaGaussianMixtureExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaGeneralizedLinearRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaGradientBoostedTreeClassifierExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaGradientBoostedTreeRegressorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaImputerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
```

```
vaIndexToStringExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaInteractionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaIsotonicRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaKMeansExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaLDAExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaLabeledDocument.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaLinearRegressionWithElasticNetExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaLinearSVCExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaLogisticRegressionSummaryExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaLogisticRegressionWithElasticNetExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaMaxAbsScalerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaMinHashLSHExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaMinMaxScalerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaModelSelectionViaCrossValidationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaModelSelectionViaTrainValidationSplitExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaMulticlassLogisticRegressionWithElasticNetExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaMultilayerPerceptronClassifierExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaNGramExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaNaiveBayesExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaNormalizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaOneHotEncoderExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaOneVsRestExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaPCAExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaPipelineExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
```

```
vaPolynomialExpansionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaPowerIterationClusteringExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaPrefixSpanExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaQuantileDiscretizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaRFormulaExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaRandomForestClassifierExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaRandomForestRegressorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaRobustScalerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaSQLTransformerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaStandardScalerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaStopWordsRemoverExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaStringIndexerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaSummarizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaTfIdfExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaTokenizerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaUnivariateFeatureSelectorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaVarianceThresholdSelectorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaVectorAssemblerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaVectorIndexerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaVectorSizeHintExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaVectorSlicerExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/ml/Ja
vaWord2VecExample.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib/
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib/JavaALS.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
```

/JavaAssociationRulesExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaBinaryClassificationMetricsExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaBisectingKMeansExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaChiSqSelectorExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaCorrelationsExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaDecisionTreeClassificationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaDecisionTreeRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaElementwiseProductExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaGaussianMixtureExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaGradientBoostingClassificationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaGradientBoostingRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaHypothesisTestingExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaHypothesisTestingKolmogorovSmirnovTestExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaIsotonicRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaKMeansExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaKernelDensityEstimationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaLBFGSExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaLatentDirichletAllocationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaLogisticRegressionWithLBFGSExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaMultiLabelClassificationMetricsExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaMulticlassClassificationMetricsExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaNaiveBayesExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaPCAExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaPowerIterationClusteringExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib

/JavaPrefixSpanExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaRandomForestClassificationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaRandomForestRegressionExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaRankingMetricsExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaRecommendationExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaSVDExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaSVMWithSGDExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaSimpleFPGrowth.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaStratifiedSamplingExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaStreamingTestExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/mllib
/JavaSummaryStatisticsExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/J
avaSQLDataSourceExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/J
avaSparkSQLExample.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/J
avaUserDefinedScalar.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/J
avaUserDefinedTypedAggregation.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/J
avaUserDefinedUntypedAggregation.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/hive/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/h
ive/JavaSparkHiveExample.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/streaming/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/s
treaming/JavaStructuredComplexSessionization.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/s
treaming/JavaStructuredKafkaWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/s
treaming/JavaStructuredKerberizedKafkaWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/s
treaming/JavaStructuredNetworkWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/s
treaming/JavaStructuredNetworkWordCountWindowed.java

```
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/sql/s
treaming/JavaStructuredSessionization.java
spark-3.2.3-bin-
hadoop3.2/examples/src/main/java/org/apache/spark/examples/streaming/
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaCustomReceiver.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaDirectKafkaWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaDirectKerberizedKafkaWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaNetworkWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaQueueStream.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaRecord.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaRecoverableNetworkWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaSqlNetworkWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/java/org/apache/spark/examples/strea
ming/JavaStatefulNetworkWordCount.java
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/als.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/avro_inputformat.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/kmeans.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/logistic_regression.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/aft_survival_regression.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/als_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/binarizer_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/bisecting_k_means_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/bucketed_random_projection_lsh_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/bucketizer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/chi_square_test_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/chisq_selector_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/correlation_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/count_vectorizer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/cross_validator.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/dataframe_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/dct_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/decision_tree_classification_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/decision_tree_regression_example.py
```

```
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/elementwise_product_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/estimator_transformer_param_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/feature_hasher_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/fm_classifier_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/fm_regressor_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/fpgrowth_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/gaussian_mixture_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/generalized_linear_regression_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/gradient_boosted_tree_clas
sifier_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/gradient_boosted_tree_regressor_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/imputer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/index_to_string_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/interaction_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/isotonic_regression_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/kmeans_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/lda_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/linear_regression_with_elastic_net.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/linearsvc.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/logistic_regression_summary_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/logistic_regression_with_elastic_net.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/max_abs_scaler_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/min_hash_lsh_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/min_max_scaler_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/multiclass_logistic_regres
sion_with_elastic_net.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/multilayer_perceptron_classification.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/n_gram_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/naive_bayes_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/normalizer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/one_vs_rest_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/onehot_encoder_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/pca_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/pipeline_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/polynomial_expansion_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/power_iteration_clustering_example.py
```

```
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/prefixspan_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/quantile_discretizer_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/random_forest_classifier_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/random_forest_regressor_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/rformula_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/robust_scaler_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/sql_transformer.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/standard_scaler_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/stopwords_remover_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/string_indexer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/summarizer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/tf_idf_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/tokenizer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/train_validation_split.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/univariate_feature_selector_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/variance_threshold_selector_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/vector_assembler_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/vector_indexer_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/ml/vector_size_hint_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/vector_slicer_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/ml/word2vec_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/binary_classification_m
etrics_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/bisecting_k_means_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/correlations.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/correlations_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/decision_tree_classification_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/decision_tree_regression_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/elementwise_product_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/fpgrowth_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/gaussian_mixture_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/gaussian_mixture_model.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/gradient_boosting_class
```

```
ification_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/gradient_boosting_regression_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/hypothesis_testing_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/hypothesis_testing_kolm
ogorov_smirnov_test_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/isotonic_regression_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/k_means_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/kernel_density_estimation_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/kmeans.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/latent_dirichlet_allocation_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/linear_regression_with_sgd_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/logistic_regression.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/logistic_regression_wit
h_lbfgs_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/multi_class_metrics_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/multi_label_metrics_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/naive_bayes_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/normalizer_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/pca_rowmatrix_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/power_iteration_clustering_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/random_forest_classification_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/random_forest_regression_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/random_rdd_generation.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/ranking_metrics_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/recommendation_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/regression_metrics_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/sampled_rdds.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/standard_scaler_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/stratified_sampling_example.py
spark-3.2.3-bin-
```

```
hadoop3.2/examples/src/main/python/mllib/streaming_k_means_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/streaming_linear_regression_example.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/mllib/summary_statistics_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/svd_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/svm_with_sgd_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/tf_idf_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/word2vec.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/mllib/word2vec_example.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/pagerank.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/parquet_inputformat.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/pi.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sort.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/arrow.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/basic.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/datasource.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/hive.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/streaming/
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/sql/streaming/structured_kafka_wordcount.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/sql/streaming/structured_network_wordcount.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/sql/streaming/structured_netw
ork_wordcount_windowed.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/sql/streaming/structured_sessionization.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/status_api_demo.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/streaming/
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/streaming/hdfs_wordcount.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/streaming/network_wordcount.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/streaming/network_wordjoinsentiments.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/streaming/queue_stream.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/streaming/recoverable_network_wordcount.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/streaming/sql_network_wordcount.py
spark-3.2.3-bin-
hadoop3.2/examples/src/main/python/streaming/stateful_network_wordcount.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/transitive_closure.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/python/wordcount.py
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/RSparkSQLExample.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/data-manipulation.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/dataframe.R
```

```
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/als.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/bisectingKmeans.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/decisionTree.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/fmClassifier.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/fmRegressor.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/fpm.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/gaussianMixture.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/gbt.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/glm.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/isoreg.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/kmeans.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/kstest.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/lda.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/lm_with_elastic_net.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/logit.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/ml.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/mlp.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/naiveBayes.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/powerIterationClustering.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/prefixSpan.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/randomForest.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/survreg.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/ml/svmLinear.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/r/streaming/
spark-3.2.3-bin-
hadoop3.2/examples/src/main/r/streaming/structured_network_wordcount.R
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/META-INF/
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/META-INF/services/
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/META-
INF/services/org.apache.spark.sql.SparkSessionExtensionsProvider
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/META-
INF/services/org.apache.spark.sql.jdbc.JdbcConnectionProvider
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/dir1/
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/dir1/dir2/
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/dir1/dir2/file2.parquet
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/dir1/file1.parquet
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/dir1/file3.json
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/employees.json
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/full_user.avsc
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/kv1.txt
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/people.csv
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/people.json
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/people.txt
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/user.avsc
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/users.avro
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/users.orc
```

```
spark-3.2.3-bin-hadoop3.2/examples/src/main/resources/users.parquet
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Accu
mulatorMetricsTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/BroadcastTest.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/DFSR
eadWriteTest.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Driv
erSubmissionTest.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Exce
ptionHandlingTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/GroupByTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/HdfsTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/LocalALS.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/LocalFileLR.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/LocalKMeans.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/LocalLR.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/LocalPi.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/LogQuery.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Mult
iBroadcastTest.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Simp
leSkewedGroupByTest.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Skew
edGroupByTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkALS.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkHdfsLR.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkKMeans.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkLR.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkPageRank.scala
```

```
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkPi.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/Spar
kRemoteFileTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/SparkTC.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/extensions/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/exte
nsions/AgeExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/exte
nsions/SessionExtensionsWithLoader.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/exte
nsions/SessionExtensionsWithoutLoader.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/exte
nsions/SparkSessionExtensionsTest.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/graphx/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/AggregateMessagesExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/Analytics.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/ComprehensiveExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/ConnectedComponentsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/LiveJournalPageRank.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/PageRankExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/SSSPExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/SynthBenchmark.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/grap
hx/TriangleCountingExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/A
FTSurvivalRegressionExample.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/ALSExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/B
inarizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/B
isectingKMeansExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/B
ucketedRandomProjectionLSHExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/B
```

ucketizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/ChiSqSelectorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/ChiSquareTestExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/CorrelationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/CountVectorizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/DCTExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/DataFrameExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/DecisionTreeClassificationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/DecisionTreeExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/DecisionTreeRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/DeveloperApiExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/ElementwiseProductExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/EstimatorTransformerParamExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/FMClassifierExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/FMRegressorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/FPGrowthExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/FeatureHasherExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/GBTExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/GaussianMixtureExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/GeneralizedLinearRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/GradientBoostedTreeClassifierExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/GradientBoostedTreeRegressorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/ImputerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/IndexToStringExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/I

nteractionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/I
sotonicRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/K
MeansExample.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/LDAExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/L
inearRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/L
inearRegressionWithElasticNetExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/L
inearSVCExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/L
ogisticRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/L
ogisticRegressionSummaryExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/L
ogisticRegressionWithElasticNetExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
axAbsScalerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
inHashLSHExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
inMaxScalerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
odelSelectionViaCrossValidationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
odelSelectionViaTrainValidationSplitExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
ulticlassLogisticRegressionWithElasticNetExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/M
ultilayerPerceptronClassifierExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/N
GramExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/N
aiveBayesExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/N
ormalizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/O
neHotEncoderExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/O
neVsRestExample.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/PCAExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/P
ipelineExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/P

olynomialExpansionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/P
owerIterationClusteringExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/P
refixSpanExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/Q
uantileDiscretizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/R
FormulaExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/R
andomForestClassifierExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/R
andomForestExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/R
andomForestRegressorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/R
obustScalerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/S
QLTransformerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/S
tandardScalerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/S
topWordsRemoverExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/S
tringIndexerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/S
ummarizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/T
fIdfExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/T
okenizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/U
naryTransformerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/U
nivariateFeatureSelectorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/V
arianceThresholdSelectorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/V
ectorAssemblerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/V
ectorIndexerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/V
ectorSizeHintExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/V
ectorSlicerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/ml/W
ord2VecExample.scala
spark-3.2.3-bin-

hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mllib/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/AbstractParams.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/AssociationRulesExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/BinaryClassification.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/BinaryClassificationMetricsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/BisectingKMeansExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/ChiSqSelectorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/Correlations.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/CorrelationsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/CosineSimilarity.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/DecisionTreeClassificationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/DecisionTreeRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/DecisionTreeRunner.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/DenseKMeans.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/ElementwiseProductExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/FPGrowthExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/GaussianMixtureExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/GradientBoostedTreesRunner.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/GradientBoostingClassificationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/GradientBoostingRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/HypothesisTestingExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/HypothesisTestingKolmogorovSmirnovTestExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/IsotonicRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/KMeansExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli

b/KernelDensityEstimationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/LBFGSExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/LDAExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/LatentDirichletAllocationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/LogisticRegressionWithLBFGSExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/MovieLensALS.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/MultiLabelMetricsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/MulticlassMetricsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/MultivariateSummarizer.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/NaiveBayesExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/NormalizerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/PCAOnRowMatrixExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/PCAOnSourceVectorExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/PMMLModelExportExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/PowerIterationClusteringExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/PrefixSpanExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/RandomForestClassificationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/RandomForestRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/RandomRDDGeneration.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/RankingMetricsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/RecommendationExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/SVDExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/SVMWithSGDExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/SampledRDDs.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli

```
b/SimpleFPGrowth.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/SparseNaiveBayes.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/StandardScalerExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/StratifiedSamplingExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/StreamingKMeansExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/StreamingLinearRegressionExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/StreamingLogisticRegression.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/StreamingTestExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/SummaryStatisticsExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/TFIDFExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/TallSkinnyPCA.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/TallSkinnySVD.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/mlli
b/Word2VecExample.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/pythonconverters/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/pyth
onconverters/AvroConverters.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
RDDRelation.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
SQLDataSourceExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
SimpleTypedAggregator.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
SparkSQLExample.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
UserDefinedScalar.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
UserDefinedTypedAggregation.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
UserDefinedUntypedAggregation.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/hive/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
hive/SparkHiveExample.scala
```

spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/jdbc/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
jdbc/ExampleJdbcConnectionProvider.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/streaming/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
streaming/StructuredComplexSessionization.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
streaming/StructuredKafkaWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
streaming/StructuredKerberizedKafkaWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
streaming/StructuredNetworkWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
streaming/StructuredNetworkWordCountWindowed.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/sql/
streaming/StructuredSessionization.scala
spark-3.2.3-bin-
hadoop3.2/examples/src/main/scala/org/apache/spark/examples/streaming/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/CustomReceiver.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/DirectKafkaWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/DirectKerberizedKafkaWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/HdfsWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/NetworkWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/QueueStream.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/RawNetworkGrep.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/RecoverableNetworkWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/SqlNetworkWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/StatefulNetworkWordCount.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/StreamingExamples.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/clickstream/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/clickstream/PageViewGenerator.scala
spark-3.2.3-bin-hadoop3.2/examples/src/main/scala/org/apache/spark/examples/stre
aming/clickstream/PageViewStream.scala

```
spark-3.2.3-bin-hadoop3.2/examples/src/main/scripts/
spark-3.2.3-bin-hadoop3.2/examples/src/main/scripts/getGpusResources.sh
spark-3.2.3-bin-hadoop3.2/jars/
spark-3.2.3-bin-hadoop3.2/jars/HikariCP-2.5.1.jar
spark-3.2.3-bin-hadoop3.2/jars/JLargeArrays-1.5.jar
spark-3.2.3-bin-hadoop3.2/jars/JTransforms-3.1.jar
spark-3.2.3-bin-hadoop3.2/jars/RoaringBitmap-0.9.0.jar
spark-3.2.3-bin-hadoop3.2/jars/ST4-4.0.4.jar
spark-3.2.3-bin-hadoop3.2/jars/activation-1.1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/aircompressor-0.21.jar
spark-3.2.3-bin-hadoop3.2/jars/algebra_2.12-2.0.1.jar
spark-3.2.3-bin-hadoop3.2/jars/annotations-17.0.0.jar
spark-3.2.3-bin-hadoop3.2/jars/antlr-runtime-3.5.2.jar
spark-3.2.3-bin-hadoop3.2/jars/antlr4-runtime-4.8.jar
spark-3.2.3-bin-hadoop3.2/jars/aopalliance-repackaged-2.6.1.jar
spark-3.2.3-bin-hadoop3.2/jars/arpack-2.2.1.jar
spark-3.2.3-bin-hadoop3.2/jars/arpack_combined_all-0.1.jar
spark-3.2.3-bin-hadoop3.2/jars/arrow-format-2.0.0.jar
spark-3.2.3-bin-hadoop3.2/jars/arrow-memory-core-2.0.0.jar
spark-3.2.3-bin-hadoop3.2/jars/arrow-memory-netty-2.0.0.jar
spark-3.2.3-bin-hadoop3.2/jars/arrow-vector-2.0.0.jar
spark-3.2.3-bin-hadoop3.2/jars/audience-annotations-0.5.0.jar
spark-3.2.3-bin-hadoop3.2/jars/automaton-1.11-8.jar
spark-3.2.3-bin-hadoop3.2/jars/avro-1.10.2.jar
spark-3.2.3-bin-hadoop3.2/jars/avro-ipc-1.10.2.jar
spark-3.2.3-bin-hadoop3.2/jars/avro-mapred-1.10.2.jar
spark-3.2.3-bin-hadoop3.2/jars/blas-2.2.1.jar
spark-3.2.3-bin-hadoop3.2/jars/bonecp-0.8.0.RELEASE.jar
spark-3.2.3-bin-hadoop3.2/jars/breeze-macros_2.12-1.2.jar
spark-3.2.3-bin-hadoop3.2/jars/breeze_2.12-1.2.jar
spark-3.2.3-bin-hadoop3.2/jars/cats-kernel_2.12-2.1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/chill-java-0.10.0.jar
spark-3.2.3-bin-hadoop3.2/jars/chill_2.12-0.10.0.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-cli-1.2.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-codec-1.15.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-collections-3.2.2.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-compiler-3.0.16.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-compress-1.21.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-crypto-1.1.0.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-dbcp-1.4.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-io-2.8.0.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-lang-2.6.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-lang3-3.12.0.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-logging-1.1.3.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-math3-3.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-net-3.1.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-pool-1.5.4.jar
spark-3.2.3-bin-hadoop3.2/jars/commons-text-1.10.0.jar
```

```
spark-3.2.3-bin-hadoop3.2/jars/compress-lzf-1.0.3.jar
spark-3.2.3-bin-hadoop3.2/jars/core-1.1.2.jar
spark-3.2.3-bin-hadoop3.2/jars/curator-client-2.13.0.jar
spark-3.2.3-bin-hadoop3.2/jars/curator-framework-2.13.0.jar
spark-3.2.3-bin-hadoop3.2/jars/curator-recipes-2.13.0.jar
spark-3.2.3-bin-hadoop3.2/jars/datanucleus-api-jdo-4.2.4.jar
spark-3.2.3-bin-hadoop3.2/jars/datanucleus-core-4.1.17.jar
spark-3.2.3-bin-hadoop3.2/jars/datanucleus-rdbms-4.1.19.jar
spark-3.2.3-bin-hadoop3.2/jars/derby-10.14.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/dropwizard-metrics-hadoop-
metrics2-reporter-0.1.2.jar
spark-3.2.3-bin-hadoop3.2/jars/flatbuffers-java-1.9.0.jar
spark-3.2.3-bin-hadoop3.2/jars/generex-1.0.2.jar
spark-3.2.3-bin-hadoop3.2/jars/gson-2.2.4.jar
spark-3.2.3-bin-hadoop3.2/jars/guava-14.0.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hadoop-client-api-3.3.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hadoop-client-runtime-3.3.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hadoop-shaded-guava-1.1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hadoop-yarn-server-web-proxy-3.3.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-beeline-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-cli-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-common-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-exec-2.3.9-core.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-jdbc-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-llap-common-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-metastore-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-serde-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-service-rpc-3.1.2.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-shims-0.23-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-shims-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-shims-common-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-shims-scheduler-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-storage-api-2.7.2.jar
spark-3.2.3-bin-hadoop3.2/jars/hive-vector-code-gen-2.3.9.jar
spark-3.2.3-bin-hadoop3.2/jars/hk2-api-2.6.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hk2-locator-2.6.1.jar
spark-3.2.3-bin-hadoop3.2/jars/hk2-utils-2.6.1.jar
spark-3.2.3-bin-hadoop3.2/jars/htrace-core4-4.1.0-incubating.jar
spark-3.2.3-bin-hadoop3.2/jars/httpclient-4.5.13.jar
spark-3.2.3-bin-hadoop3.2/jars/httpcore-4.4.14.jar
spark-3.2.3-bin-hadoop3.2/jars/istack-commons-runtime-3.0.8.jar
spark-3.2.3-bin-hadoop3.2/jars/ivy-2.5.0.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-annotations-2.12.3.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-core-2.12.3.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-core-asl-1.9.13.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-databind-2.12.3.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-dataformat-yaml-2.12.3.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-datatype-jsr310-2.11.2.jar
```

```
spark-3.2.3-bin-hadoop3.2/jars/jackson-mapper-asl-1.9.13.jar
spark-3.2.3-bin-hadoop3.2/jars/jackson-module-scala_2.12-2.12.3.jar
spark-3.2.3-bin-hadoop3.2/jars/jakarta.annotation-api-1.3.5.jar
spark-3.2.3-bin-hadoop3.2/jars/jakarta.inject-2.6.1.jar
spark-3.2.3-bin-hadoop3.2/jars/jakarta.servlet-api-4.0.3.jar
spark-3.2.3-bin-hadoop3.2/jars/jakarta.validation-api-2.0.2.jar
spark-3.2.3-bin-hadoop3.2/jars/jakarta.ws.rs-api-2.1.6.jar
spark-3.2.3-bin-hadoop3.2/jars/jakarta.xml.bind-api-2.3.2.jar
spark-3.2.3-bin-hadoop3.2/jars/janino-3.0.16.jar
spark-3.2.3-bin-hadoop3.2/jars/javassist-3.25.0-GA.jar
spark-3.2.3-bin-hadoop3.2/jars/javax.jdo-3.2.0-m3.jar
spark-3.2.3-bin-hadoop3.2/jars/javolution-5.5.1.jar
spark-3.2.3-bin-hadoop3.2/jars/jaxb-api-2.2.11.jar
spark-3.2.3-bin-hadoop3.2/jars/jaxb-runtime-2.3.2.jar
spark-3.2.3-bin-hadoop3.2/jars/jcl-over-slf4j-1.7.30.jar
spark-3.2.3-bin-hadoop3.2/jars/jdo-api-3.0.1.jar
spark-3.2.3-bin-hadoop3.2/jars/jersey-client-2.34.jar
spark-3.2.3-bin-hadoop3.2/jars/jersey-common-2.34.jar
spark-3.2.3-bin-hadoop3.2/jars/jersey-container-servlet-2.34.jar
spark-3.2.3-bin-hadoop3.2/jars/jersey-container-servlet-core-2.34.jar
spark-3.2.3-bin-hadoop3.2/jars/jersey-hk2-2.34.jar
spark-3.2.3-bin-hadoop3.2/jars/jersey-server-2.34.jar
spark-3.2.3-bin-hadoop3.2/jars/jline-2.14.6.jar
spark-3.2.3-bin-hadoop3.2/jars/joda-time-2.10.10.jar
spark-3.2.3-bin-hadoop3.2/jars/jodd-core-3.5.2.jar
spark-3.2.3-bin-hadoop3.2/jars/jpam-1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/json-1.8.jar
spark-3.2.3-bin-hadoop3.2/jars/json4s-ast_2.12-3.7.0-M11.jar
spark-3.2.3-bin-hadoop3.2/jars/json4s-core_2.12-3.7.0-M11.jar
spark-3.2.3-bin-hadoop3.2/jars/json4s-jackson_2.12-3.7.0-M11.jar
spark-3.2.3-bin-hadoop3.2/jars/json4s-scalap_2.12-3.7.0-M11.jar
spark-3.2.3-bin-hadoop3.2/jars/jsr305-3.0.0.jar
spark-3.2.3-bin-hadoop3.2/jars/jta-1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/jul-to-slf4j-1.7.30.jar
spark-3.2.3-bin-hadoop3.2/jars/kryo-shaded-4.0.2.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-client-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-admissionregistration-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-apiextensions-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-apps-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-autoscaling-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-batch-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-certificates-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-common-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-coordination-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-core-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-discovery-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-events-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-extensions-5.4.1.jar
```

```
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-flowcontrol-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-metrics-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-networking-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-node-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-policy-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-rbac-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-scheduling-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/kubernetes-model-storageclass-5.4.1.jar
spark-3.2.3-bin-hadoop3.2/jars/lapack-2.2.1.jar
spark-3.2.3-bin-hadoop3.2/jars/leveldbjni-all-1.8.jar
spark-3.2.3-bin-hadoop3.2/jars/libfb303-0.9.3.jar
spark-3.2.3-bin-hadoop3.2/jars/libthrift-0.12.0.jar
spark-3.2.3-bin-hadoop3.2/jars/log4j-1.2.17.jar
spark-3.2.3-bin-hadoop3.2/jars/logging-interceptor-3.12.12.jar
spark-3.2.3-bin-hadoop3.2/jars/lz4-java-1.7.1.jar
spark-3.2.3-bin-hadoop3.2/jars/macro-compat_2.12-1.1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/mesos-1.4.0-shaded-protobuf.jar
spark-3.2.3-bin-hadoop3.2/jars/metrics-core-4.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/metrics-graphite-4.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/metrics-jmx-4.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/metrics-json-4.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/metrics-jvm-4.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/minlog-1.3.0.jar
spark-3.2.3-bin-hadoop3.2/jars/netty-all-4.1.68.Final.jar
spark-3.2.3-bin-hadoop3.2/jars/objenesis-2.6.jar
spark-3.2.3-bin-hadoop3.2/jars/okhttp-3.12.12.jar
spark-3.2.3-bin-hadoop3.2/jars/okio-1.14.0.jar
spark-3.2.3-bin-hadoop3.2/jars/opencsv-2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/orc-core-1.6.14.jar
spark-3.2.3-bin-hadoop3.2/jars/orc-mapreduce-1.6.14.jar
spark-3.2.3-bin-hadoop3.2/jars/orc-shims-1.6.14.jar
spark-3.2.3-bin-hadoop3.2/jars/oro-2.0.8.jar
spark-3.2.3-bin-hadoop3.2/jars/osgi-resource-locator-1.0.3.jar
spark-3.2.3-bin-hadoop3.2/jars/paranamer-2.8.jar
spark-3.2.3-bin-hadoop3.2/jars/parquet-column-1.12.2.jar
spark-3.2.3-bin-hadoop3.2/jars/parquet-common-1.12.2.jar
spark-3.2.3-bin-hadoop3.2/jars/parquet-encoding-1.12.2.jar
spark-3.2.3-bin-hadoop3.2/jars/parquet-format-structures-1.12.2.jar
spark-3.2.3-bin-hadoop3.2/jars/parquet-hadoop-1.12.2.jar
spark-3.2.3-bin-hadoop3.2/jars/parquet-jackson-1.12.2.jar
spark-3.2.3-bin-hadoop3.2/jars/protobuf-java-2.5.0.jar
spark-3.2.3-bin-hadoop3.2/jars/py4j-0.10.9.5.jar
spark-3.2.3-bin-hadoop3.2/jars/pyrolite-4.30.jar
spark-3.2.3-bin-hadoop3.2/jars/rocksdbjni-6.20.3.jar
spark-3.2.3-bin-hadoop3.2/jars/scala-collection-compat_2.12-2.1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/scala-compiler-2.12.15.jar
spark-3.2.3-bin-hadoop3.2/jars/scala-library-2.12.15.jar
spark-3.2.3-bin-hadoop3.2/jars/scala-parser-combinators_2.12-1.1.2.jar
```

```
spark-3.2.3-bin-hadoop3.2/jars/scala-reflect-2.12.15.jar
spark-3.2.3-bin-hadoop3.2/jars/scala-xml_2.12-1.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/shapeless_2.12-2.3.3.jar
spark-3.2.3-bin-hadoop3.2/jars/shims-0.9.0.jar
spark-3.2.3-bin-hadoop3.2/jars/slf4j-api-1.7.30.jar
spark-3.2.3-bin-hadoop3.2/jars/slf4j-log4j12-1.7.30.jar
spark-3.2.3-bin-hadoop3.2/jars/snakeyaml-1.27.jar
spark-3.2.3-bin-hadoop3.2/jars/snappy-java-1.1.8.4.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-catalyst_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-core_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-graphx_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-hive-thriftserver_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-hive_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-kubernetes_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-kvstore_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-launcher_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-mesos_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-mllib-local_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-mllib_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-network-common_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-network-shuffle_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-repl_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-sketch_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-sql_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-streaming_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-tags_2.12-3.2.3-tests.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-tags_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-unsafe_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spark-yarn_2.12-3.2.3.jar
spark-3.2.3-bin-hadoop3.2/jars/spire-macros_2.12-0.17.0.jar
spark-3.2.3-bin-hadoop3.2/jars/spire-platform_2.12-0.17.0.jar
spark-3.2.3-bin-hadoop3.2/jars/spire-util_2.12-0.17.0.jar
spark-3.2.3-bin-hadoop3.2/jars/spire_2.12-0.17.0.jar
spark-3.2.3-bin-hadoop3.2/jars/stax-api-1.0.1.jar
spark-3.2.3-bin-hadoop3.2/jars/stream-2.9.6.jar
spark-3.2.3-bin-hadoop3.2/jars/super-csv-2.2.0.jar
spark-3.2.3-bin-hadoop3.2/jars/threeten-extra-1.5.0.jar
spark-3.2.3-bin-hadoop3.2/jars/tink-1.6.0.jar
spark-3.2.3-bin-hadoop3.2/jars/transaction-api-1.1.jar
spark-3.2.3-bin-hadoop3.2/jars/univocity-parsers-2.9.1.jar
spark-3.2.3-bin-hadoop3.2/jars/velocity-1.5.jar
spark-3.2.3-bin-hadoop3.2/jars/xbean-asm9-shaded-4.20.jar
spark-3.2.3-bin-hadoop3.2/jars/xz-1.8.jar
spark-3.2.3-bin-hadoop3.2/jars/zjsonpatch-0.3.0.jar
spark-3.2.3-bin-hadoop3.2/jars/zookeeper-3.6.2.jar
spark-3.2.3-bin-hadoop3.2/jars/zookeeper-jute-3.6.2.jar
spark-3.2.3-bin-hadoop3.2/jars/zstd-jni-1.5.0-4.jar
spark-3.2.3-bin-hadoop3.2/kubernetes/
```

```
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/Dockerfile
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/bindings/
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/bindings/R/
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/bindings/R/Dockerfile
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/bindings/python/
spark-3.2.3-bin-
hadoop3.2/kubernetes/dockerfiles/spark/bindings/python/Dockerfile
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/decom.sh
spark-3.2.3-bin-hadoop3.2/kubernetes/dockerfiles/spark/entrypoint.sh
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/autoscale.py
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/decommissioning.py
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/decommissioning_cleanup.py
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/py_container_checks.py
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/pyfiles.py
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/python_executable_check.py
spark-3.2.3-bin-hadoop3.2/kubernetes/tests/worker_memory_check.py
spark-3.2.3-bin-hadoop3.2/licenses/
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-AnchorJS.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-CC0.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-JLargeArrays.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-JTransforms.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-antlr.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-arpack.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-automaton.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-blas.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-bootstrap.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-cloudpickle.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-d3.min.js.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-dagre-d3.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-datatables.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-dnsjava.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-f2j.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-graphlib-dot.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-istack-commons-runtime.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jakarta-annotation-api
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jakarta-ws-rs-api
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jakarta.activation-api.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jakarta.xml.bind-api.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-janino.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-javassist.html
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-javax-transaction-transaction-api.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-javolution.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jaxb-runtime.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jline.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jodd.txt
```

```
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-join.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jquery.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-json-formatter.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-jsp-api.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-kryo.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-leveldbjni.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-machinist.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-matchMedia-polyfill.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-minlog.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-modernizr.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-mustache.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-netlib.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-paranamer.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-pmml-model.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-protobuf.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-py4j.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-pyrolite.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-re2j.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-reflectasm.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-respond.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-sbt-launch-lib.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-scala.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-scopt.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-slf4j.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-sorttable.js.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-spire.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-vis-timeline.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-xmlenc.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-zstd-jni.txt
spark-3.2.3-bin-hadoop3.2/licenses/LICENSE-zstd.txt
spark-3.2.3-bin-hadoop3.2/python/
spark-3.2.3-bin-hadoop3.2/python/.coveragerc
spark-3.2.3-bin-hadoop3.2/python/.gitignore
spark-3.2.3-bin-hadoop3.2/python/MANIFEST.in
spark-3.2.3-bin-hadoop3.2/python/README.md
spark-3.2.3-bin-hadoop3.2/python/dist/
spark-3.2.3-bin-hadoop3.2/python/docs/
spark-3.2.3-bin-hadoop3.2/python/docs/Makefile
spark-3.2.3-bin-hadoop3.2/python/docs/make.bat
spark-3.2.3-bin-hadoop3.2/python/docs/make2.bat
spark-3.2.3-bin-hadoop3.2/python/docs/source/
spark-3.2.3-bin-hadoop3.2/python/docs/source/_static/
spark-3.2.3-bin-hadoop3.2/python/docs/source/_static/copybutton.js
spark-3.2.3-bin-hadoop3.2/python/docs/source/_static/css/
spark-3.2.3-bin-hadoop3.2/python/docs/source/_static/css/pyspark.css
spark-3.2.3-bin-hadoop3.2/python/docs/source/_templates/
spark-3.2.3-bin-hadoop3.2/python/docs/source/_templates/autosummary/
spark-3.2.3-bin-hadoop3.2/python/docs/source/_templates/autosummary/class.rst
```

```
spark-3.2.3-bin-
hadoop3.2/python/docs/source/_templates/autosummary/class_with_docs.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/conf.py
spark-3.2.3-bin-hadoop3.2/python/docs/source/development/
spark-3.2.3-bin-hadoop3.2/python/docs/source/development/contributing.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/development/debugging.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/development/index.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/development/setting_ide.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/development/testing.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/getting_started/
spark-3.2.3-bin-hadoop3.2/python/docs/source/getting_started/index.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/getting_started/install.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/getting_started/quickstart_df.ipynb
spark-3.2.3-bin-hadoop3.2/python/docs/source/getting_started/quickstart_ps.ipynb
spark-3.2.3-bin-hadoop3.2/python/docs/source/index.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/migration_guide/
spark-3.2.3-bin-hadoop3.2/python/docs/source/migration_guide/index.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/koalas_to_pyspark.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_1.0_1.2_to_1.3.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_1.4_to_1.5.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_2.2_to_2.3.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_2.3.0_to_2.3.1_above.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_2.3_to_2.4.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_2.4_to_3.0.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/migration_guide/pyspark_3.1_to_3.2.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/index.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.ml.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.mllib.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/
spark-3.2.3-bin-
hadoop3.2/python/docs/source/reference/pyspark.pandas/extensions.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/frame.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/reference/pyspark.pandas/general_functions.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/reference/pyspark.pandas/groupby.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/index.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/reference/pyspark.pandas/indexing.rst
```

```
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/io.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/ml.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/series.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.pandas/window.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.resource.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.sql.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.ss.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/reference/pyspark.streaming.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/arrow_pandas.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/index.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/pandas_on_spark/
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/best_practices.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/pandas_on_spark/faq.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/from_to_dbms.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/index.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/options.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/pandas_pyspark.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/transform_apply.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/typehints.rst
spark-3.2.3-bin-
hadoop3.2/python/docs/source/user_guide/pandas_on_spark/types.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/python_packaging.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/sql/
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/sql/arrow_pandas.rst
spark-3.2.3-bin-hadoop3.2/python/docs/source/user_guide/sql/index.rst
spark-3.2.3-bin-hadoop3.2/python/lib/
spark-3.2.3-bin-hadoop3.2/python/lib/PY4J_LICENSE.txt
spark-3.2.3-bin-hadoop3.2/python/lib/py4j-0.10.9.5-src.zip
spark-3.2.3-bin-hadoop3.2/python/lib/pyspark.zip
spark-3.2.3-bin-hadoop3.2/python/mypy.ini
spark-3.2.3-bin-hadoop3.2/python/pylintrc
spark-3.2.3-bin-hadoop3.2/python/pyspark/
spark-3.2.3-bin-hadoop3.2/python/pyspark/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/__pycache__/
spark-3.2.3-bin-hadoop3.2/python/pyspark/__pycache__/install.cpython-38.pyc
spark-3.2.3-bin-hadoop3.2/python/pyspark/_globals.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/_typing.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/accumulators.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/accumulators.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/broadcast.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/broadcast.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/cloudpickle/
spark-3.2.3-bin-hadoop3.2/python/pyspark/cloudpickle/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/cloudpickle/cloudpickle.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/cloudpickle/cloudpickle_fast.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/cloudpickle/compat.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/conf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/conf.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/context.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/context.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/daemon.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/files.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/files.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/find_spark_home.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/install.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/java_gateway.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/join.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/_typing.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/base.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/base.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/classification.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/classification.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/clustering.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/clustering.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/common.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/common.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/evaluation.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/evaluation.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/feature.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/feature.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/fpm.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/fpm.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/functions.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/image.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/image.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/linalg/
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/linalg/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/linalg/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/_shared_params_code_gen.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/_shared_params_code_gen.pyi
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/shared.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/param/shared.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/pipeline.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/pipeline.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/recommendation.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/recommendation.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/regression.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/regression.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/stat.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/stat.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_algorithms.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_base.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_evaluation.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_feature.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_image.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_linalg.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_param.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_persistence.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_pipeline.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_stat.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_training_summary.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_tuning.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tests/test_wrapper.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tree.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tree.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tuning.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/tuning.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/util.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/wrapper.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/ml/wrapper.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/_typing.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/classification.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/classification.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/clustering.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/clustering.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/common.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/common.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/evaluation.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/evaluation.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/feature.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/feature.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/fpm.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/fpm.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/linalg/
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/linalg/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/linalg/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/linalg/distributed.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/linalg/distributed.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/random.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/random.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/recommendation.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/recommendation.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/regression.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/regression.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/KernelDensity.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/KernelDensity.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/_statistics.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/_statistics.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/distribution.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/distribution.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/test.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/stat/test.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/test_algorithms.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/test_feature.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/test_linalg.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/test_stat.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/mllib/tests/test_streaming_algorithms.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tests/test_util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tree.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/tree.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/mllib/util.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/_typing.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/accessors.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/base.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/categorical.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/config.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/base.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/binary_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/boolean_ops.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/categorical_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/complex_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/date_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/datetime_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/null_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/num_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/string_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/data_type_ops/udt_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/datetimes.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/exceptions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/extensions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/frame.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/generic.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/groupby.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/base.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/category.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/datetimes.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/multi.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexes/numeric.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/indexing.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/internal.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/common.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/frame.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/groupby.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/indexes.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/series.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/missing/window.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/ml.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/mlflow.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/namespace.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/numpy_compat.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/plot/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/plot/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/plot/core.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/plot/matplotlib.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/plot/plotly.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/series.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/spark/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/spark/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/spark/accessors.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/spark/functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/spark/utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/sql_processor.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/strings.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/data_type_ops/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/data_type_ops/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_base.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_binary_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_boolean_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_categorical_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_complex_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_date_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_datetime_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_null_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_num_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_string_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/test_udt_ops.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/data_type_ops/testing_utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/indexes/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/indexes/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/indexes/test_base.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/indexes/test_category.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/indexes/test_datetime.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/plot/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/plot/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/plot/test_frame_plot.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/plot/test_frame_plot_matplotlib.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/plot/test_frame_plot_plotly.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/plot/test_series_plot.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/plot/test_series_plot_matplotlib.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/plot/test_series_plot_plotly.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_categorical.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_config.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_csv.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_dataframe.py
```

```
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/test_dataframe_conversion.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_dataframe_spark_io.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_default_index.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_expanding.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_extension.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_frame_spark.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_groupby.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_indexing.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_indexops_spark.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_internal.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_namespace.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_numpy_compat.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_ops_on_diff_frames.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/test_ops_on_diff_frames_groupby.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_ops_on_diff_frames_gr
oupby_expanding.py
spark-3.2.3-bin-
hadoop3.2/python/pyspark/pandas/tests/test_ops_on_diff_frames_groupby_rolling.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_repr.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_reshape.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_rolling.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_series.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_series_conversion.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_series_datetime.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_series_string.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_spark_functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_sql.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_stats.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_typedef.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/tests/test_window.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/typedef/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/typedef/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/typedef/string_typehints.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/typedef/typehints.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/usage_logging/
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/usage_logging/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/usage_logging/usage_logger.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/pandas/window.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/profiler.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/profiler.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/py.typed
spark-3.2.3-bin-hadoop3.2/python/pyspark/python/
spark-3.2.3-bin-hadoop3.2/python/pyspark/python/pyspark/
spark-3.2.3-bin-hadoop3.2/python/pyspark/python/pyspark/shell.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/rdd.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/rdd.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/rddsampler.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/information.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/information.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/profile.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/profile.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/requests.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/requests.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resource/tests/test_resources.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resultiterable.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/resultiterable.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/serializers.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/shell.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/shuffle.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/_typing.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/avro/
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/avro/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/avro/functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/avro/functions.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/catalog.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/catalog.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/column.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/column.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/conf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/conf.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/context.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/context.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/dataframe.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/dataframe.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/functions.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/group.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/group.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/_typing/
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/_typing/__init__.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/_typing/protocols/
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/_typing/protocols/__init__.pyi
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/_typing/protocols/frame.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/_typing/protocols/series.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/conversion.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/conversion.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/functions.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/group_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/group_ops.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/map_ops.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/map_ops.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/serializers.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/typehints.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/types.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/pandas/utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/readwriter.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/readwriter.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/session.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/session.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/streaming.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/streaming.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_arrow.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_catalog.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_column.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_conf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_context.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_dataframe.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_datasources.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_functions.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_group.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_cogrouped_map.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_grouped_map.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_map.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_udf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_udf_grouped_agg.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_udf_scalar.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_udf_typehints.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_pandas_udf_window.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_readwriter.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_serde.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_session.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_streaming.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_types.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_udf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/tests/test_utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/types.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/types.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/udf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/udf.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/window.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/sql/window.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/statcounter.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/statcounter.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/status.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/status.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/storagelevel.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/storagelevel.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/context.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/context.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/dstream.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/dstream.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/kinesis.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/kinesis.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/listener.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/listener.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/tests/test_context.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/tests/test_dstream.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/tests/test_kinesis.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/tests/test_listener.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/streaming/util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/taskcontext.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/taskcontext.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/mllibutils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/mlutils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/pandasutils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/sqlutils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/streamingutils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/testing/utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/__init__.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_appsubmit.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_broadcast.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_conf.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_context.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_daemon.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_install_spark.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_join.py
```

```
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_pin_thread.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_profiler.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_rdd.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_rddbarrier.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_readwrite.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_serializers.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_shuffle.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_taskcontext.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/tests/test_worker.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/traceback_utils.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/util.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/util.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/version.py
spark-3.2.3-bin-hadoop3.2/python/pyspark/version.pyi
spark-3.2.3-bin-hadoop3.2/python/pyspark/worker.py
spark-3.2.3-bin-hadoop3.2/python/pyspark.egg-info/
spark-3.2.3-bin-hadoop3.2/python/pyspark.egg-info/PKG-INFO
spark-3.2.3-bin-hadoop3.2/python/pyspark.egg-info/SOURCES.txt
spark-3.2.3-bin-hadoop3.2/python/pyspark.egg-info/dependency_links.txt
spark-3.2.3-bin-hadoop3.2/python/pyspark.egg-info/requires.txt
spark-3.2.3-bin-hadoop3.2/python/pyspark.egg-info/top_level.txt
spark-3.2.3-bin-hadoop3.2/python/run-tests
spark-3.2.3-bin-hadoop3.2/python/run-tests-with-coverage
spark-3.2.3-bin-hadoop3.2/python/run-tests.py
spark-3.2.3-bin-hadoop3.2/python/setup.cfg
spark-3.2.3-bin-hadoop3.2/python/setup.py
spark-3.2.3-bin-hadoop3.2/python/test_coverage/
spark-3.2.3-bin-hadoop3.2/python/test_coverage/conf/
spark-3.2.3-bin-hadoop3.2/python/test_coverage/conf/spark-defaults.conf
spark-3.2.3-bin-hadoop3.2/python/test_coverage/coverage_daemon.py
spark-3.2.3-bin-hadoop3.2/python/test_coverage/sitecustomize.py
spark-3.2.3-bin-hadoop3.2/python/test_support/
spark-3.2.3-bin-hadoop3.2/python/test_support/SimpleHTTPServer.py
spark-3.2.3-bin-hadoop3.2/python/test_support/hello/
spark-3.2.3-bin-hadoop3.2/python/test_support/hello/hello.txt
spark-3.2.3-bin-hadoop3.2/python/test_support/hello/sub_hello/
spark-3.2.3-bin-hadoop3.2/python/test_support/hello/sub_hello/sub_hello.txt
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/ages.csv
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/ages_newlines.csv
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/_SUCCESS
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=0/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=0/c=0/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=0/c=0/.part-
r-00000-829af031-b970-49d6-ad39-30460a0be2c8.orc.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=0/c=0/part-r
```

```
-00000-829af031-b970-49d6-ad39-30460a0be2c8.orc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=1/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=1/c=1/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=1/c=1/.part-
r-00000-829af031-b970-49d6-ad39-30460a0be2c8.orc.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/orc_partitioned/b=1/c=1/part-r
-00000-829af031-b970-49d6-ad39-30460a0be2c8.orc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/_SUCCESS
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/_common_metadata
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/_metadata
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2014/
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2014/month=9/
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2014/month=9/day=1/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2014/
month=9/day=1/.part-r-00008.gz.parquet.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2014/
month=9/day=1/part-r-00008.gz.parquet
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/month=10/
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/month=10/day=25/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=10/day=25/.part-r-00002.gz.parquet.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=10/day=25/.part-r-00004.gz.parquet.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=10/day=25/part-r-00002.gz.parquet
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=10/day=25/part-r-00004.gz.parquet
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/month=10/day=26/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=10/day=26/.part-r-00005.gz.parquet.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=10/day=26/part-r-00005.gz.parquet
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/month=9/
spark-3.2.3-bin-
hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/month=9/day=1/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=9/day=1/.part-r-00007.gz.parquet.crc
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/parquet_partitioned/year=2015/
month=9/day=1/part-r-00007.gz.parquet
```

```
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/people.json
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/people1.json
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/people_array.json
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/people_array_utf16le.json
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/streaming/
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/streaming/text-test.txt
spark-3.2.3-bin-hadoop3.2/python/test_support/sql/text-test.txt
spark-3.2.3-bin-hadoop3.2/python/test_support/userlib-0.1.zip
spark-3.2.3-bin-hadoop3.2/python/test_support/userlibrary.py
spark-3.2.3-bin-hadoop3.2/sbin/
spark-3.2.3-bin-hadoop3.2/sbin/decommission-slave.sh
spark-3.2.3-bin-hadoop3.2/sbin/decommission-worker.sh
spark-3.2.3-bin-hadoop3.2/sbin/slaves.sh
spark-3.2.3-bin-hadoop3.2/sbin/spark-config.sh
spark-3.2.3-bin-hadoop3.2/sbin/spark-daemon.sh
spark-3.2.3-bin-hadoop3.2/sbin/spark-daemons.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-all.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-history-server.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-master.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-mesos-dispatcher.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-mesos-shuffle-service.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-slave.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-slaves.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-thriftserver.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-worker.sh
spark-3.2.3-bin-hadoop3.2/sbin/start-workers.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-all.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-history-server.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-master.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-mesos-dispatcher.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-mesos-shuffle-service.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-slave.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-slaves.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-thriftserver.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-worker.sh
spark-3.2.3-bin-hadoop3.2/sbin/stop-workers.sh
spark-3.2.3-bin-hadoop3.2/sbin/workers.sh
spark-3.2.3-bin-hadoop3.2/yarn/
spark-3.2.3-bin-hadoop3.2/yarn/spark-3.2.3-yarn-shuffle.jar
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-
wheels/public/simple/
Collecting pyspark
  Downloading pyspark-3.3.2.tar.gz (281.4 MB)
                            281.4/281.4

MB 5.5 MB/s eta 0:00:00
  Preparing metadata (setup.py) … done
Collecting py4j==0.10.9.5
```

```
Downloading py4j-0.10.9.5-py2.py3-none-any.whl (199 kB)
                              199.7/199.7 KB
22.3 MB/s eta 0:00:00
Building wheels for collected packages: pyspark
  Building wheel for pyspark (setup.py) … done
  Created wheel for pyspark: filename=pyspark-3.3.2-py2.py3-none-any.whl
size=281824028
sha256=dc9a7510bad5583b17d8afd8d90425fd279de8f7ab38389ffed76bc44f3b877c
  Stored in directory: /root/.cache/pip/wheels/6c/e3/9b/0525ce8a69478916513509d4
3693511463c6468db0de237c86
Successfully built pyspark
Installing collected packages: py4j, pyspark
  Attempting uninstall: py4j
    Found existing installation: py4j 0.10.9.7
    Uninstalling py4j-0.10.9.7:
      Successfully uninstalled py4j-0.10.9.7
Successfully installed py4j-0.10.9.5 pyspark-3.3.2
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-
wheels/public/simple/
Requirement already satisfied: pyarrow in /usr/local/lib/python3.9/dist-packages
(9.0.0)
Requirement already satisfied: numpy>=1.16.6 in /usr/local/lib/python3.9/dist-
packages (from pyarrow) (1.22.4)
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-
wheels/public/simple/
Collecting tf-estimator-nightly==2.8.0.dev2021122109
  Downloading tf_estimator_nightly-2.8.0.dev2021122109-py2.py3-none-any.whl (462
kB)
                              462.5/462.5 KB
14.9 MB/s eta 0:00:00
Installing collected packages: tf-estimator-nightly
Successfully installed tf-estimator-nightly-2.8.0.dev2021122109
```

```python
[3]: import os
     os.environ["JAVA_HOME"] = "/usr/lib/jvm/java-11-openjdk-amd64"
     #os.environ["SPARK_HOME"] = "/content/spark-3.2.3"
```

```python
[4]: from pyspark.sql.functions import col, pandas_udf, regexp_extract
     import io

     from tensorflow.keras.applications.imagenet_utils import decode_predictions
     import pandas as pd
     from pyspark.sql.functions import col, pandas_udf, PandasUDFType

     import torch
     from torch.utils.data import Dataset, DataLoader
     from torchvision import models, transforms
```

```python
from PIL import Image

from __future__ import absolute_import, division, print_function,␣
 ↪unicode_literals
import tensorflow as tf
import pathlib
import findspark

from pyspark.sql import SparkSession
import matplotlib.pyplot as plt


findspark.init()
spark = SparkSession.builder.master("local[*]").getOrCreate()  #starting the␣
 ↪spark session
```

Download the Public Dataset - CIFAR10

```python
[5]: data_dir = tf.keras.utils.get_file(origin='https://mmlspark.azureedge.net/
     ↪datasets/CIFAR10/train.zip',extract = True)

     print(data_dir)
```

```
Downloading data from https://mmlspark.azureedge.net/datasets/CIFAR10/train.zip
127708997/127708997 [==============================] - 6s 0us/step
/root/.keras/datasets/train.zip
```

Recursively Read all the Images from the Parent directory and create a DataFrame

```python
[6]: images = spark.read.format("binaryFile").option("recursiveFileLookup", "true").
     ↪option("pathGlobFilter", "*.png").load(data_dir[:-4])
     print(type(images))
```

```
<class 'pyspark.sql.dataframe.DataFrame'>
```

```python
[7]: images.select("path").show(5)
```

```
+--------------------+
|                path|
+--------------------+
|file:/root/.keras…|
|file:/root/.keras…|
|file:/root/.keras…|
|file:/root/.keras…|
|file:/root/.keras…|
+--------------------+
only showing top 5 rows
```

```
[8]: files=images.select('path').rdd.map(lambda x :x.path ).collect()
     files[0:10]
```

```
[8]: ['file:/root/.keras/datasets/train/29920-02.png',
      'file:/root/.keras/datasets/train/18370-06.png',
      'file:/root/.keras/datasets/train/39576-04.png',
      'file:/root/.keras/datasets/train/02898-06.png',
      'file:/root/.keras/datasets/train/20310-06.png',
      'file:/root/.keras/datasets/train/29550-06.png',
      'file:/root/.keras/datasets/train/06510-06.png',
      'file:/root/.keras/datasets/train/34823-06.png',
      'file:/root/.keras/datasets/train/44783-02.png',
      'file:/root/.keras/datasets/train/07348-06.png']
```

```
[9]: from pyspark.sql.types import IntegerType
     from pyspark.sql.functions import when
     def extract_label(path_col):
       """Extract label from file path using built-in SQL functions."""
       return regexp_extract(path_col, r'(\d{2})\.png$', 1)

     def extract_size(content):
       """Extract image size from its raw content."""
       image = Image.open(io.BytesIO(content))
       return image.size

     @pandas_udf("width: int, height: int")
     def extract_size_udf(content_series):
       sizes = content_series.apply(extract_size)
       return pd.DataFrame(list(sizes))

     df = images.select(
       col("path"),
       col("modificationTime"),
       extract_label(col("path")).alias("label"),
       extract_size_udf(col("content")).alias("size"),
       col("content"))

     df  = df.withColumn("label",                                  #airplanes,␣
      ↪cars, birds, cats, deer, dogs, frogs, horses, ships, and trucks
                         when(col("label")=="00","airplanes" )
                         .when(col("label")=="01", "cars")
                         .when(col("label")=="02", "birds")
                         .when(col("label")=="03", "cats")
                         .when(col("label")=="04", "deer")
                         .when(col("label")=="05", "dogs")
                         .when(col("label")=="06", "frogs")
                         .when(col("label")=="07", "horses")
```

```
                            .when(col("label")=="09", "ships")
                            .otherwise("trucks"))
df.show(5)
```

```
+------------------+------------------+-----+-------+------------------+
|              path|  modificationTime|label|   size|           content|
+------------------+------------------+-----+-------+------------------+
|file:/root/.keras…|2023-04-09 15:20:…|birds|{40, 40}|[89 50 4E 47 0D 0…|
|file:/root/.keras…|2023-04-09 15:20:…|frogs|{40, 40}|[89 50 4E 47 0D 0…|
|file:/root/.keras…|2023-04-09 15:20:…| deer|{40, 40}|[89 50 4E 47 0D 0…|
|file:/root/.keras…|2023-04-09 15:20:…|frogs|{40, 40}|[89 50 4E 47 0D 0…|
|file:/root/.keras…|2023-04-09 15:20:…|frogs|{40, 40}|[89 50 4E 47 0D 0…|
+------------------+------------------+-----+-------+------------------+
only showing top 5 rows
```

```python
[ ]: ima=images.select('content').rdd.map(lambda x: x.content).collect()
     ima[0]
```

```python
[32]: import matplotlib.pyplot as plt
      import numpy as np
      imgg = Image.open(io.BytesIO(ima[1]))
      plt.axis("off")
      plt.imshow(np.array(imgg))
```

```
[32]: <matplotlib.image.AxesImage at 0x7fd5af66aca0>
```

```
[33]: print(np.array(imgg).shape)
```

(40, 40, 3)

Each image is 40x40 pixels with 3 input channels "R","G","B". All the models that are pretrained on the imagenet dataset have input shapes of (224x224x3). Thus, we need to perform standard ImageNet preprocessing on the CIFAR10 dataset

```
[13]: class ImageNetDataset(Dataset):
        """
        Converts image contents into a PyTorch Dataset with standard ImageNet␣
        ↪preprocessing.
        """
        def __init__(self, contents):
          self.contents = contents


        def __len__(self):

          return len(self.contents)


        def __getitem__(self, index):
          return self._preprocess(self.contents[index])


        def _preprocess(self, content):
          """
          Preprocesses the input image content using standard ImageNet normalization.

          See https://pytorch.org/docs/stable/torchvision/models.html.
          """
          image = Image.open(io.BytesIO(content))
          transform = transforms.Compose([
            transforms.Resize(256),                           ### Smaller lenght is␣
        ↪convertd to 256
            transforms.CenterCrop(224),
            transforms.ToTensor(),
            transforms.Normalize(mean=[0.485, 0.456, 0.406], std=[0.229, 0.224, 0.
        ↪225]),
          ])
          return transform(image)
```

```
[14]: def imagenet_model_udf(model_fn):
        """

        Wraps an ImageNet model into a Pandas UDF that makes predictions.

        You might consider the following customizations for your own use case:
```

```python
        - Tune DataLoader's batch_size and num_workers for better performance.
        - Use GPU for acceleration.
        - Change prediction types.
    """

    def predict(content_series_iter : pd.Series) -> pd.DataFrame:
        model = model_fn() # Once per Map
        model.eval()       # Once Per Map ,model file read from memory
        for content_series in content_series_iter:                              ␣
↪                    #Iterates overall all Images
            dataset = ImageNetDataset(list(content_series))
            loader = DataLoader(dataset, batch_size=64)
            with torch.no_grad():
                for image_batch in loader:
                    predictions = model(image_batch).numpy()                     ␣
↪                    # Predictions for all 1000 classes of Mobilenetv2 Training␣
↪Dataset
                    predicted_labels = [x[0] for x in decode_predictions(predictions,␣
↪top=1)]
                    yield pd.DataFrame(predicted_labels)


    return_type = "class: string, desc: string, score:float"
    return pandas_udf(predict,return_type, PandasUDFType.SCALAR_ITER)
    #Returns a Predict function object as the final user defined function object.
    #Iterates over an Image: A sequence of bytes represented as a 2D array.
    #Scalar is a series of bytes.
```

Predictions: Mobile net

```python
[15]: # imagenet = imagenet_model_udf(lambda: models.mobilenet_v2(pretrained=True))
      mobilenetv2 = imagenet_model_udf(lambda: models.mobilenet_v2(pretrained = True))
      mobilenetv2
```

/usr/local/lib/python3.9/dist-packages/pyspark/sql/pandas/functions.py:394:
UserWarning: In Python 3.6+ and Spark 3.0+, it is preferred to specify type
hints for pandas UDF instead of specifying pandas UDF type which will be
deprecated in the future releases. See SPARK-28264 for more details.
  warnings.warn(

```python
[15]: <function __main__.imagenet_model_udf.<locals>.predict(content_series_iter:
      pandas.core.series.Series) -> pandas.core.frame.DataFrame>
```

```python
[16]: predictions = df.withColumn("prediction", mobilenetv2(col("content")))
      display(predictions.select(col("path"), col("prediction")).limit(5))
```

DataFrame[path: string, prediction: struct<class:string,desc:string,score:float>]

```
[17]: mobile_net_predictions = predictions.select(col("label"),col("prediction.desc").
      ↪alias("MobileNet prediction"),col("prediction.score").alias("MobileNet␣
      ↪Score") )
      mobile_net_predictions.show(20,truncate = False)
```

```
+-----+------------------+--------------+
|label|MobileNet prediction|MobileNet Score|
+-----+------------------+--------------+
|birds|comic_book        |9.823734      |
|frogs|frilled_lizard    |11.226815     |
|deer |orangutan         |8.612705      |
|frogs|revolver          |9.759069      |
|frogs|waffle_iron       |9.964415      |
|frogs|book_jacket       |10.09747      |
|frogs|muzzle            |11.94763      |
|frogs|three-toed_sloth  |13.096301     |
|birds|patas             |10.979576     |
|frogs|bolo_tie          |10.29219      |
|frogs|cheetah           |9.640568      |
|frogs|muzzle            |10.303909     |
|frogs|fox_squirrel      |8.597261      |
|frogs|leopard           |11.523518     |
|birds|safety_pin        |10.109551     |
|deer |limpkin           |10.380197     |
|frogs|cheetah           |9.61996       |
|deer |fox_squirrel      |12.25812      |
|cats |English_foxhound  |10.38315      |
|frogs|cheetah           |12.006193     |
+-----+------------------+--------------+
only showing top 20 rows
```

Predictions: Resnet50

```
[18]: import torch
      from torchvision.models import resnet50,ResNet50_Weights, vgg16,VGG16_Weights
      Resnet50 = imagenet_model_udf(lambda: resnet50(weights=ResNet50_Weights.
      ↪DEFAULT))
      Resnet50
```

```
[18]: <function __main__.imagenet_model_udf.<locals>.predict(content_series_iter:
      pandas.core.series.Series) -> pandas.core.frame.DataFrame>
```

```
[19]: predictions = df.withColumn("prediction", Resnet50(col("content")))
      display(predictions.select(col("path"), col("prediction")).limit(5))
```

```
DataFrame[path: string, prediction: struct<class:string,desc:string,score:float>]
```

```
[20]: resnet50_predictions = predictions.select(col("label"),col("prediction.desc").
      ↪alias("ResNet50 prediction"),col("prediction.score").alias("ResNet50 Score")⎵
      ↪)
      resnet50_predictions.show(20,truncate = False)
```

```
+-----+--------------------------+-------------+
|label|ResNet50 prediction       |ResNet50 Score|
+-----+--------------------------+-------------+
|birds|brambling                 |6.5817957    |
|frogs|tailed_frog               |5.7556643    |
|deer |tusker                    |5.8913913    |
|frogs|muzzle                    |5.5295134    |
|frogs|cheetah                   |7.1604624    |
|frogs|screen                    |5.916838     |
|frogs|shoji                     |4.5856814    |
|frogs|tailed_frog               |6.1878433    |
|birds|patas                     |5.433097     |
|frogs|sidewinder                |5.265415     |
|frogs|sidewinder                |5.7072563    |
|frogs|book_jacket               |5.4684696    |
|frogs|tailed_frog               |6.578742     |
|frogs|milk_can                  |5.7039857    |
|birds|howler_monkey             |5.801503     |
|deer |limpkin                   |4.8295956    |
|frogs|limpkin                   |7.5168877    |
|deer |screen                    |5.94618      |
|cats |book_jacket               |5.341413     |
|frogs|German_short-haired_pointer|6.310394    |
+-----+--------------------------+-------------+
only showing top 20 rows
```

Predictions: GoogleNet

```
[21]: GoogleNet = imagenet_model_udf(lambda: torch.hub.load('pytorch/vision:v0.10.0',⎵
      ↪'googlenet', pretrained=True))
      GoogleNet
```

```
[21]: <function __main__.imagenet_model_udf.<locals>.predict(content_series_iter:
      pandas.core.series.Series) -> pandas.core.frame.DataFrame>
```

```
[22]: predictions = df.withColumn("prediction", GoogleNet(col("content")))
      display(predictions.select(col("path"), col("prediction")).limit(5))
```

```
DataFrame[path: string, prediction: struct<class:string,desc:string,score:float>]
```

```
[23]:
```

```
googlenet_predictions = predictions.select(col("label"),col("prediction.desc").
 ↪alias("GoogleNet prediction"),col("prediction.score").alias("GoogleNet␣
 ↪Score"))
googlenet_predictions.show(20,truncate = False)
```

```
+-----+------------------+--------------+
|label|GoogleNet prediction|GoogleNet Score|
+-----+------------------+--------------+
|birds|brambling         |8.454064      |
|frogs|book_jacket       |6.4626827     |
|deer |book_jacket       |6.2683506     |
|frogs|book_jacket       |6.6099167     |
|frogs|cheetah           |7.160299      |
|frogs|screen            |7.0333133     |
|frogs|safety_pin        |6.7185173     |
|frogs|screen            |5.701735      |
|birds|patas             |9.558256      |
|frogs|bolo_tie          |6.728154      |
|frogs|book_jacket       |6.834465      |
|frogs|screen            |6.812574      |
|frogs|fox_squirrel      |6.750074      |
|frogs|screen            |6.3442874     |
|birds|screen            |7.789497      |
|deer |book_jacket       |6.203725      |
|frogs|book_jacket       |6.9980235     |
|deer |sorrel            |8.453428      |
|cats |screen            |7.7593718     |
|frogs|book_jacket       |7.0712056     |
+-----+------------------+--------------+
only showing top 20 rows
```

[24]:
```
VGG16 = imagenet_model_udf(lambda: vgg16(weights=VGG16_Weights.DEFAULT))
VGG16
```

[24]: <function __main__.imagenet_model_udf.<locals>.predict(content_series_iter:
pandas.core.series.Series) -> pandas.core.frame.DataFrame>

[25]:
```
predictions = df.withColumn("prediction", VGG16(col("content")))
display(predictions.select(col("path"), col("prediction")).limit(5))
```

DataFrame[path: string, prediction: struct<class:string,desc:string,score:float>]

[26]:
```
VGG16_predictions = predictions.select(col("label"),col("prediction.desc").
 ↪alias("VGG16 prediction"),col("prediction.score").alias("VGG16 Score"))
VGG16_predictions.show(20, truncate = False)
```

```
+-----+--------------------------+-----------+
```

```
|label|VGG16 prediction          |VGG16 Score|
+-----+--------------------------+-----------+
|birds|screen                    |8.6330185  |
|frogs|frilled_lizard            |11.306978  |
|deer |bulletproof_vest          |7.5320554  |
|frogs|comic_book                |9.264689   |
|frogs|cheetah                   |10.472668  |
|frogs|book_jacket               |8.955809   |
|frogs|safety_pin                |8.636215   |
|frogs|three-toed_sloth          |9.986124   |
|birds|fox_squirrel              |11.699705  |
|frogs|rock_python               |8.877836   |
|frogs|hen-of-the-woods          |7.9704266  |
|frogs|book_jacket               |7.852457   |
|frogs|fox_squirrel              |13.552772  |
|frogs|plate_rack                |10.658487  |
|birds|fox_squirrel              |6.7122188  |
|deer |barn_spider               |9.036906   |
|frogs|cheetah                   |6.843171   |
|deer |fox_squirrel              |8.38976    |
|cats |Windsor_tie               |8.3282795  |
|frogs|German_short-haired_pointer|7.845697   |
+-----+--------------------------+-----------+
only showing top 20 rows
```

Conclusion:

1. From the above predictions reported, ResNet 50 is performing better compared all other models like GoogleNet, MobileNet and VGG16.

2. The reason being, it has predicted

a. brambling(a bird) - for the class "bird"

b. tailed frog - for the class "frogs"

c. tusker - for the class "deer" (may it is drawing correlation between the tusks of the two classes)

3. These predictions are better compared to predictions of other models which are completely different like screen for birds(VGG16), book_jacket for frogs(GoogleNet)….

4. Thus, we can conclude that ResNet50 is working better on CIFAR10 dataset compared to other pretrained models which are trained on ImageNet dataset.