LAB - 8

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Subject	Big Data Analytics

Aim: Leveraging machine learning using Mahout like tools.

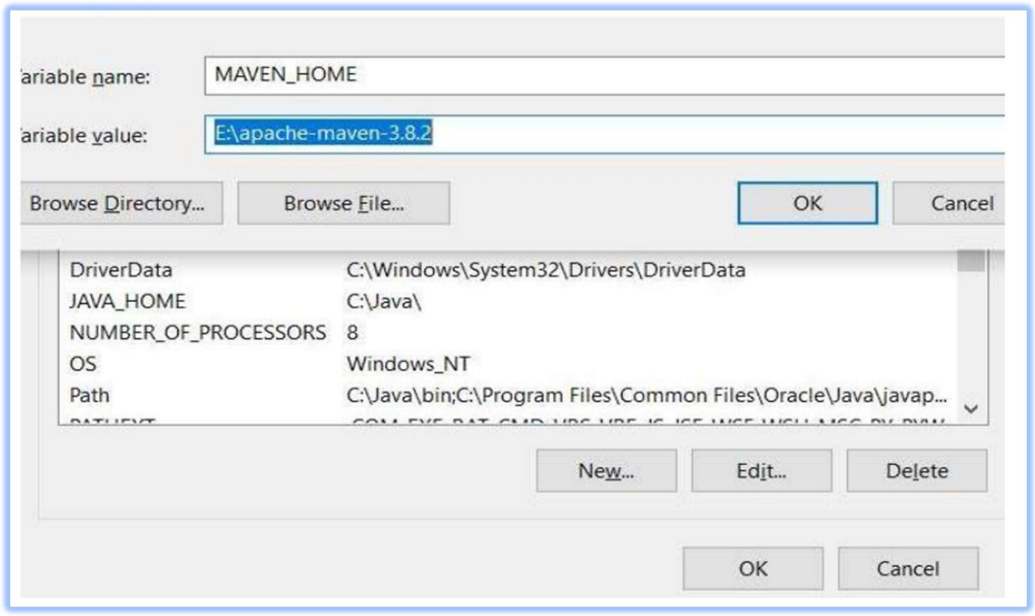
❖ Installing Mahout:

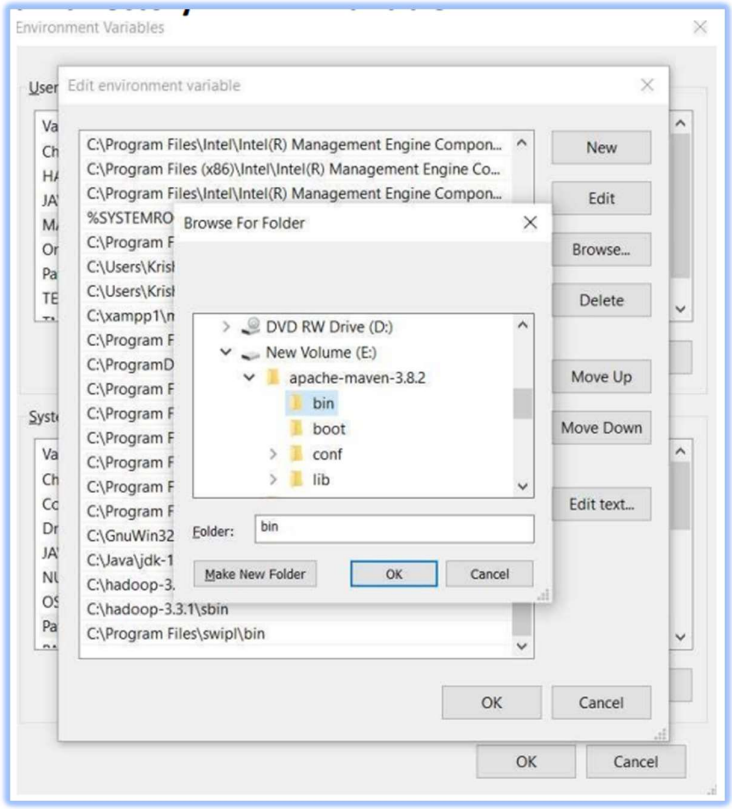
- ✓ Cloning the git repository of the Mahout.

```
C:\Users\Admin>git clone https://github.com/apache/mahout.git mahout
```

❖ Installing Maven:

- ✓ We need to download the maven.
- ✓ Then, we need to add environment variables such as MAVEN_HOME and M2_HOME.
- ✓ Finally, by adding path of the bin directory we are ready to use it.


ariable name:
MAVEN_HOME
ariable value:
E:\apache-maven-3.8.2
Browse Directory...
Browse File...
OK
Cancel
DriverData
C:\Windows\System32\Drivers\DriverData
JAVA_HOME
C:\Java\
NUMBER_OF_PROCESSORS
8
OS
Windows_NT
Path
C:\Java\bin;C:\Program Files\Common Files\Oracle\Java\javap...
New...
Edit...
Delete
OK
Cancel


Environment Variables
Edit environment variable
C:\Program Files\Intel\Intel(R) Management Engine Compon...
C:\Program Files (x86)\Intel\Intel(R) Management Engine Co...
C:\Program Files\Intel\Intel(R) Management Engine Compon...
%SYSTEMRO
C:\Program F
C:\Users\Krish
C:\Users\Krish
C:\xampp1\n
C:\Program F
C:\ProgramD
C:\Program F
C:\Program F
C:\Program F
C:\Program F
C:\Program F
C:\GnuWin32
C:\Java\jdk-1
C:\hadoop-3.
C:\hadoop-3.3.1\sbin
C:\Program Files\swipl\bin
New
Edit
Browse...
Delete
Move Up
Move Down
Edit text...
OK
Cancel
Browse For Folder
DVD RW Drive (D:)
New Volume (E:)
apache-maven-3.8.2
bin
boot
conf
lib
Folder:
bin
Make New Folder
OK
Cancel
OK
Cancel

❖ **Java program to run the recommendation on the dataset with the help of the mahout library.**

```
import java.io.File;
import java.util.List;
import org.apache.mahout.cf.taste.impl.model.file.FileDataModel;
import org.apache.mahout.cf.taste.impl.neighborhood.ThresholdUserNeighborhood;
import org.apache.mahout.cf.taste.impl.recommender.GenericUserBasedRecommender;
import org.apache.mahout.cf.taste.impl.similarity.PearsonCorrelationSimilarity;
import org.apache.mahout.cf.taste.model.DataModel;
import org.apache.mahout.cf.taste.neighborhood.UserNeighborhood;
import org.apache.mahout.cf.taste.recommender.RecommendedItem;
import org.apache.mahout.cf.taste.recommender.UserBasedRecommender;
import org.apache.mahout.cf.taste.similarity.UserSimilarity;


public class Recommender
{

    public static void main(String args[]){
        try
        {
            //Creating data model
            DataModel datamodel = new FileDataModel(new File("data")); //data

            //Creating UserSimilarity object.
            UserSimilarity usersimilarity = new
PearsonCorrelationSimilarity(datamodel);

            //Creating UserNeighbourHHood object.
            UserNeighborhood userneighborhood = new ThresholdUserNeighborhood(1.0,
usersimilarity, datamodel);
            System.out.println("User Neighborhood information");

            //Create UserRecomender
            UserBasedRecommender recommender = new
GenericUserBasedRecommender(datamodel, userneighborhood, usersimilarity);

            int i = 2;
            for(int i = 1; i <= 5; i++)
            {
                List<RecommendedItem> recommendations = recommender.recommend(i,
3);
                System.out.println("User ID #"+i);
                for (RecommendedItem recommendation : recommendations)
                {
                    System.out.println(recommendation);
                }
```

```
            }
        }
        catch(Exception e)
        {
            System.out.println(e.getMessage());
        }
    }
}
```

❖ Pom.xml file for dependencies:

```
<project
    xmlns=http://maven.apache.org/POM/4.0.0
xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>Mavens</groupId>
    <artifactId>demo-mahout</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <name>demo-mahout</name>
    <description>Demo project for Mahout Maven Build Demonstration</description>
    <properties>
        <java.version>1.8</java.version>
    </properties>
    <build>
        <sourceDirectory>src</sourceDirectory>
        <outputDirectory>build/classes</outputDirectory>
        <plugins>
            <plugin>
                <version>3.1.0</version>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-jar-plugin</artifactId>zzzzzzzzzzzzzz
                <configuration>
                <archive>
                <manifest>
                <addClasspath>true</addClasspath>
                <!-- add you main class -->
                <mainClass>Recommender</mainClass>
                </manifest>
                <manifestFile>src/resources/META-INF/MANIFEST.MF</manifestFile>
                </archive>
                </configuration>
                </plugin>
            <plugin>
                <groupId>org.apache.maven.plugins</groupId>
```

```
                <artifactId>maven-dependency-plugin</artifactId>
                <executions>
                    <execution>
                        <id>copy</id>
                        <phase>install</phase>
                        <goals>
                            <goal>copy-dependencies</goal>
                        </goals>
                        <configuration>
                            <outputDirectory> ${project.build.directory}
                            </outputDirectory>
                        </configuration>
                    </execution>
                </executions>
            </plugin>
                <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-resources-plugin</artifactId>
                <configuration>
                    <encoding>UTF-8</encoding>
                </configuration>
                </plugin>
        </plugins>
    </build>
    <dependencies>
        <dependency>
            <groupId>org.apache.mahout</groupId>
            <artifactId>mahout-core</artifactId>
            <version>0.9</version>
        </dependency>
        <dependency>
            <groupId>org.apache.mahout</groupId>
            <artifactId>mahout-math</artifactId>
            <version>0.13.0</version>
        </dependency>
        <dependency>
            <groupId>org.apache.mahout</groupId>
            <artifactId>mahout-integration</artifactId>
            <version>0.13.0</version>
        </dependency>
    </dependencies>
</project>
```

❖ Mahout:

- ✓ Apache mahout is an open-source project that is mainly used for creating scalable machine learning algorithms.
- ✓ It provides different machine learning techniques like preprocessors, clustering, regression, recommenders, distributed linear algebra.
- ✓ It also provides the MapReduce but it is deprecated.
- ✓ Algorithms of mahout are written on top of the Hadoop, so it works well in distributed environment.
- ✓ One of the applications of Mahout is, Twitter uses Mahout for user interest modeling.

❖ Performing analytics using machine learning techniques:

- ✓ Machine learning is a data analytics technique that teaches computers to do what comes naturally to humans and animals, learn from experience.
- ✓ Machine Learning uses two techniques:

  - ➢ **Supervised learning:**
    - Here we train machine using data that is well labeled which means some data is already tagged with the correct result.
    - It learns with labeled data.
    - Types: Regression, classification, Decision Trees, etc.

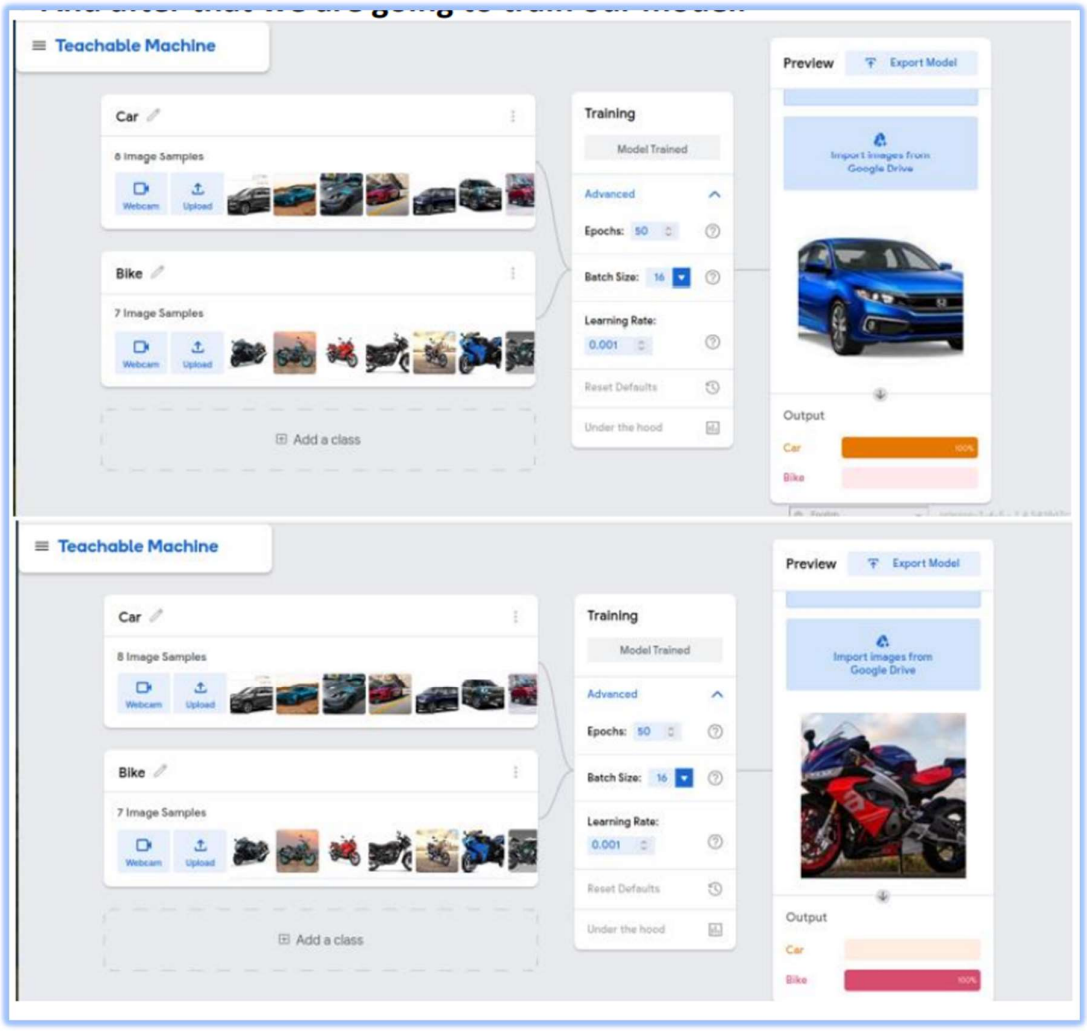
  - ➢ **Unsupervised learning:**
    - It is a training of machine using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance.
    - No training will be given to the machine.
    - Platform for performing analytics.

- ✓ We need to group our examples into classes that you want the computer to learn.
- ✓ Train your model.
- ✓ You can export your model for your projects.

Example:

Dataset-1: Cars

Dataset-2: Bikes

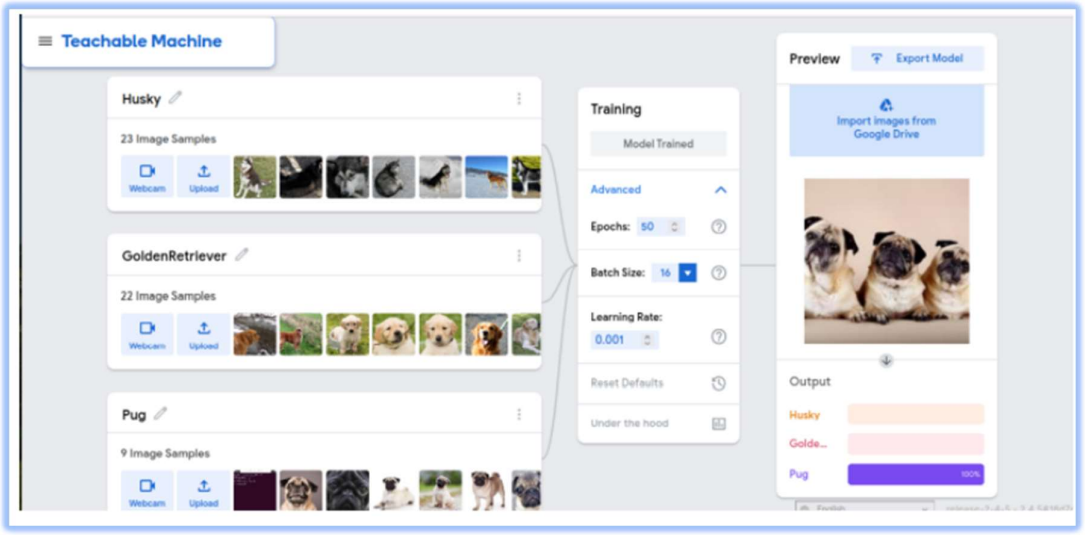


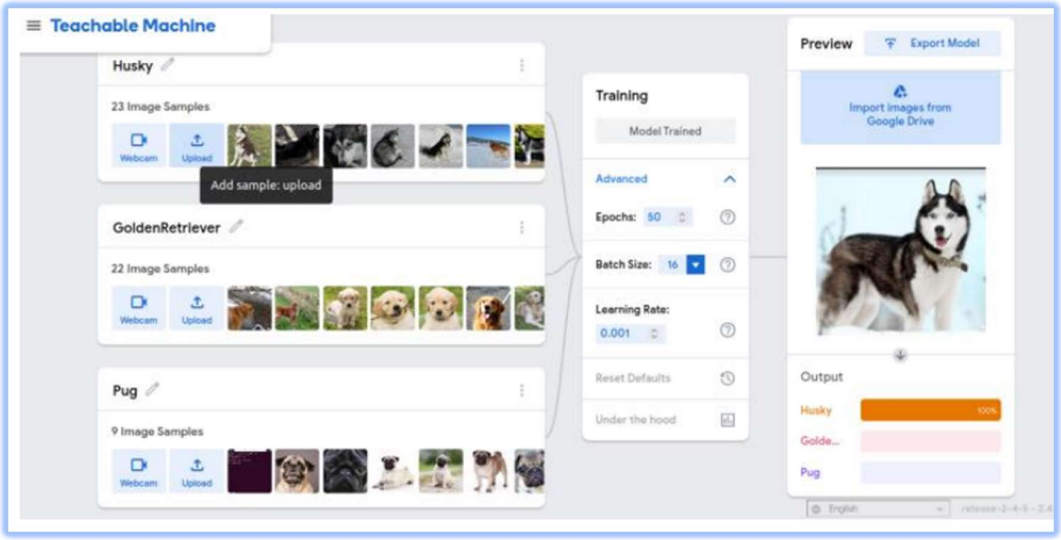
Example:

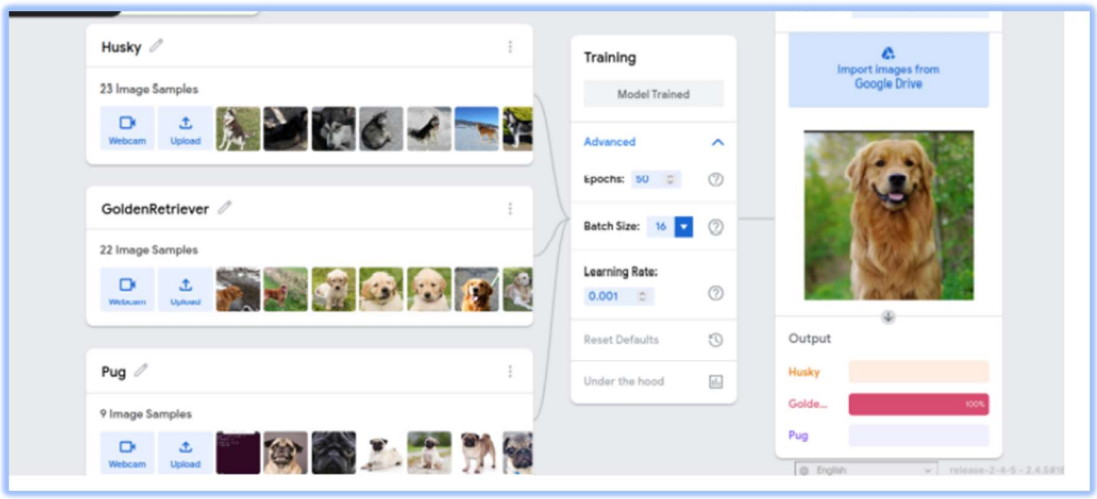
Dataset-1: Husky

Dataset-2: Golden Retriever

Dataset-3: Pug






Husky
23 Image Samples
Webcam
Upload
GoldenRetriever
22 Image Samples
Webcam
Upload
Pug
9 Image Samples
Webcam
Upload
Training
Model Trained
Advanced
Epochs: 50
Batch Size: 16
Learning Rate:
0.001
Reset Defaults
Under the hood
Import images from Google Drive
Output
Husky
Golde...
100%
Pug