**INSTRUCTIONS HOW TO RUN THE CODE**

**Download the Source Code**

1. Download the source code and README.docx files from the following link

<https://github.com/drmakhan1971/GrapeDiseasesDetection/archive/refs/heads/main.zip>

1. Extract (unzip) GrapeDiseasesDetection-main.zip. There are two files inside this zip file
   1. SourceCode.zip.

Unzip this file, it contains the required MATLAB files are there (extension .m)

* 1. README.docx

This file contains instructions, on how to run the code.

**Download the Dataset**

1. Download the dataset of grape images from the following link

<https://figshare.com/ndownloader/files/41593164>

1. Extract (unzip) GrapeImagesDataSet.zip. It will create a folder GrapeImagesDataSet
2. Inside the folder GrapeImagesDataSet there will be four subfolders:
   * 1-BlackMeasles
   * 2-BlackRot
   * 3-LeafBlight
   * 4-HealthyLeaves
3. Each of the above subfolders has grape images of four classes

**Setting MATLAB Path for source code**

* The path of the source code folder should be added in the MATLAB environment using the **Set Path** option in the MATLAB

**Defining root folder in the MATLAB script**

1. Open the file **mainGrape.m** (Don’t run it. First you have to set the path of the dataset folder in the mainGrape.m)
2. In the **mainGrape.m** set the value of a variable **datasetRootFolder**. This folder is the root folder of grape images. For example, if you have extracted the dataset in **C:\Work\GrapeImagesDataSet** then set the value of **datasetRootFolder** in the mainGrape.m as follows:
   * **datasetRootFolder = ' C:\Work\GrapeImagesDataSet \';**

**Running the Source Code**

1. Run the **mainGrape.m** in MATLAB. The program should run with the default settings
2. Results will be shown in the command window

**Tuning Parameters Values**

1. In the **mainGrape.m** set the value of a variable **P**, i.e., the percentage of training data. The value of P shall be between 0 and 1. For example, if P = 0.3 then 30% data is used for training and 70% for testing.
2. The variable **colorSpace** refers to the color space. Use only one of the following values for colorSpace
   * colorSpace = 'rgb';
   * colorSpace = 'ycbcr';
   * colorSpace = 'hsv';
   * colorSpace = 'lab';
   * *Note you can comment a line in the source code by writing the percentage symbol, i.e.,* ***%*** *at the beginning of the line. Then MATLAB will not run this line*
   * *Example:%This code line is a comment in MATLAB*
3. The variable ***K*** refers to the number of clusters used by the *K*-means clustering algorithm, i.e., the size of visual vocabulary size to quantize the number of image features. It is set to 500, i.e., *K* = 500. Optionally you may modify it.
4. It is recommended to run the simulation multiple times for any value of *P* to get stable results. Each time training and testing images are selected randomly for the given value of *P*. Consequently, the accuracy value will not be the same every time.