Chapter 9 - Lecture 1

ENGR1120 - 800 - Honors Programming for Engineers

April 14, 2020

Data Input from .csv Files

Lecture 1 - Data Input from .csv Files

- Data Files
- File IO
- File Input from .csv
- Example in MATLAB

What is a Data File?

What is a Data File ?

- Standard way of organizing data for computer **storage**
- The data can represent many different things but it is all stored digitally
- Different file types are used for different purposes
  -
  -
  - list of all...

Why use Data Files?

Why use Data Files ?

- Organize large amounts of information
- Share large amounts of information
-

What is File IO?

What is File IO?

-
-
-

File Input in a Program

File Input in a Program

- get data from a file during Program Execution
- data can be stored in a variable(s) to be used by your program

Comma Separated Values

The individual values in a file are often separated or *delimited* by a comma. Other characters are also used such as the space or *newline*.

A .txt file with values delimited by commas is called a comma separared value file or **.csv** file.

Traditionally the *end of file* was marked by a special character as well but modern data files are organized by file size and do not require an end of file character.

.mat and MATLAB

.mat files are compatible with MATLAB only

- save() - saves the workspace to a **.mat** file
- load() - loads a **.mat** file into workspace
- this is useful if you want to be stuck in MATLAB...
- a *universal* filetype is a good idea for data storage

Universal Filetypes

Standard file formats are compatible with many software systems.

Software	File Type
C++	.txt
MATLAB	.mat .dat
Python	.csv
MS Excel	.xlsx
ilearn	.pdf .docx
Solidworks	.sldprt .stl

Some don't play well with others.

MATLAB functions for file IO

There are different ways to get data from a file. We are going to **scan** the data one character at a time using these functions.

```
fopen()

fscanf()

fclose()
```

The fopen() Function

Open the file with the **fopen()** function

```
[FID]=fopen(FILENAME,PERMISSION)
```

- Input 1: FILENAME - the name of the file to open
- Input 2: PERMISSION - direction of access 'r' or 'w'
- Output 1: FID - the file identifier

The File Identifier

The **file identifier** (FID) gives important info

- If the file opens properly the FID will have a positive value
- The FID will have a negative value if there was an error
  - File is not in the proper directory
  - The current folder has not been set properly
  - Please organize you file structure!
- FID can also give information about the End Of File

The fscanf() Function

fscanf() can access the data only if the file is open

```
[A,COUNT]=fscanf(FID,FORMAT,SIZEA);
```

- Input 1: FID - the **file identifier** fid

  Input 2: FORMAT - format specification of the scan

  Input 3: SIZEA - number of values to be scanned
- Output 1: A - an array containing the scanned **data**

  Output 2: COUNT - the number of elements in **A**

The fclose() Function

Remember to close the file with **fclose()**

```
[ST]=fclose(FID)
```

- Input 1: FID - the **file identifier** fid
- Output 1: ST - status of close?

- Close the file after your program accesses the data
- THIS IS EASY TO FORGET BUT IMPORTANT!!!

A Simple Example

```
FID = fopen('input_data.csv','r');

A = fscanf(FID,'%f')

fclose(FID);
```

A More Complex Example

```
fid=fopen(’lab9_degrees.csv’,’r’);

i=1;
while ~feof(fid)
    data(i)=fscanf(fid,’%f,’,1);
    i=i+1;
end

fclose(fid);
```

References

- Your MATLAB textbook - Chapter 9 - Low Level File IO