4.5 Importing and Exporting Data

MATLAB is often used for analyzing data that was recorded in experiments or generated by other computer programs. This can be done by first importing the data into MATLAB. Similarly, data that is produced by MATLAB sometimes needs to be transferred to other computer applications. There are various types of data (numerical, text, audio, graphics, and images). This section describes only how to import and export numerical data, which is probably the most common type of data that needs to be transferred by new users of MATLAB. For other types of data transfer, look in the Help Window under File I/O.

Importing data can be done either by using commands or by using the Import Wizard. Commands are useful when the format of the data being imported is known. MATLAB has several commands that can be used for importing various types of data. Importing commands can also be included in a script file such that the data is imported when the script is executed. The Import Wizard is useful when the format of the data (or the command that is applicable for importing the data) is not known. The Import Wizard determines the format of the data and automatically imports it.

4.5.1 Commands for Importing and Exporting Data

This section describes—in detail—how to transfer data into and out of Excel spreadsheets. Microsoft Excel is commonly used for storing data, and Excel is compatible with many data recording devices and computer applications. Many people are also capable of importing and exporting various data formats into and from Excel. MATLAB also has commands for transferring data directly to and from formats such as csv and ASCII, as well as to the spreadsheet program Lotus 123. Details of these and many other commands can be found in the Help Window under File I/O

Importing and exporting data into and from Excel:

Importing data from Excel is done with the `xlsread` command. When the command is executed, the data from the spreadsheet is assigned as an array to a variable. The simplest form of the `xlsread` command is:

```
variable_name = xlsread('filename')
```

- `'filename'` (typed as a string) is the name of the Excel file. The directory of the Excel file must be either the current directory or listed in the search path.
- If the Excel file has more than one sheet, the data will be imported from the first sheet.

When an Excel file has several sheets, the `xlsread` command can be used to import data from a specified sheet. The form of the command is then:

```
variable_name = xlsread('filename','sheet_name')
```

- The name of the sheet is typed as a string.

Another option is to import only a portion of the data that is in the spreadsheet. This is done by typing an additional argument in the command:

```
variable_name = xlsread('filename','sheet_name','range')
```

- The `'range'` (typed as a string) is a rectangular region of the spreadsheet defined by the addresses (in Excel notation) of the cells at opposite corners of the region. For example, `'C2:E5'` is a 4×3 region of rows 2, 3, 4, and 5 and columns *C*, *D*, and *E*.

Exporting data from MATLAB to an Excel spreadsheet is done by using the `xlswrite` command. The simplest form of the command is:

```
xlswrite('filename',variable_name)
```

- `'filename'` (typed as a string) is the name of the Excel file to which the data is exported. The file must be in the current directory. If the file does not exist, a new Excel file with the specified name will be created.
- `variable_name` is the name of the variable in MATLAB with the assigned data that is being exported.
- The arguments `'sheet_name'` and `'range'` can be added to the `xlswrite` command to export to a specified sheet and to a specified range of cells, respectively.

As an example, the data from the Excel spreadsheet shown in Figure 4-7 is imported into MATLAB by using the `xlsread` command.

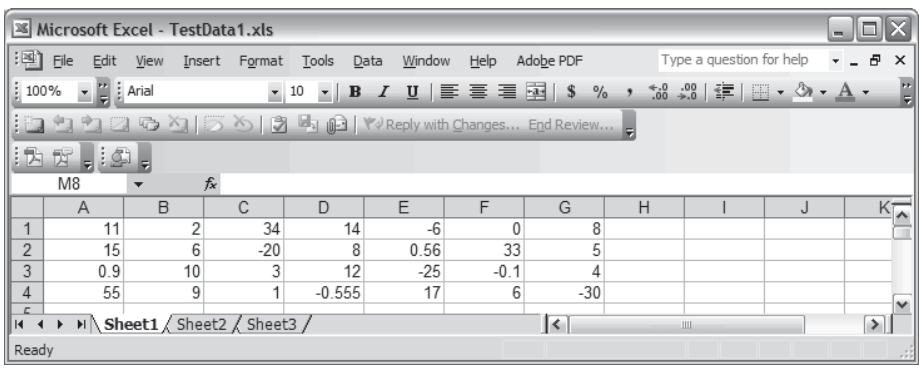

Figure 4-7: Excel spreadsheet with data.

The spreadsheet is saved in a file named TestData1 in a disk in drive A. After the Current Directory is changed to drive A, the data is imported into MATLAB by assigning it to the variable `DATA`:

```
>> DATA = xlsread('TestData1')
DATA =
 11.0000   2.0000  34.0000  14.0000  -6.0000        0   8.0000
 15.0000   6.0000 -20.0000   8.0000   0.5600  33.0000   5.0000
  0.9000  10.0000   3.0000  12.0000 -25.0000  -0.1000   4.0000
 55.0000   9.0000   1.0000  -0.5550  17.0000   6.0000 -30.0000
```

4.5.2 Using the Import Wizard

Using the Import Wizard is probably the easiest way to import data into MATLAB since the user does not have to know, or to specify, the format of the data. The Import Wizard is activated by selecting **Import Data** in the **File** menu of the Command Window. (It can also be started by typing the command `uiimport`.) The Import Wizard starts by displaying a file selection box that shows all the data files recognized by the Wizard. The user then selects the file that contains the data to be imported, and clicks **Open**. The Import Wizard opens the file and displays a portion of the data in a preview box so that the user can verify that the data is the correct choice. The Import Wizard tries to process the data, and if the wizard is successful, it displays the variables it has created with a portion of the data. The user clicks **next** and the wizard shows the Column Separator that was used. If the variable has the correct data, the user can proceed with the wizard (click **next**); otherwise the user can choose a different Column Separator. In the next window the wizard shows the name and size of the variable to be created in MATLAB. (When the data is all numerical, the variable in MATLAB has the same name as the file from which the data was imported.) When the wizard ends (click **finish**), the data is imported to MATLAB.

As an example, the Import Wizard is used to import numerical ASCII data saved in a .txt file. The data saved with the file name TestData2 is shown in Figure 4-8.

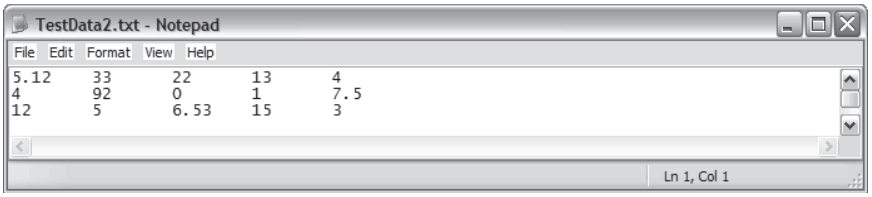

Figure 4-8: Numerical ASCII data.

The display of the Import Wizard during the import process for the TestData2 file is shown in Figures 4-9 and 4-10. Figure 4-10 shows that the name of the variable in MATLAB is `TestData2` and its size is 3×5.

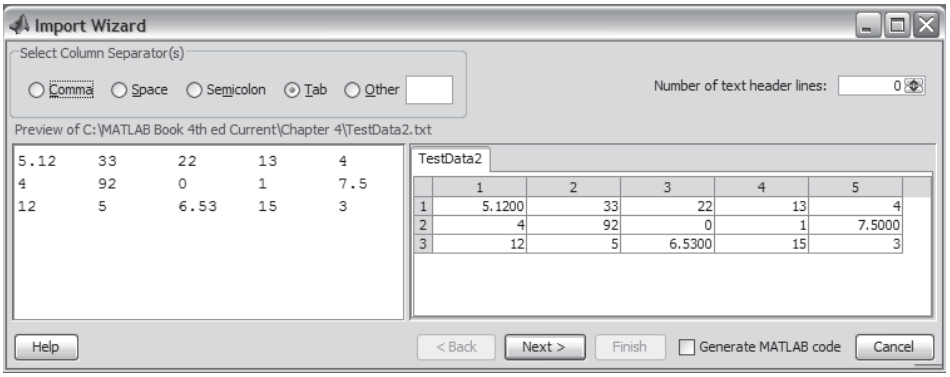

Figure 4-9: Import Wizard, first display.

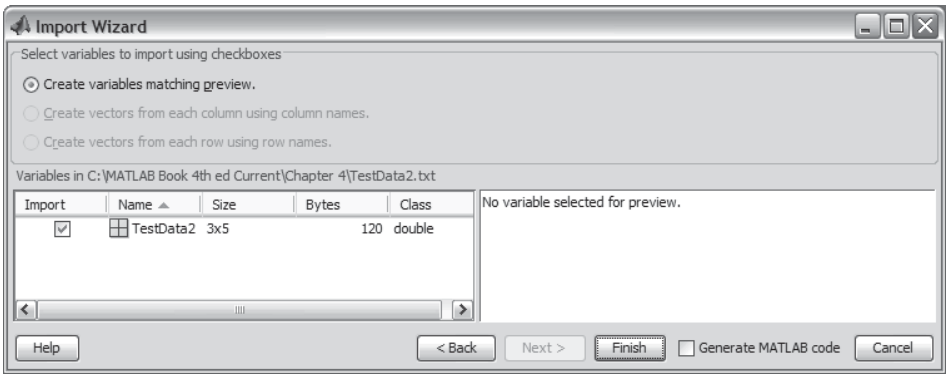

Figure 4-10: Import Wizard, second display.

In the Command Window of MATLAB, the imported data can be displayed by typing the name of the variable.

```
>> TestData2

TestData2 =
  5.1200   33.0000   22.0000   13.0000    4.0000
  4.0000   92.0000         0    1.0000    7.5000
 12.0000    5.0000    6.5300   15.0000    3.0000
```