NORTHERN ILLINOIS UNIVERSITY

PHYSICS DEPARTMENT

Physics 374 – Junior Physics Lab Spring 2024

Python Tutorial #5

**Reading and Writing Files**

The thermocouple data (voltage verses temperature) is located in the Thermocouple.txt file (located on the Physics 374 WebPage: [www.niu.edu/brown](http://www.niu.edu/brown)). Rather than hardcode the file in the program, we would like to have the program prompt us with a file dialog requesting for the file. This can be done with routines from the *tcl/tk* modules (see <https://docs.python.org/3/library/dialog.html>). To have the program ask for an input data file, use the *tkinter* function: filedialog.askopenfilename() as shown below:

import numpy as np # the alias for "numpy" will be "np"

import tkinter as tk # the alias for "tkinter" will be "tk"

from tkinter import filedialog # use the filedialog from tkinter

root = tk.Tk() # shows the root window

root.withdraw() # hides the root window

inputfile = filedialog.askopenfilename() # opens a file dialog

print(inputfile) # prints the file path to the console

x, y = np.loadtxt(inputfile, unpack=True) # unpack=True transposes columns

print(x) # x = Temperature data points

print(y) # y = Voltage data points

Notice that we have loaded the columns of voltage and temperature in the data file called inputfile into the *x* and *y* arrays using np.loadtxt(inputfile, unpack=True).

Now we need a way to save data to an output file. We can use the filedialog.asksaveasfile() on the python.org webpage to write data into a file called outputfile (<https://docs.python.org/3/library/dialog.html>). The following code writes the matrix elements of A to an output file named by the user of the program.

import numpy as np # the alias for "numpy" will be "np"

import tkinter as tk # the alias for "tkinter" will be "tk"

from tkinter import filedialog # use the filedialog from tkinter

A = np.array([[1, 2, 3],

[4, 5, 6],

[7, 8, 9]])

root = tk.Tk() # shows the root window

root.withdraw() # hides the root window

#

# askopenfilename opens a file dialog and creates a file path: inputfile

# the default filetype will be \*.txt

# otherwise, one can look at all files \*.\*

#

inputfile = filedialog.askopenfilename(title="Input File",

filetypes = (("Text files","\*.txt\*"),

("all files","\*.\*")))

print(inputfile) # prints the file path to the console

x, y = np.loadtxt(inputfile, unpack=True) # unpack=True transposes columns

print(x) # x = Temperature data points

print(y) # y = Voltage data points

#

# asksaveasfile opens a file dialog and creates a file object: outputfile

# the default filetype will be \*.txt

# otherwise, one can look at all files \*.\*

#

outputfile = filedialog.asksaveasfile(title="Output File",

filetypes = (("Text files","\*.txt\*"),

("all files","\*.\*")))

np.savetxt(outputfile, A, fmt='%2.4f') # writes matrix A into output file

# in floating xx.xxxx format

outputfile.close() # close the output file

**Homework**

None