MSc Artificial Intelligence Python Primer

Unit 6 Worksheet

**Aims and Objectives**

1. Learn how to create NumPy Arrays
2. Learn how to index and slice NumPy Arrays
3. Learn how to reshape, concatenate and split NumPy Arrays
4. Learn how to aggregate, filter and sort NumPy Array values

**Introductory Tasks**

* Download the ***Unit 6 Jupyter Notebook*** to your local drive. The Notebook can be found on Blackboard (in Python Primer >> Unit 6 – Introduction to Numpy)
  + Once you have downloaded this Notebook, open the *Anaconda Navigator* and launch the *Jupyter Notebook* application and open the downloaded Notebook file
  + There are exercises for you to complete throughout the Notebook. These are clearly marked Worksheet Exercises
* The following online guide to NumPy provides another perspective to the very useful module: <https://towardsdatascience.com/the-ultimate-beginners-guide-to-numpy-f5a2f99aef54>
  + Take a look at this guide to help supplement your understanding of this unit’s Jupyter Notebook
  + There are other introductory tutorials listed in the Useful Links section that you may also find useful.

**Optional Extra Tasks**

* Given that we have started to look at pre-written Python modules in this unit, you should become familiar with how to access and read API documentation. This kind of documentation provides detailed information on what is available.
  + Examine NumPy’s API reference at <https://numpy.org/doc/stable/reference/>
  + Focus on the Routines section to see what functionality this module offers.
    - Each function provides a detailed explanation of the function and some example code. Try experimenting with the code examples.
    - In the ***Unit 6 Jupyter Notebook*** we briefly looked at sorting NumPy arrays. NumPy provides a set of functions for searching arrays. Examine these in more detail.
* Review the module reading list for other sources of information to supplement your understanding of the NumPy module.

**Advanced Tasks**

* The NumPy module provides some more advanced functionality. A second Jupyter Notebook (***Unit 6 Advanced NumPy***) has been created which contains more instruction on this extra functionality. NOTE: there are no Worksheet Exercises included in this NoteBook.
  + In particular, the following functional elements are covered:
    - Ufuncs
    - Broadcasting
    - Structured Arrays

**Assessment Details**

* In the ***Unit 6 Jupyter Notebook***, you will see several exercises that are written in ***bold italic*** type. These exercises are to be formatively assessed by the module team.
* In fact, the following units have assessed exercises embedded within them: 1-3 & 5-6
* Exercises are worth 2, 3 or 4 marks. There are 50 marks available for all assessed exercises.
* You are expected to provide solutions to these exercises in the **Python\_Primer\_Submission** **Jupyter Notebook** (available on Blackboard in the Python Primer folder)
* Once completed you should submit this Jupyter Notebook to the Blackboard link provided in the Python Primer folder on Blackboard
* The module team will mark your solutions at regular intervals during the first two weeks of term.

**Useful Links and Resources**

* NumPy Introduction Article: <https://towardsdatascience.com/the-ultimate-beginners-guide-to-numpy-f5a2f99aef54>
* NumPy API Reference: <https://numpy.org/doc/stable/reference/>
* NumPy Absolute Beginner’s Tutorial: <https://numpy.org/doc/stable/user/absolute_beginners.html>
* Another introductory article: <https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy-tutorial-for-data-science-beginners/>
* NumPy Cheat Sheet: <https://www.dataquest.io/blog/numpy-cheat-sheet/>
* NumPy Tutorial from Kaggle: <https://www.kaggle.com/legendadnan/numpy-tutorial-for-beginners-data-science>
* NumPy Tutorial from datacamp: <https://www.datacamp.com/community/tutorials/python-numpy-tutorial>