Changing lives through learning

Quality Endorsed Unit

This unit does not form part of a regulated qualification.

Unit Title: Practical Artificial Intelligence

Unit Reference Number: CK3/4/WR/004

Level: 4

Credit Value: 8

Minimum Guided Learning Hours: 60

Learning Outcome (The Learner will):	Assessment Criterion (The Learner can):
1. Understand the underlying technology of Artificial Intelligence and the importance of Big Data	1.1 Define the differences between machine learning and deep learning
	1.2 Define the role of Big Data in machine learning
	1.3 Define the role of algorithms in machine learning and deep learning
	1.4 Perform a Rank & Percentile data analysis using the Spotify Oldies dataset
2. Install the software required for creating machine learning algorithms and understand how machine learning works with data	2.1 Create a new Jupyter Notebook containing Python code
	2.2 Create a Python program containing advanced matrix operations, including multiplication and vector operations
	2.3 Define the differences between Supervised, Unsupervised, and Reinforcement learning
	2.4 Define the difference between bias and variance and the need for separate training and testing datasets
	2.5 Work through a complete machine learning project involving the classification of flowers
3. Understand the importance of clean data, evaluate a range of machine learning algorithms, and create a basic neural network	3.1 Conduct a data cleansing experiment using a hotel bookings dataset, removing bad data such as outliers and skewed value distributions, and replacing missing data with average values

	3.2	Evaluate the K-Means and K-Nearest Neighbours algorithms using Python code
	3.3	Install and utilise the TensorFlow neural network framework
	3.4	Use the TensorFlow Neural Network Playground to understand how a neural network works
	3.5	Create a decision tree algorithm and improve it with the Random Forests algorithm
4. Understand and implement the classification of images and text documents and how recommender systems work	4.1	Write an algorithm to apply filters to clean up an image.
	4.2	Use appropriate machine learning algorithms for facial recognition purposes
	4.3	Use Natural Language Processing deep learning algorithms to interpret text, extracting positive reviews from a Movies Review dataset
	4.4	Use deep learning algorithms on the MovieLens dataset to recommend similar movies to ones that you like
	4.5	Implement a traffic sign recognition system using a convolutional neural network (CNN)
5. Understand and implement deep learning techniques using neural networks	5.1	Create a matrix filled with binary or boolean values and perform multiplication and other operations on the matrix
	5.2	Update a neural network using weights
	5.3	Create a LeNet-5 algorithm to recognise handwritten numbers
	5.4	Implement an LSTM neural network to predict stock prices
6. Understand how AI is used in current applications	6.1	Define how machine learning algorithms are used in making automatic typing corrections and making suggestions based on past behaviour or membership of groups
	6.2	Define how AI is used in medical applications, including the use of robotic arms in surgery, the analysis of MRI scans, and in prosthetics, including exoskeletons
	6.3	Define the state-of-the-art in robotics, including humanoids

	6.4	Define the underlying systems behind self-driving cars, including GPE, radar, lidar, ultrasound, and cameras, and the AI algorithms that “drive” the car
	6.5	Create a deep learning neural network that predicts a team’s score in the Indian Premier League