Machine Learning 600

1. Overview

This programme prepares participants to understand, implement, and evaluate machine learning solutions for real-world problems. Participants explore machine learning fundamentals, the machine learning project cycle, statistical foundations, supervised and unsupervised learning algorithms, and practical applications in text and image processing. The programme develops practical skills for data scientists, machine learning engineers, and technical professionals working with intelligent systems.

2. Learning Outcome:

- Explain the history of machine learning, distinguish between supervised and unsupervised learning approaches, and identify appropriate applications of machine learning techniques using various programming languages and data repositories
- Apply the machine learning project cycle including data acquisition techniques, data quality assessment and cleaning processes, and data team collaboration strategies while addressing data privacy and storage considerations
- Implement statistical analysis and linear regression models for machine learning datasets, create scatter plots and trendlines for prediction, and apply randomness principles in machine learning algorithms
- Develop decision tree models using entropy and information gain computations, implement K-means clustering algorithms, and apply cross-validation techniques including silhouette methods for model evaluation
- Apply association rules for web mining applications, implement support vector machines for classification tasks, and design artificial neural networks with appropriate data preparation techniques
- Process text documents using stop words removal, stemming, n-grams, and TF/IDF techniques, implement convolutional neural networks for image processing and feature extraction, and assess machine learning algorithm performance using confusion matrices and regularization methods

Qualification:	Certificate of Competence
Duration:	4-Months
Programme Type:	Category B – Workplace-Based Learning Programme
Programme ID:	PA0685
NQF Level:	6
Credits:	10
Contact Days:	Three (3) facilitated online workshops (recordings available)
Prerequisites:	Grade 12 Qualification or NQF Level 4 equivalent
Training Options:	Online Learning: Please contact our Sales team to confirm the next available intake date for this programme.
Minimum Learner Required:	(1) Online

3. Topics

- Introduction to Machine Learning
- History and Evolution of Machine Learning
- Machine Learning Applications and Use Cases
- Machine Learning Project Lifecycle
- Data Acquisition and Data Repositories
- Data Quality Assessment and Data Cleaning
- Data Privacy, Ethics, and Storage
- Team Collaboration in Machine Learning Projects
- Statistical Foundations for Machine Learning
- Linear Regression and Predictive Modelling
- Data Visualisation (Scatter Plots and Trendlines)
- Randomness and Probability in Machine Learning
- Supervised Learning Algorithms
- Unsupervised Learning Algorithms
- Decision Trees, Entropy, and Information Gain
- K-Means Clustering
- Cross-Validation and Model Evaluation
- Silhouette Analysis
- Association Rule Mining and Web Mining
- Support Vector Machines (SVM)
- Artificial Neural Networks (ANN)
- Text Processing and Natural Language Processing (NLP)
- Text Pre-processing (Stopwords, Stemming, N-grams, TF-IDF)
- Image Processing and Computer Vision
- Convolutional Neural Networks (CNN)
- Feature Extraction Techniques
- Model Performance Evaluation
- Confusion Matrices and Performance Metrics
- Regularisation Techniques
- Practical Machine Learning Case Studies

4. Workplace-Based Learning Programme

This WLP is a fusion of academic learning and practical work. The learning is directly applied to the workplace by using client-based mentors and extensive workplace-based portfolio work and assignments. Apart from the obvious benefits of a workplace directed qualification, each WLP qualifies for recognition as a Category B Skills Programme in the Learning Matrix of the Amended BEE codes, which allows for the salaries of participants to be recognized as part of the Skills Development Expenditure.

We trust that the above is in order and look forward to hearing from you for Implementation