## Assessment type (🗹):

Questioning (Oral/Written)

Practical Demonstration

3rd Party Report

Other – Project/Portfolio (*please specify)*

**Assessment Resources:**

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| * Access to academic journals * Online databases and resources * Course materials and textbooks * Student's personal notes |

## Assessment Instructions:

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| You are to complete a Knowledge-Based Assessment that covers the Key Elements of Knowledge from Week 8 to Week 13. These questions are based on the topics discussed in lectures and tutorials, and they assess your understanding and ability to apply theoretical concepts to practical situations. Instructions: Carefully read each question and provide a detailed response that includes examples, explanations, and any supporting information you consider relevant. Responses should be well-structured and demonstrate a deep understanding of the subject matter. Submission Evidence:  * Once you have completed all parts of the KBA, submit through the blackboard portal as a .docx file. * Include any supplementary material such as diagrams or code snippets that are referenced in your responses. |

**Assessment Instrument:**

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| Question 1: Functions and Features of Machine Training Datasets (501.KE4) *Describe the functions and features of machine training datasets and their relevance in the automation of work tasks. Explain how these characteristics enable the effective application of machine learning principles to improve organizational productivity and provide examples of automation scenarios that benefit from well-structured training datasets.*  *Your answer here.* Question 2: Importance of Parameters in Machine Learning (502.KE2 - Default and non-default parameters) *Discuss the significance of default and non-default parameters in the context of machine learning models. Explain how adjusting these parameters can affect a model's learning process and performance. Provide examples of common parameters that are tuned during the hyperparameter optimization process.*  *Your answer here.* Question 3: Significance of Evaluation Metrics in Machine Learning (502.KE2 - Metrics) *Detail the role of various evaluation metrics in machine learning and how they guide the model refinement process. Explain how selection of the appropriate metric or metrics aligns with the prediction task at hand, and give examples of different types of metrics applied in specific machine learning scenarios.*  *Your answer here.* Question 4: Training, Validation, and Test Data in Machine Learning Model Development (502.KE5) *Explain the difference between training data, validation data, and test data in the context of a machine learning model's development life cycle. Discuss the crucial role each data type plays and why it's important to have distinct sets for developing robust AI models.*  *Your answer here.* Question 5: Determining Predictive Accuracy of ML Models (502.KE6) *Explain the importance of determining the predictive accuracy of machine learning models using target data. Describe the methods used to do so and discuss how this accuracy measurement contributes to the overall evaluation and efficacy of a model in production environments. Provide examples of how predictive accuracy affects decision-making in real-world applications.*  *Your answer here.* Question 6: Documenting Machine Learning Model Evaluations (502.KE8) *Discuss the variety of formats and best practices for documenting the evaluation of machine learning models within an organization. How does proper documentation aid in the interpretation, reproducibility, and communication of model performance to stakeholders? Provide guidance on what to include in such documentation and any tools or platforms that might be used.*  *Your answer here.* Question 7: Comparison of Supervised and Unsupervised Learning Techniques (ICTAII502 KE3) *Explain the primary differences between supervised and unsupervised learning techniques and discuss the unique features of each. Provide one real-world application example for both supervised and unsupervised learning that illustrates their typical use cases. Additionally, discuss how the choice between these two techniques might affect the way data is prepared and the outcomes expected from the machine learning model.*  *Your answer here.* Question 8: Exploring ML Learning Paradigms (ICTAII501 KE11) *Provide a detailed comparison of semi-supervised, supervised, unsupervised, and reinforcement learning. For each learning paradigm, discuss the underlying principles, typical use cases, and the contexts in which each would be the most effective. Also, provide examples of specific applications or projects where each learning type has been successfully implemented.*  *Your answer here.* Question 9: Evaluating Machine Learning Model Outputs (ICTAII501 KE14) *Explain the importance of comparing expected and actual outputs in machine learning models. Discuss methodologies used to assess the performance of a model, particularly in terms of alignment with expected outcomes. Provide examples from both supervised and unsupervised learning contexts to illustrate different approaches for evaluating model outputs.*  *Your answer here.* Question 10: Evaluating ML Model Accuracy (ICTAII501 KE15) *Discuss the importance of comparing expected and actual outputs in machine learning models. Describe the methodologies and techniques used to assess model performance, particularly in the context of supervised learning. Provide real-world examples to illustrate how discrepancies between expected and actual outputs are analyzed and addressed.*  *Your answer here.* Question 11: Understanding Feature Engineering in Machine Learning (ICTAII502 KE2 - Feature Engineering) *Explain the role of feature engineering in the machine learning process. Describe the techniques and approaches used in feature engineering to improve model accuracy and efficiency. Provide practical examples of how effectively engineered features can impact the performance of machine learning models.*  *Your answer here* Question 12: Application of CRISP-DM and Software Development Methodologies in ML Deployment (ICTAII501 KE17 & ICTAII502 KE4) *Discuss how the Cross-Industry Standard Process for Data Mining (CRISP-DM) and software development methodologies can be applied to determine machine learning deployment requirements for end users. Describe each methodology and provide examples of how they facilitate effective deployment of ML models.*  *Your answer here.* Question 13: Understanding Organizational Policies and Legislative Requirements in ML Projects (ICTAII502 KE9) *Explain the importance of adhering to organizational policies and legislative requirements when conducting machine learning projects. Provide examples of specific policies or legislation that might impact the deployment and operation of ML models within an organizational context.*  *Your answer here.* Question 14: Importance of Model Sizes in Machine Learning (ICTAII502 KE2 - Model Sizes) *Discuss the significance of model size in the development and performance of machine learning models, particularly language models. Finally, calculate in GB roughly how much VRAM would be needed to load an 80 Billion parameter model (neural network) as bfloat16 and again as int8.*  *Your answer here.* Question 15: Evaluating Industry-Recognized Machine Learning Models (ICTAII502 KE14 & KE7) *Identify and discuss several industry-recognized machine learning models. Provide two examples of Transformer models of different sizes and briefly summarize how the size of each model might impact how you could apply it to real-world use-cases.*  *Your answer here.* Question 16: Understanding Vision Transformers (ViT) and Their Applications (ICTAII502 KE7) *Discuss the concept of Vision Transformers (ViT) and explain how they adapt transformer architectures for vision-related tasks (an in-depth explanation is not required). Describe in general the key features and functionalities of ViT, and provide examples of specific applications where Vision Transformers have proven effective.*  *Your answer here.* |

## Marking Checklist

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| Question Completion | S/NYS |
| Student provided comprehensive responses to all questions. |  |
| Responses include examples, explanations, and references to course materials. |  |