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Course: Machine Learning Fundamentals
Workshop 2 – Assignment 2.3

Machine Learning vs. Deep Learning

Example 1 – Machine Learning (ML)
Application: Predicting whether an email is spam using traditional ML.
In this approach, key features such as specific words, email length, and sender domain are manually selected and fed into a model like a decision tree or logistic regression. Machine learning is suitable here because the dataset is structured and the important features are identifiable. This method is efficient, interpretable, and requires less computational power.

Why Deep Learning is less suitable: For this small-to-medium dataset, deep learning adds unnecessary complexity and computational overhead without significantly improving results. Traditional ML provides accurate predictions more efficiently.

Example 2 – Deep Learning (DL)
Application: Automatic image recognition in medical imaging, such as detecting tumors in X-rays.
Deep neural networks automatically extract features from raw images, identifying complex patterns that are difficult to define manually. Deep learning is suitable for this problem because the data is large, unstructured, and high-dimensional, requiring advanced pattern recognition.

Why Machine Learning is less suitable: Traditional ML would need extensive manual feature engineering and could miss subtle patterns, reducing accuracy.

Conclusion
Machine learning is best for structured datasets where feature selection is straightforward, while deep learning excels with unstructured, complex, and large-scale data. Selecting the right approach depends on the nature of the data, problem complexity, and available resources.