**DATA SCIENCE – BWT – WEEK – 9**

**TASK – 22**

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**Introduction to Artificial Neural Networks with Keras**

**Introduction**

Artificial Neural Networks (ANNs) are computational models inspired by the human brain. They consist of interconnected nodes (neurons) that process data and learn patterns to make predictions or decisions. ANNs are the foundation of deep learning, a subset of machine learning that excels in tasks like image recognition, natural language processing, and more.

**Why Use Keras?**

Keras is a user-friendly, high-level API for building and training neural networks. It's built on top of TensorFlow, allowing you to easily create and experiment with deep learning models without needing in-depth knowledge of the underlying algorithms. Keras simplifies the process of building complex networks, making it an excellent choice for both beginners and experienced practitioners.

**Key Concepts in Neural Networks**

1. **Layers:** Neural networks are composed of layers, each containing a set of neurons. The most common types of layers include:
   1. **Input Layer:** Where the data enters the network.
   2. **Hidden Layers:** Where computations are performed to learn patterns in the data.
   3. **Output Layer:** Where the final prediction or classification is made.
2. **Activation Functions:** These functions determine the output of a neuron based on its input. Common activation functions include ReLU (Rectified Linear Unit), Sigmoid, and Softmax.
3. **Weights and Biases:** Each connection between neurons has an associated weight that adjusts during training. Biases are additional parameters that help the model fit the data better.
4. **Loss Function:** This function measures how well the model's predictions match the actual data. The goal of training is to minimize this loss.
5. **Optimizer:** An algorithm used to adjust the weights and biases during training to minimize the loss function. Popular optimizers include SGD (Stochastic Gradient Descent), Adam, and RMSprop.

**Conclusion**

Artificial Neural Networks are powerful tools for solving complex problems in various domains. With Keras, building and experimenting with neural networks becomes accessible and straightforward. By understanding the basics of ANNs and using Keras, you can start creating your own models to tackle real-world challenges.