**TOPIC ONE**

**Introduction to Machine Learning**

**Summary Notes**

**AI Implementation in Business**

**Introduction**: Discussed AI benefits for business efficiency, using Coffee on Wheels as a case study.

**Challenges**:

* **Location & Route Optimization**: Difficulty predicting truck placements and optimizing routes.
* **Sales Forecasting**: Need for improved forecasting and performance tracking.
* **Marketing Automation**: Desire for more efficient marketing processes.

**Collaboration**: Partnered with Data Beans to leverage data and AI technologies.

**Dashboard Features**:

* Users can view city-specific statistics (revenue, margins) via BigQuery and Looker.
* Provides route suggestions based on weather and events.

**Operational Monitoring**: Real-time tracking with options for marketing campaigns and customizable functionality.

**AI Processes**:

* **Multimodal Input**: Utilizes various data types.
* **Prediction & Generation**: Involves analytics for sales and marketing.
* **Visual Output**: Data insights for decision-making.

**Technology Stack**: Integrates Google products (Gemini, Vertex AI, Looker) to support the data-to-AI lifecycle.

**Benefits**:

* Streamlined operations and marketing.
* Improved customer service with automated insights.
* Enhanced employee productivity through generative AI tools.

**Foundations of Machine Learning**

**Clarifying Terms**:

* **AI**: Systems mimicking human intelligence (e.g., robots).
* **ML**: A subset of AI enabling systems to learn from data.

**Key Concepts**:

* **Deep Learning**: Uses neural networks for complex tasks.
* **Generative AI**: Creates content based on input.

**Learning Types**:

* **Supervised Learning**: Uses labeled data (e.g., classification, regression).
* **Unsupervised Learning**: Works with unlabeled data (e.g., clustering, association).

**Conclusion**: Clarified distinctions between AI and ML, types of learning, and model selection.

**Google Cloud AI Development Options**

**Overview**: Various AI development approaches for different skill levels:

1. **Pre-trained APIs**: Use existing models; no expertise required.
2. **BigQuery ML**: Create models with SQL; suited for tabular data users.
3. **AutoML**: No-code model building; user-friendly interface.
4. **Custom Training**: Full control to build models from scratch; requires expertise.

**User Needs**:

* **Business Users**: Automate tasks without ML experience.
* **Data Analysts**: Build custom models with SQL skills.
* **Data Scientists**: Work with large datasets.
* **ML Engineers/Scientists**: Prefer DIY coding.

**Choosing the Right Option**:

* **Pre-trained APIs**: Best for beginners.
* **BigQuery ML**: Ideal for SQL users.
* **AutoML**: Suitable for minimal coding.
* **Custom Training**: For those seeking control.

**Google Cloud AI Development Options in Detail**

**Pre-trained APIs**:

* **Natural Language API**: Text analysis.
* **Vision API**: Image recognition.
* **Video Intelligence API**: Motion analysis.
* **Document AI**: Document processing.
* **Dialogflow API**: Conversational interfaces.

**Vertex AI**:

* Unified platform for end-to-end ML development.
* Key features include an ML pipeline, scalability, and reusability.

**AutoML**:

* Automates the ML development process.
* Offers a no-code interface for easy model building.

**Custom Training**:

* DIY approach to ML projects with pre-built or custom containers.
* Tools include Vertex AI Workbench and Colab Enterprise.
* Uses ML libraries like TensorFlow.