# 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.

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## 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.

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## 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.

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## 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.