Tech Elevate

Three-Month Training Plan for Machine Learning and Large Language Models

Agenda

- Introduction
- Month 1: Foundations and Basics
- Week 1: Introduction to Machine Learning and LLMs
- Week 2: Data Preprocessing
- Week 3: Exploratory Data Analysis (EDA)
- Week 4: Building Basic Models
- Month 2: Intermediate Concepts
- Week 5: Model Evaluation and Validation
- Week 6: Advanced Machine Learning Algorithms
- Week 7: Feature Engineering
- Week 8: Unsupervised Learning
- Month 3: Advanced Topics and Best Practices

Introduction

- Three hours per week commitment
  - Focus on Machine Learning and Large Language Models

Month 1: Foundations and Basics

Month 1: Foundations and Basics

Machine Learning: Introduction to Machine Learning

- Overview of machine learning concepts
- Types of machine learning
  - Supervised
  - Unsupervised
  - Reinforcement Learning
- Setting up your environment
  - Python
  - Jupyter Notebook
  - Essential libraries

LLMs: Introduction to Large Language Models

- Overview of LLMs and their applications
- Introduction to transformers and neural networks
- Setting up your environment
  - Hugging Face Transformers library
  - Colab
  - GPUs

Machine Learning: Data Preprocessing

- Understanding datasets and data types
- Data cleaning, handling missing values, and feature scaling
- Practical example: Preprocessing a dataset (e.g., Titanic dataset)

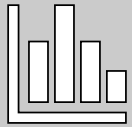
LLMs: Text Preprocessing

- Tokenization and Text Normalization
  - Breaking down text into individual tokens
  - Standardizing text for analysis
- Handling Stop Words and Special Characters
  - Removing common words with little meaning
  - Dealing with non-alphanumeric characters
- Practical Example
  - Preprocessing text data for use in LLMs

Machine Learning: EDA Techniques

- Visualizing data distributions
  - Using histograms and box plots
- Identifying patterns and correlations
  - Using scatter plots and heatmaps
- Practical example
  - Performing EDA on a sample dataset

LLMs: EDA for Text Data

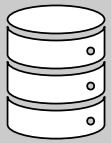


Analyzing text data distributions

Word frequency

n-grams

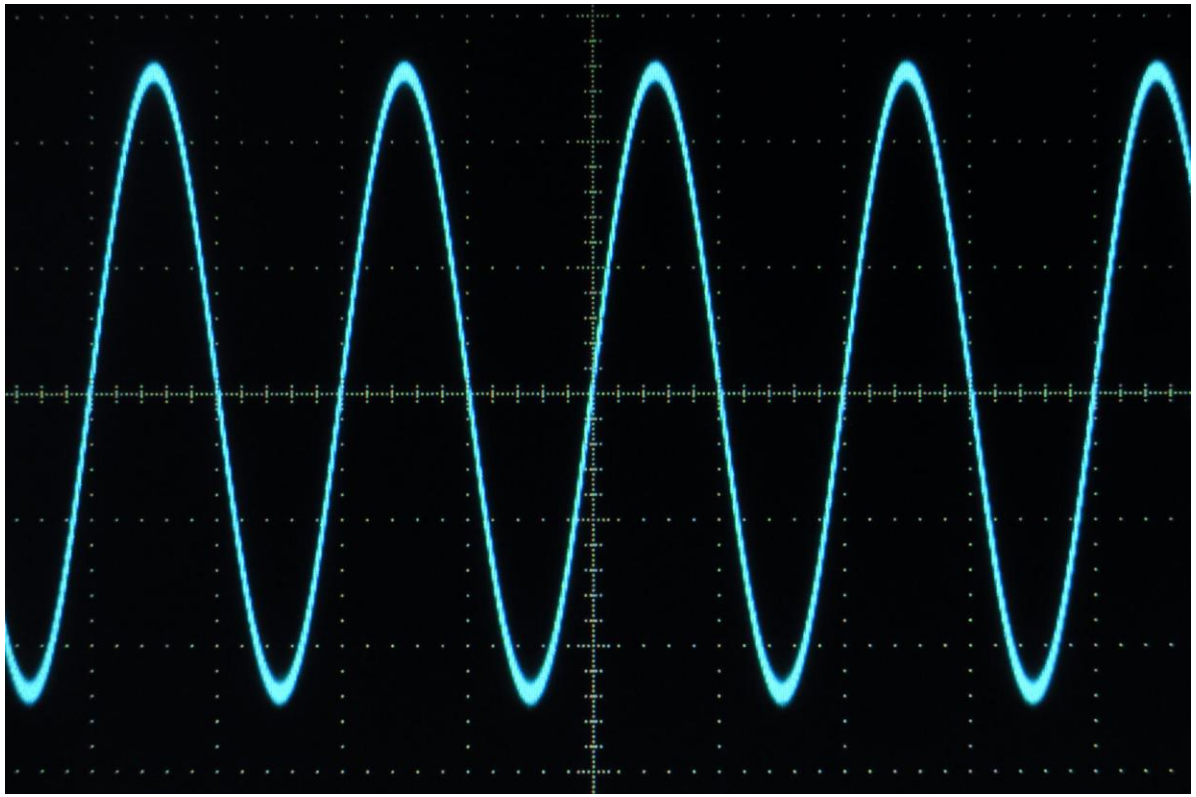
Identifying patterns and trends in text data



Practical example: EDA on a text dataset

Sentiment analysis dataset

Machine Learning: Building a Simple Model



- Introduction to supervised learning algorithms
  - Linear Regression
  - Decision Trees
- Training and evaluating a basic model
- Practical example: Building a linear regression model

LLMs: Fine-Tuning a Pre-trained Model

- Introduction to transfer learning and fine-tuning
- Fine-tuning a pre-trained LLM for a specific task
  - Example: Text classification
- Practical example: Fine-tuning a BERT model for sentiment analysis

Month 2: Intermediate Concepts

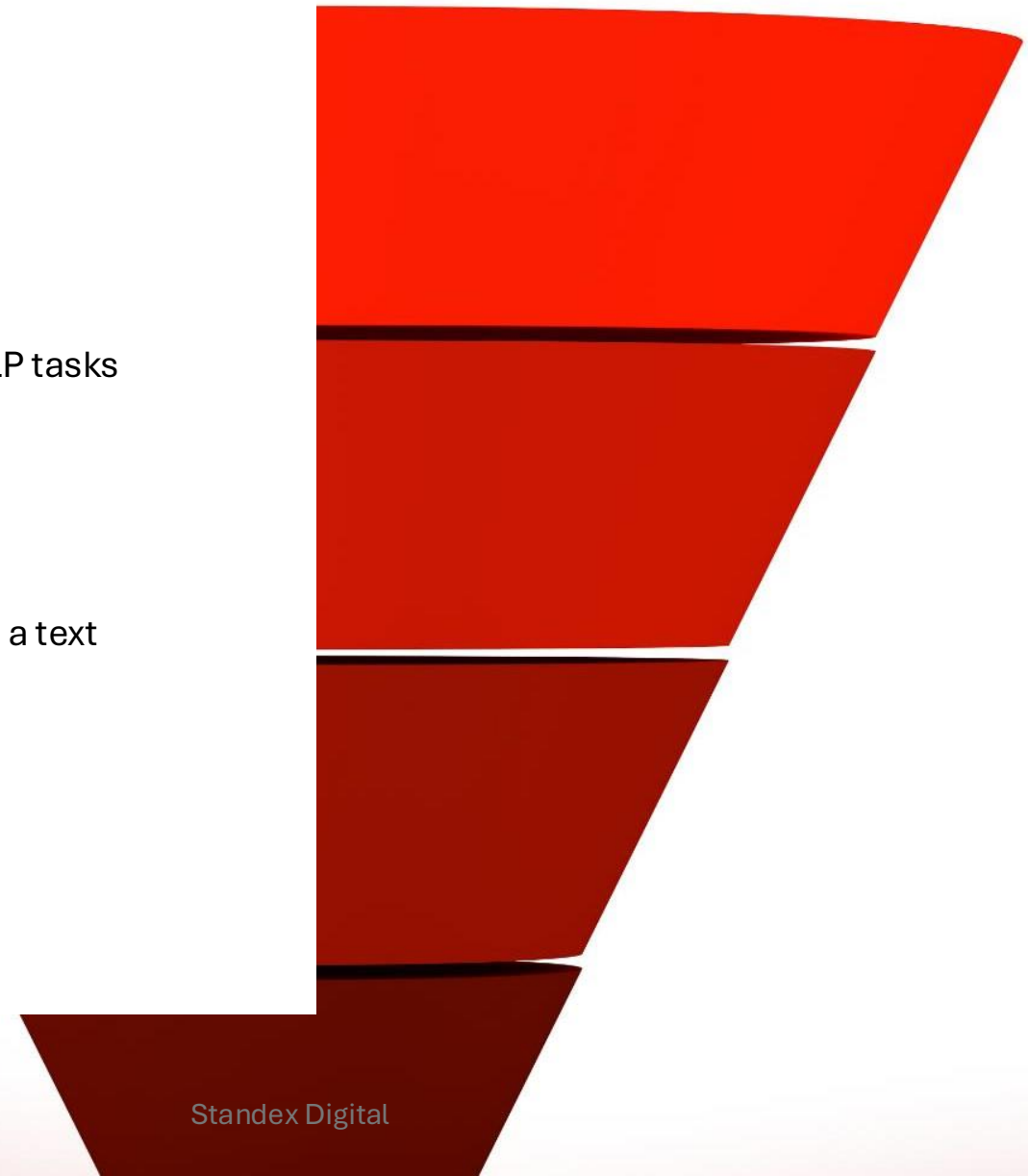
Month 2: Intermediate Concepts

Machine Learning: Model Evaluation

- Understanding evaluation metrics
  - Accuracy, precision, recall, F1-score
- Cross-validation and hyperparameter tuning
- Practical example
  - Evaluating and tuning a classification model

LLMs: Evaluation Metrics for LLMs

- Understanding evaluation metrics for NLP tasks
  - BLEU
  - ROUGE
  - Perplexity
- Practical example: Evaluating an LLM for a text generation task



Machine Learning: Advanced Algorithms

- Introduction to ensemble methods
  - Random Forest
  - Gradient Boosting
- Understanding Support Vector Machines (SVM)
- Practical example: Implementing a Random Forest classifier

LLMs: Advanced Techniques in LLMs

- Understanding attention mechanisms and self-attention
- Introduction to more advanced models (GPT, T5)
- Practical example: Using GPT-3 for text generation

Machine Learning: Feature Engineering

- Creating new features from existing data
- Feature selection techniques
  - PCA
  - Lasso
- Practical example: Feature engineering on a real-world dataset

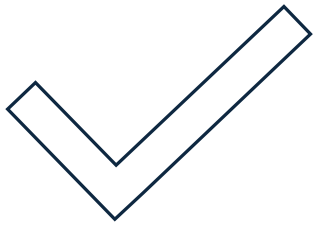
LLMs: Feature Engineering for Text Data

- Using embeddings and vector representations
  - Word2Vec
  - GloVe
- Practical example: Creating and using word embeddings for text classification

Machine Learning: Unsupervised Learning Algorithms

- Introduction to clustering
  - K-Means
  - Hierarchical
- Dimensionality reduction techniques
  - PCA
  - t-SNE
- Practical example: Implementing K-Means clustering

LLMs: Topic Modeling



Introduction to topic modeling

Latent Dirichlet Allocation (LDA)

Non-negative Matrix Factorization (NMF)

Practical example

Implementing topic modeling on a text dataset

Month 3: Advanced Topics and Best Practices

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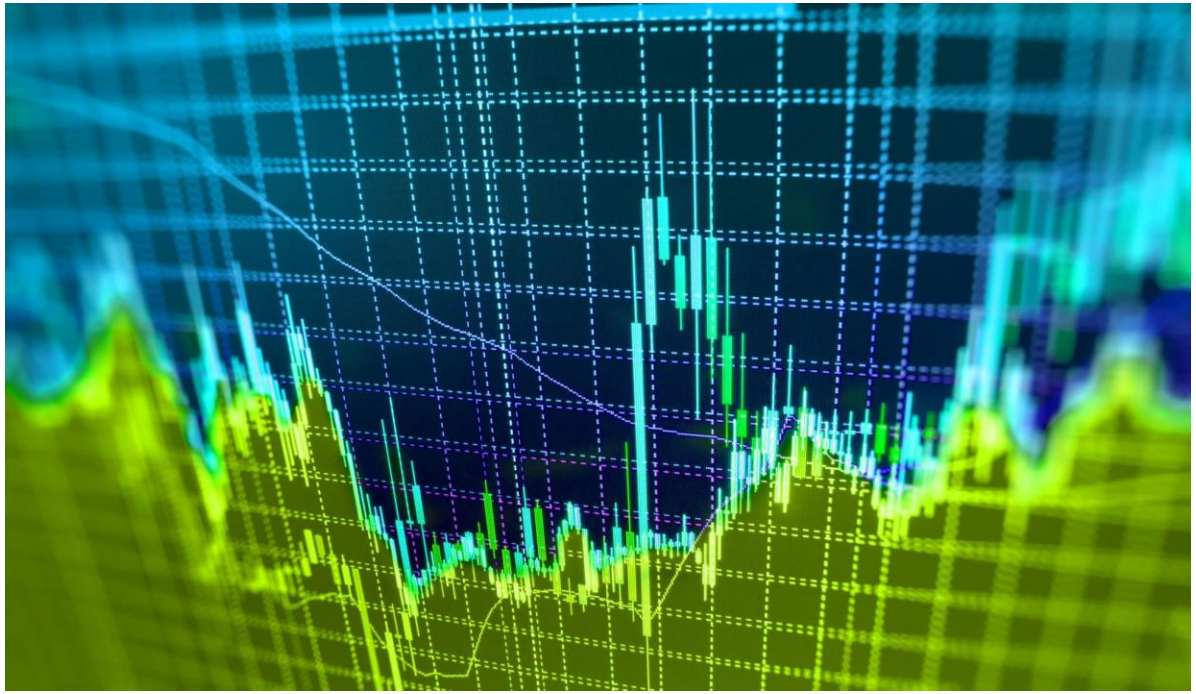
Machine Learning: Time Series Analysis



- Understanding time series data
- Implementing time series forecasting
  - ARIMA
  - LSTM
- Practical example: Time series forecasting on a stock price dataset

LLMs: Sequential Data Processing

- Working with sequence data and LSTMs
- Practical example: Implementing sequence classification with LSTMs

Machine Learning: Deploying Machine Learning Models

- Introduction to Model Deployment
  - Using Flask and Docker
- Building and Deploying a Simple ML Web App
  - Practical Example: Deploying a Machine Learning Model with Flask

LLMs: Deploying LLMs

- Using APIs for model deployment
  - Hugging Face API
  - FastAPI
- Practical example: Deploying an LLM for text generation

Machine Learning: Introduction to Reinforcement Learning

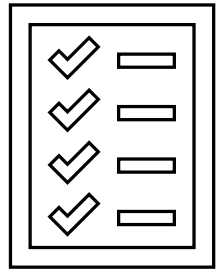
- Understanding the basics of reinforcement learning
- Implementing a simple RL algorithm (Q-learning)
- Practical example: Solving a basic RL problem (e.g., CartPole)

LLMs: Advanced LLM Techniques

Exploring advanced topics in LLMs

Zero-shot learning

Few-shot learning

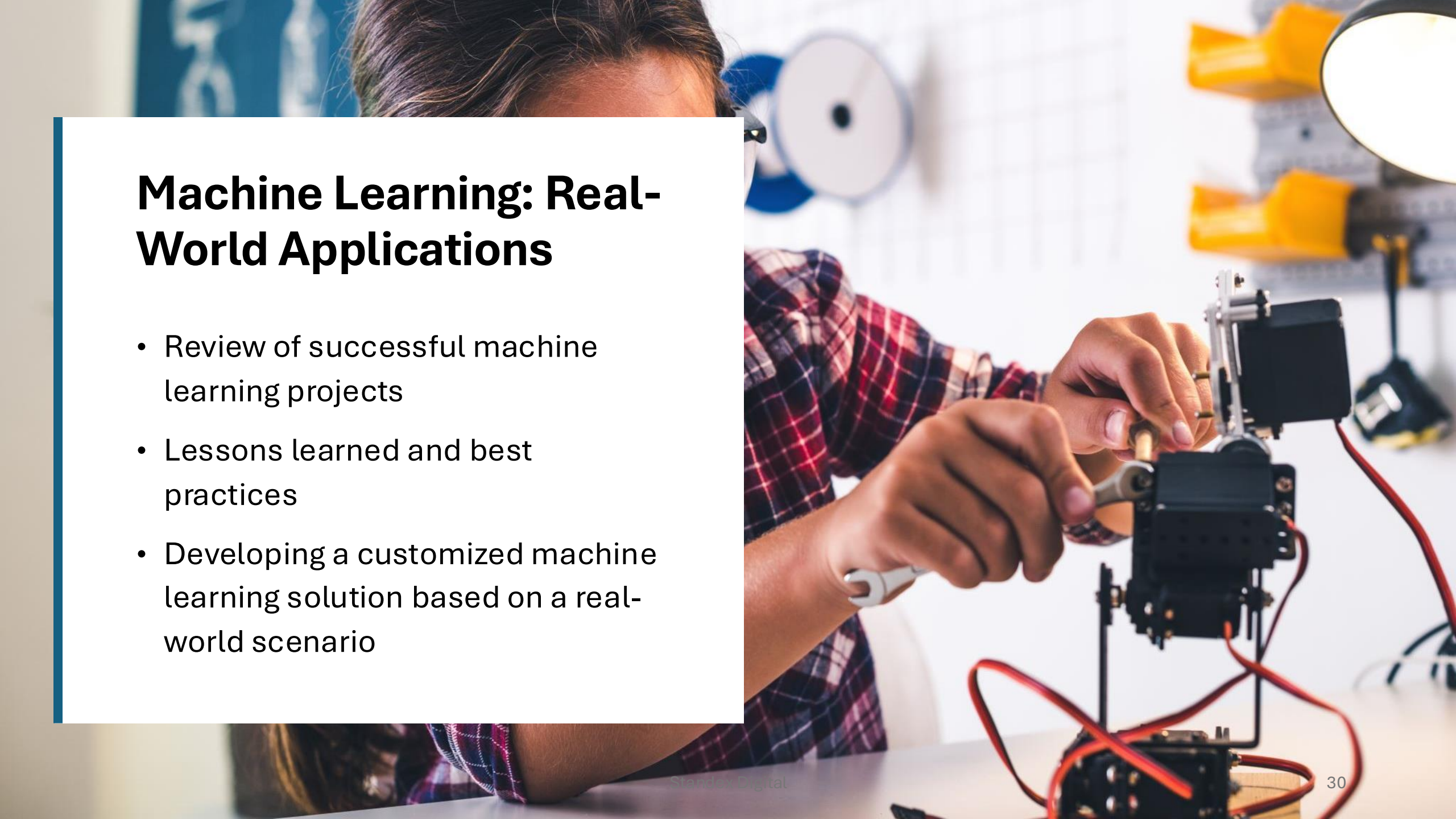


Practical example

Using GPT-3 for zero-shot and few-shot tasks

Week 12: Capstone Project

- Machine Learning and LLMs: Capstone Project
  - Defining a real-world problem to solve using ML and LLMs
  - Designing and implementing a comprehensive solution
  - Integrating both ML models and LLMs in the project
  - Presenting the final project with detailed documentation



Machine Learning: Real-World Applications

- Review of successful machine learning projects
- Lessons learned and best practices
- Developing a customized machine learning solution based on a real-world scenario

LLMs: Real-World Applications

- Review of successful LLM projects
- Lessons learned and best practices
- Developing a customized LLM solution based on a real-world scenario

Machine Learning: Certification Exam Preparation

- Review of key concepts and skills
- Practice questions and mock exams
- Tips and strategies for passing the certification exam

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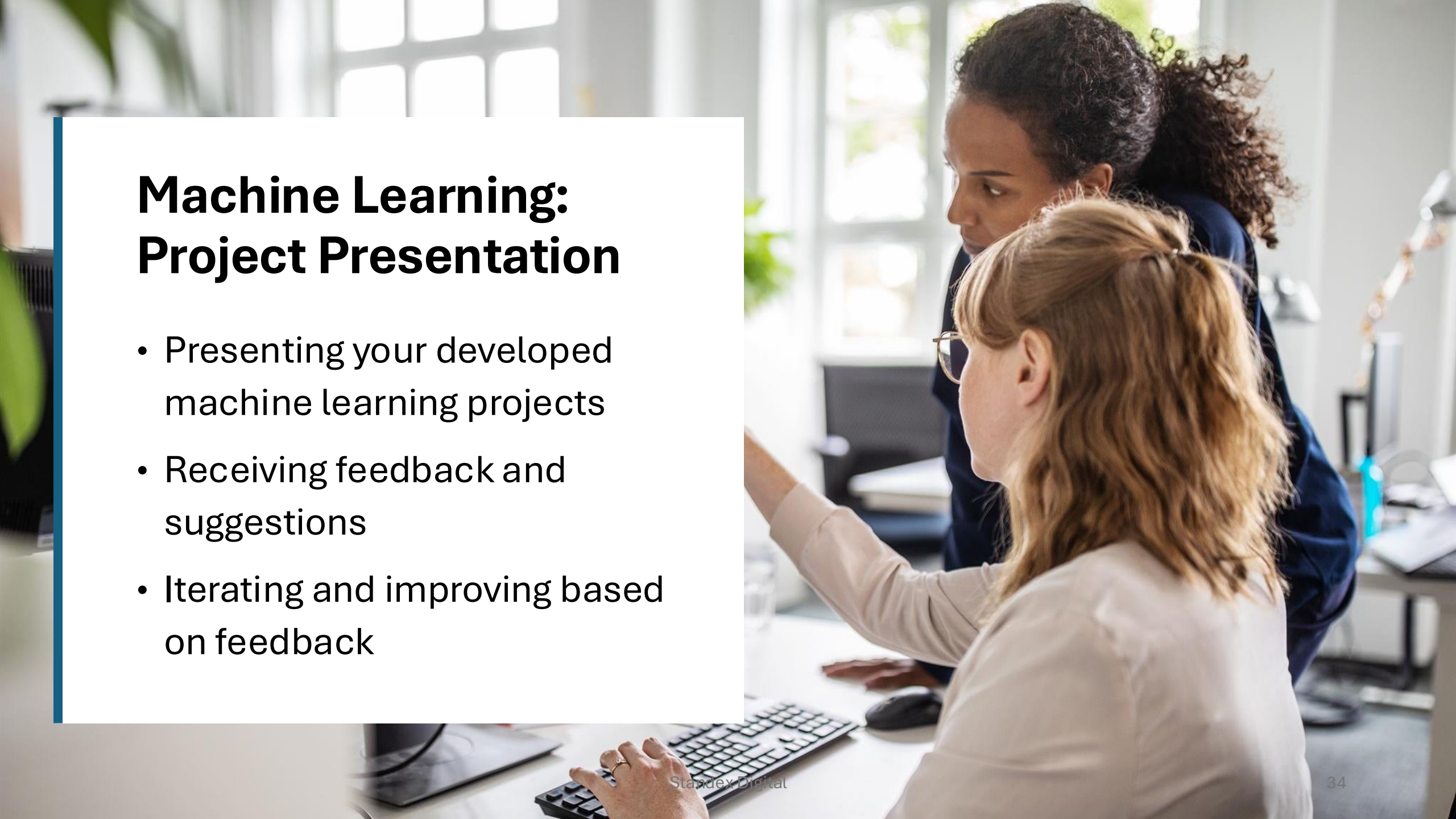
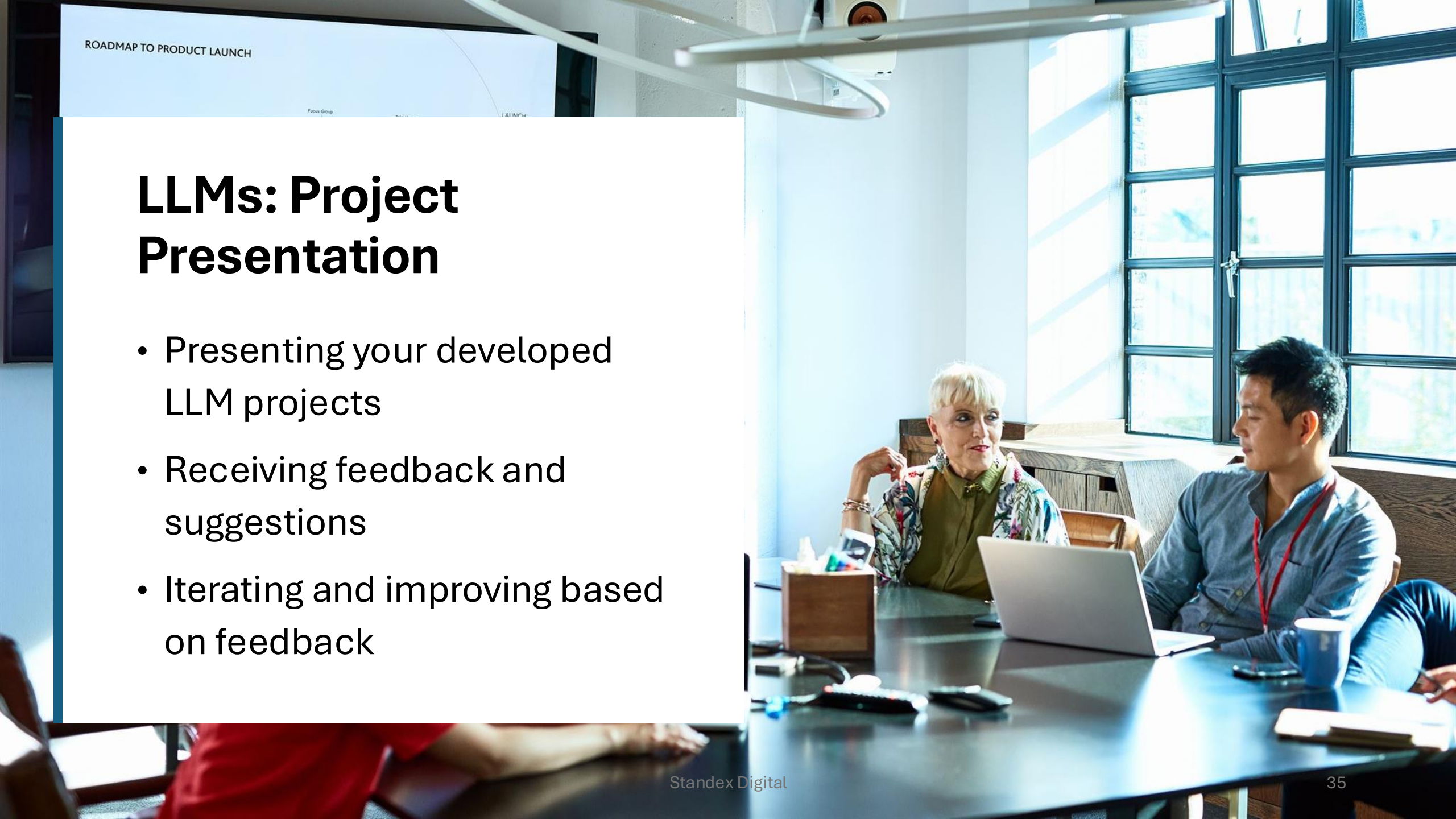


Machine Learning: Project Presentation

- Presenting your developed machine learning projects
- Receiving feedback and suggestions
- Iterating and improving based on feedback

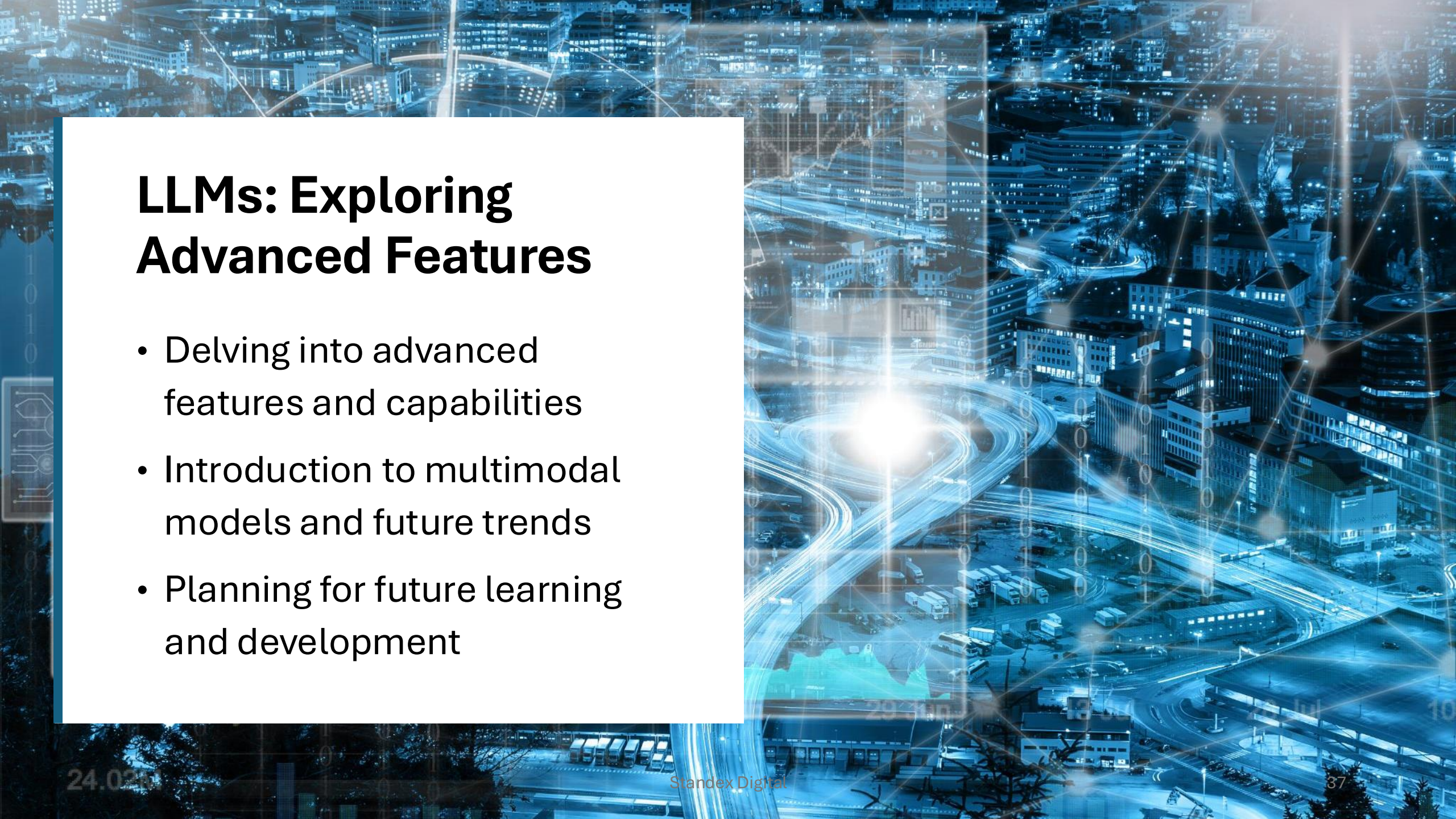


LLMs: Project Presentation

- Presenting your developed LLM projects
- Receiving feedback and suggestions
- Iterating and improving based on feedback

Machine Learning: Exploring Advanced Features

- Delving into advanced features and capabilities
- Introduction to AutoML and automated model selection
- Planning for future learning and development



LLMs: Exploring Advanced Features

- Delving into advanced features and capabilities
- Introduction to multimodal models and future trends
- Planning for future learning and development

Conclusion

- Comprehensive training plan to equip with knowledge and skills
  - Proficient use of machine learning
  - Proficient use of large language models
  - Integration of both for powerful AI-driven solutions