Machine Learning Engineer

Content

Module 1: Google Cloud Big Data and Machine Learning Fundamentals

- **Topics:**
  - Big Data and Machine Learning on Google Cloud
  - Data Engineering for Streaming Data
  - Big Data with BigQuery
  - Machine Learning Options on Google Cloud
  - The Machine Learning Workflow with Vertex AI
- **Hands-On:**
  - AI Platform: Qwik Start
  - Dataprep: Qwik Start
  - Dataflow: Qwik Start - Templates
  - Dataflow: Qwik Start - Python
  - Dataproc: Qwik Start - Console
  - Dataproc: Qwik Start - Command Line

Module 2: How Google Does Machine Learning

- **Topics:**
  - What It Means to be AI-First
  - How Google Does ML
  - Machine Learning Development with Vertex AI
  - Machine Learning Development with Vertex Notebooks
  - Best Practices for Implementing Machine Learning on Vertex AI
  - Responsible AI Development
- **Hands-On:**
  - Vertex AI: Qwik Start
  - Using an Image Dataset to Train an AutoML Model

Module 3: Launching into Machine Learning

- **Topics:**
  - Introduction
  - Get to Know Your Data: Improve Data through Exploratory Data Analysis
  - Machine Learning in Practice
  - Training AutoML Models Using Vertex AI
  - BigQuery Machine Learning: Develop ML Models Where Your Data Lives
  - Optimization
  - Generalization and Sampling
- **Hands-On:**
  - Exploratory Data Analysis Using Python and BigQuery
  - Using BigQuery ML to Predict Penguin Weight

Module 4: TensorFlow on Google Cloud

- **Topics:**
    - o Introduction to the TensorFlow ecosystem
    - o Design and Build an Input Data Pipeline
    - o Building Neural Networks with the TensorFlow and Keras API
    - o Training at Scale with Vertex AI
- **Hands-On:**
    - o Classifying Structured Data using Keras Preprocessing Layers
    - o Build a DNN using the Keras Functional API

Module 5: Feature Engineering

- **Topics:**
    - o Introduction to Vertex AI Feature Store
    - o Raw Data to Features
    - o Feature Engineering
    - o Preprocessing and Feature Creation
    - o Feature Crosses - TensorFlow Playground
    - o Introduction to TensorFlow Transform
- **Hands-On:**
    - o Using Feature Store
    - o Performing Basic Feature Engineering in BQML
    - o Performing Basic Feature Engineering in Keras

Module 6: Machine Learning in the Enterprise

- **Topics:**
    - o Introduction
    - o Understanding the ML Enterprise Workflow
    - o Data in the Enterprise
    - o Science of Machine Learning and Custom Training
    - o Vertex Vizier Hyperparameter Tuning
    - o Prediction and Model Monitoring Using Vertex AI
    - o Vertex AI Pipelines
    - o Best Practices for ML Development
- **Hands-On:**
    - o Vertex Pipelines: Qwik Start
    - o Cloud Natural Language API: Qwik Start
    - o Google Cloud Speech API: Qwik Start
    - o Video Intelligence: Qwik Start

Module 7: End-to-End Machine Learning with TensorFlow on Google Cloud

- **Topics:**
    - o Machine Learning (ML) on Google Cloud Platform (GCP)
    - o Explore the Data
    - o Create the dataset
    - o Build the Model
    - o Operationalize the model

- **Hands-On:**
  - Identify Damaged Car Parts with Vertex AutoML Vision
  - Deploy a BigQuery ML Customer Churn Classifier to Vertex AI for Online Predictions

Module 8: Production Machine Learning Systems

- **Topics:**
  - Introduction to Advanced Machine Learning on Google Cloud
  - Architecting Production ML Systems
  - Designing Adaptable ML Systems
  - Designing High-Performance ML Systems
  - Building Hybrid ML Systems
- **Hands-On:**
  - Structured data prediction using Vertex AI Platform
  - Serving ML Predictions in Batch and Real Time
  - Distributed Training with Keras
  - Using Kubeflow Pipelines with AI Platform

Module 9: Computer Vision Fundamentals with Google Cloud

- **Topics:**
  - Introduction to Computer Vision and Pre-built ML Models for Image Classification
  - Vertex AI and AutoML Vision on Vertex AI
  - Custom Training with Linear, Neural Network and Deep Neural Network models
  - Convolutional Neural Networks
  - Dealing with Image Data
- **Hands-On:**
  - Using the What-If Tool with Image Recognition Models
  - Identifying Bias in Mortgage Data using Cloud AI Platform and the What-if Tool
  - Compare Cloud AI Platform Models using the What-If Tool to Identify potential bias

Module 10: Sequence Models for Time Series and Natural Language Processing on Google Cloud

- **Topics:**
  - Working with Sequences
  - Recurrent Neural Networks
  - Dealing with Longer Sequences
  - Text Classification
  - Reusable Embeddings
  - Encoder-Decoder Models
- **Hands-On:**
  - Time Series Prediction with a DNN Model
  - Time Series Prediction with a Two-Layer RNN Model
  - Text Classification using TensorFlow/Keras on AI Platform

o   Text generation using tensor2tensor on Cloud AI Platform

Module 11: Recommendation Systems on Google Cloud

- **Topics:**
  - o   Recommendation Systems Overview
  - o   Content-Based Recommendation Systems
  - o   Collaborative Filtering Recommendations Systems
  - o   Neural Networks for Recommendation Systems
  - o   Reinforcement Learning
- **Hands-On:**
  - o   Using Neural Networks for Content-Based Filtering
  - o   Collaborative Filtering on Google Analytics data
  - o   ML on GCP: Hybrid Recommendations with the MovieLens Dataset
  - o   Applying Contextual Bandits for Recommendations with Tensorflow and TF-Agents

Module 12: MLOps (Machine Learning Operations) Fundamentals

- **Topics:**
  - o   Why and When do we Need MLOps
  - o   Understanding the Main Kubernetes Components (Optional)
  - o   Introduction to AI Platform Pipelines
  - o   Training, Tuning and Serving on AI Platform
  - o   Kubeflow Pipelines on AI Platform
  - o   CI/CD for Kubeflow Pipelines on AI Platform
- **Hands-On:**
  - o   Working with Cloud Build
  - o   Creating Google Kubernetes Engine Deployments
  - o   Using custom containers with AI Platform Training
  - o   Continuous Training Pipeline with Kubeflow Pipeline and Cloud AI Platform
  - o   CI/CD for a Kubeflow pipeline

Module 13: ML Pipelines on Google Cloud

- **Topics:**
  - o   Introduction to TFX Pipelines
  - o   Pipeline orchestration with TFX
  - o   Custom components and CI/CD for TFX pipelines
  - o   ML Metadata with TFX
  - o   Continuous Training with multiple SDKs, KubeFlow & AI Platform Pipelines
  - o   Continuous Training with Cloud Composer
  - o   ML Pipelines with MLflow
- **Hands-On:**
  - o   TFX Standard Components Walkthrough
  - o   TFX on Cloud AI Platform Pipelines
  - o   CI/CD for a TFX pipeline
  - o   Continuous Training Pipelines with Cloud Composer