

## Preface

Hello there! *The Definitive Guide to Google Vertex AI* is a comprehensive guide on accelerating the development and deployment of real-world ML solutions, with the help of the frameworks and best practices offered by Google as part of Vertex AI within Google Cloud.

Developing large-scale ML solutions and managing ML workflows in production is important for every business nowadays. Google has developed a unified data and AI platform, called Google Vertex AI, to help accelerate your ML journey and MLOps tools for workflow management.

This book is a complete guide that lets you explore all the features of Google Vertex AI, from an easy to advanced level, for end-to-end ML solution development. Starting from data management, model building, and experimentation to deployment, the Vertex AI platform provides you with tooling for no-code and low-code as well as fully customized approaches.

This book also provides a hands-on guide to developing and deploying some real-world applications on Google Cloud Platform, using technologies such as computer vision, NLP, and generative AI. Additionally, this book discusses some pre-built/turnkey solution offerings from Google and shows you how to quickly integrate them into ML projects.

### Who this book is for

If you are a machine learning practitioner who wants to learn end-to-end ML solution development journey on Google Cloud Platform, using the MLOps best practices and tools offered by Google Vertex AI, this book is for you. Starting from data storage and data management, this book takes you through the Vertex AI offerings to build, experiment, optimize, and deploy ML solutions in a fast and scalable way. It also covers topics related to scaling, monitoring, and governing your ML workloads with the help of MLOps tooling on Google Cloud.

### What this book covers

**Chapter 1, Machine Learning Project Life Cycle and Challenges**, provides an introduction to a typical ML project's life cycle. It also highlights the common challenges and limitations of developing ML solutions for real-world use cases.

**Chapter 2, What Is MLOps, and Why Is It So Important for Every ML Team?** covers a set of practices usually known as MLOps that mature ML teams use as part of their ML development life cycle.

**Chapter 3, It's All about Data – Options to Store and Transform ML Datasets**, provides an overview of the different options available for storing data and analyzing data in Google Cloud. It also helps you to choose the best option based on your requirements.

**Chapter 4, Vertex AI Workbench – a One-Stop Tool for AI/ML Development Needs**, demonstrates the use of a Vertex AI Workbench-based notebook environment for end-to-end ML solution development.

**Chapter 5, No-Code Options for Building ML Models**, covers GCP AutoML capabilities that can help users build state-of-the-art ML models, without the need for code or deep data science knowledge.

**Chapter 6, Low-Code Options for Building ML Models**, covers how to use BigQuery ML (BQML) to build and evaluate ML models using just SQL.

**Chapter 7, Training Fully Custom ML Models with Vertex AI**, explores how to develop fully customized ML solutions using the Vertex AI tooling available on Google Cloud. This chapter also shows you how to monitor training progress and evaluate ML models.

**Chapter 8, ML Model Explainability**, discusses concepts around ML model explainability and describes how to effectively incorporate explainable models into your ML solutions, using Vertex AI.

**Chapter 9, Model Optimizations – Hyperparameter Tuning and NAS**, explains the need for model optimization. It also covers two model optimization frameworks in detail – hyperparameter tuning and Neural Architecture Search (NAS).

**Chapter 10, Vertex AI Deployment and Automation Tools – Orchestration through Managed Kubeflow Pipelines**, provides an overview of ML orchestrations and automation tools. This chapter further covers the implementation examples of ML workflow orchestration, using Cloud Composer and Vertex AI pipelines.

**Chapter 11, MLOps Governance with Vertex AI**, describes the different Google Cloud ML tools that can be used to deploy governance and monitoring controls.

**Chapter 12, Vertex AI – Generative AI Tools**, provides an overview of Vertex AI's recently launched generative AI features, such as Model Garden and Generative AI Studio.

**Chapter 13, Document AI – an End-to-End Solution for Processing Documents**, provides an overview of the document processing-related offerings on Google Cloud, such as OCR and Form Parser. This chapter also shows how to combine prebuilt and custom document processing solutions to develop a custom document processor.

**Chapter 14, ML APIs for Vision, NLP, and Speech**, provides an overview of the pre-built state-of-the-art solutions from Google for computer vision, NLP, and speech-related use cases. It also shows you how to integrate them to solve real-world problems.

**Chapter 15, Recommender Systems – Predict What Movies a User Would Like to Watch**, provides an overview of popular approaches to building recommender systems and how to deploy one using Vertex AI.

**Chapter 16, Vision-Based Defect Detection System – Machines Can See Now**, shows you how to develop end-to-end computer vision-based custom solutions using Vertex AI tooling on Google Cloud, enabling you to solve real-world use cases.

**Chapter 17, Natural Language Models – Detecting Fake News Articles**, shows you how to develop NLP-related, end-to-end custom ML solutions on Google Cloud. This chapter explores a classical as well as a deep learning-based approach to solving the problem of detecting fake news articles.

### To get the most out of this book

You will need to have a basic understanding of machine learning and deep learning techniques. You also should have beginner-level experience with the Python programming language.

Software/hardware for the coding exercises	Operating system requirements
Python 3.8 or later	Windows, macOS, or Linux
Google Cloud SDK	Windows, macOS, or Linux
A Google Cloud Platform account	N/A

```
export PROJECT=$(gcloud config list project --format "value")
docker build . -f Dockerfile.example -t "gcr.io/${PROJECT}/tf-c
docker push "gcr.io/${PROJECT}/tf-custom:latest"
```

Any command-line input or output is written as follows:

```
$ mkdir css
$ cd css
```

**Bold**: Indicates a new term, an important word, or words that you see on screen. For instance, words in menus or dialog boxes appear in **bold**. Here is an example: “In the **Environment** field, select **Custom Container**.”

#### TIPS OR IMPORTANT NOTES

Appear like this.

### Get in touch

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Preface

The Definitive Guide to Google Vertex AI

Part 1: The Importance of MLOps in a Real-World...

◀ The Definitive Guide to Google Vertex AI

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