Fine-tuning Models

In this module, you learn to ...

01 Evaluate scenarios for creating tuned models

02 Build workflows for tuning and deploying models

03 Use tuned models in your applications

Topics

01	Tuned Models
02	Preparing a Model Tuning Dataset
03	Creating a Tuning Job

Use model tuning to improve model performance on specific tasks

- When few-shot prompting and adding context are not adequate to your use case
- Allows you to teach the model more about what your expected output should be
- You specify a custom dataset which includes prompts along with the expected output
  - Like adding examples, but more of them with custom training
- The custom training jobs learn the outputs (called weights)

Tuning is required when you want output that deviates from general language patterns

- Specific structures or formats for generating output
- Specific behaviors such as when to provide a terse or verbose output
- Specific customized outputs for specific types of inputs

When custom training may be required: Classification

- Classification with custom classes (groups)
  - Give the model examples, with the correct answers

```
input_text:
Classify the following text into one of the following classes:
[HR, Sales, Marketing, Customer Service].
Text: Are you currently hiring?

output_text:
HR
```

When custom training may be required: Summarization

- Summaries that require specific output
- In the example below, you want to remove personally identifiable information (PII) in a chat summary

```
input_text:
Summarize:
Jessica: That sounds great! See you in Times Square!
Alexander: See you at 10!

output_text:
#Person1 and #Person2 agree to meet at Times Square at 10:00 AM
```

When custom training may be required: Extractive question answering

- The question is about a context and the answer is a substring of the context

```
input_text:
context: There is evidence that there have been significant changes in
Amazon rainforest vegetation over the last 21,000 years through the Last
Glacial Maximum (LGM) and subsequent deglaciation.
question: What does LGM stand for?

output_text:
Last Glacial Maximum
```

Including context in your training data

- In the example below, the **input_text** consists of both a **context** section and a **question** section

```
input_text:
context: There is evidence that there have been significant changes in
Amazon rainforest vegetation over the last 21,000 years through the Last
Glacial Maximum (LGM) and subsequent deglaciation.
question: What does LGM stand for?
```

- The context provides additional information for answering the question
- If your training data is formatted in this way, you must format prompts in the same way when using your model for inference
  - I.e. Whatever sections your training data has as input, must be included in prompts in the same order when using the model

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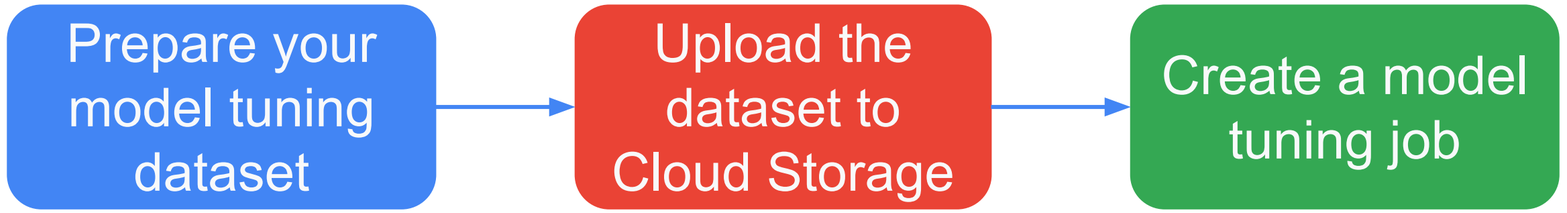
Model tuning workflow on Vertex AI



- After tuning, the model is automatically deployed to a Vertex AI endpoint using the name you provide in the tuning job
- The model is also available in Vertex AI Studio when creating prompts

Prepare your model tuning dataset

- The training data must be in JSONL format
  - The “L” is for “Line”
  - Each line in the JSONL file is one example
  - It is not an array of objects, it is one object per line
- Each object must have the properties `input_text` and `output_text`

custom-training-data.jsonl

Users > doug > {} custom-training-data.jsonl

```
1  {"input_text": "question: How many copies of Gears of War 3 were sold ? context: Like
2  {"input_text": "question: How many parishes are there in Louisiana ? context: The U .
```

It is important to include instructions into the training data

- The following has no instructions, so it is not a good example

```
{"input_text": "5 stocks to buy now","output_text": "business"}
```

- The following has instructions, so it is a better example

```
{"input_text": "Classify the following text into one of the following classes:
[business, entertainment] Text: 5 stocks to buy now","output_text": "business"}
```

Including context within the input text

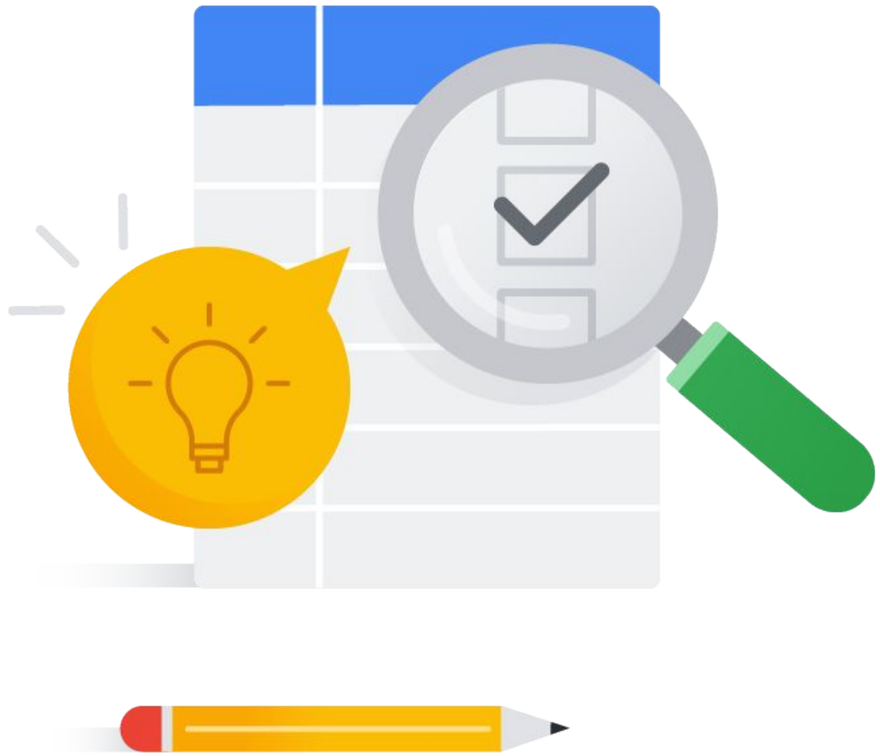
- Notice that the following `input_text` has question and context sections
  - When using the model, remember that prompts need to be formatted the same way
  - Be consistent

```
{"input_text": "question: How many parishes are there in Louisiana? context: The U.S. state of Louisiana is divided into 64 parishes (French: paroisses) in the same manner that 48 other states of the United States are divided into counties, and Alaska is divided into boroughs.", "output_text": "64"}
```

Do Now: Exploring Sample Training Data

5 min

1. Go to: https://github.com/roitraining/genai-model-tuning-examples
2. You will find some example fine-tuning datasets
3. Click on a couple of them and explore the examples
   a. Each file has 1 example per line
   b. Each example hss input_text and output text attributes



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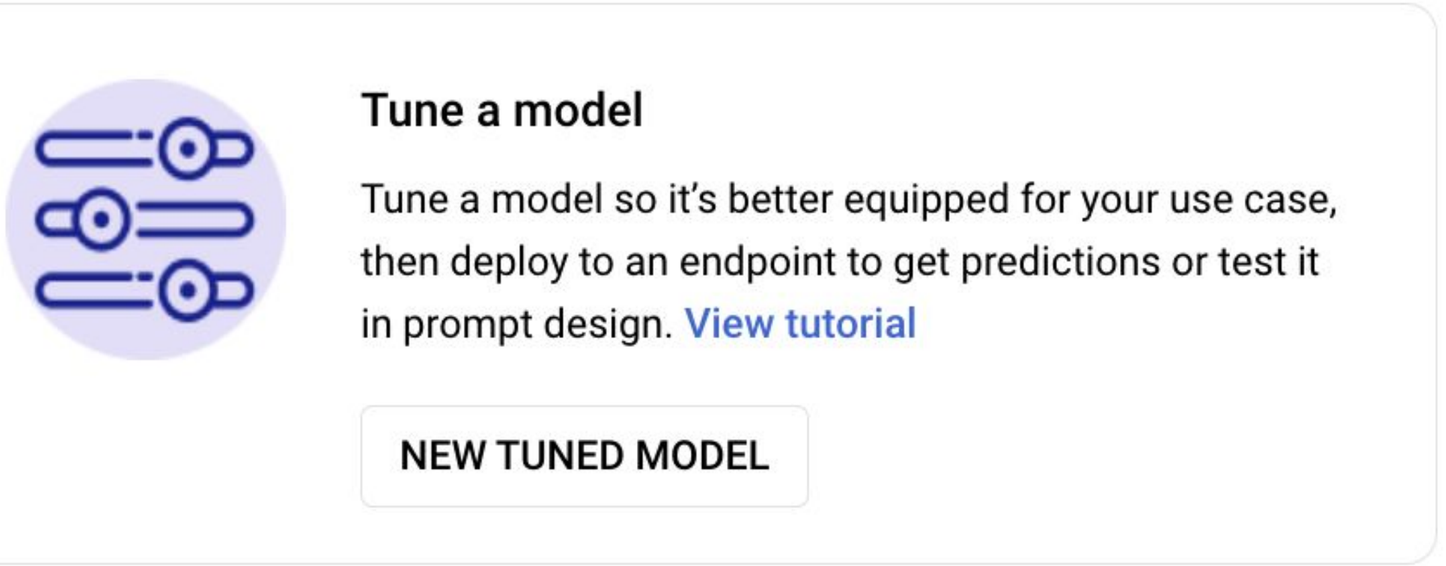
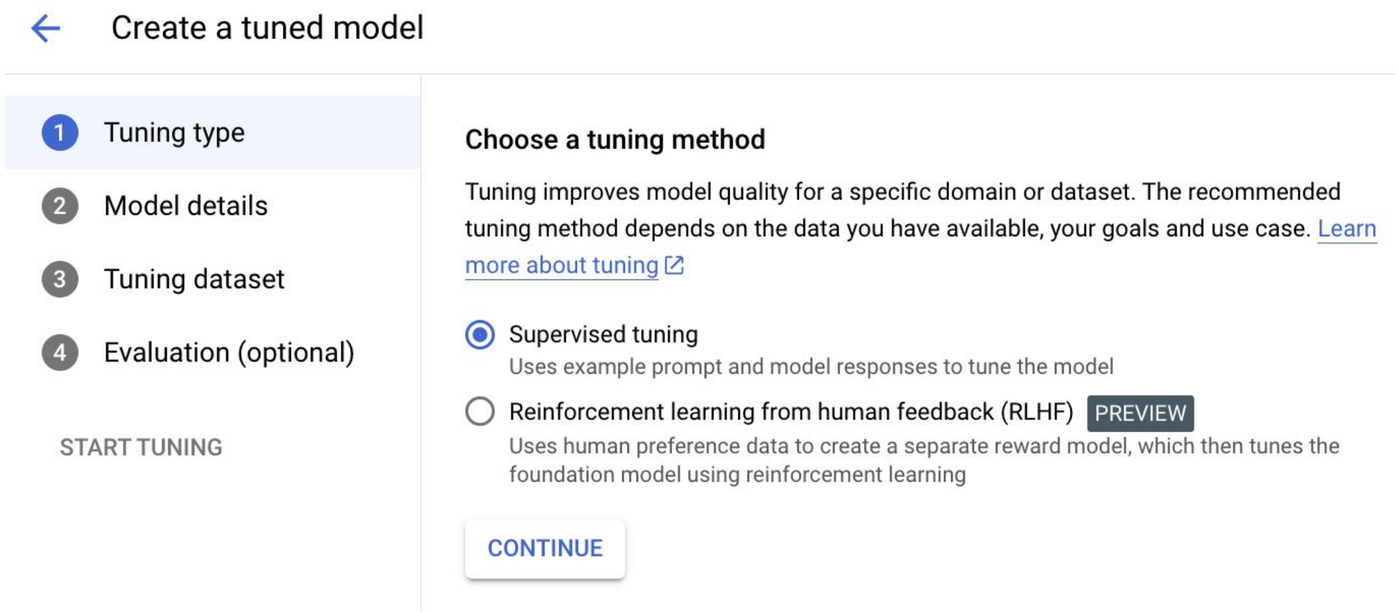
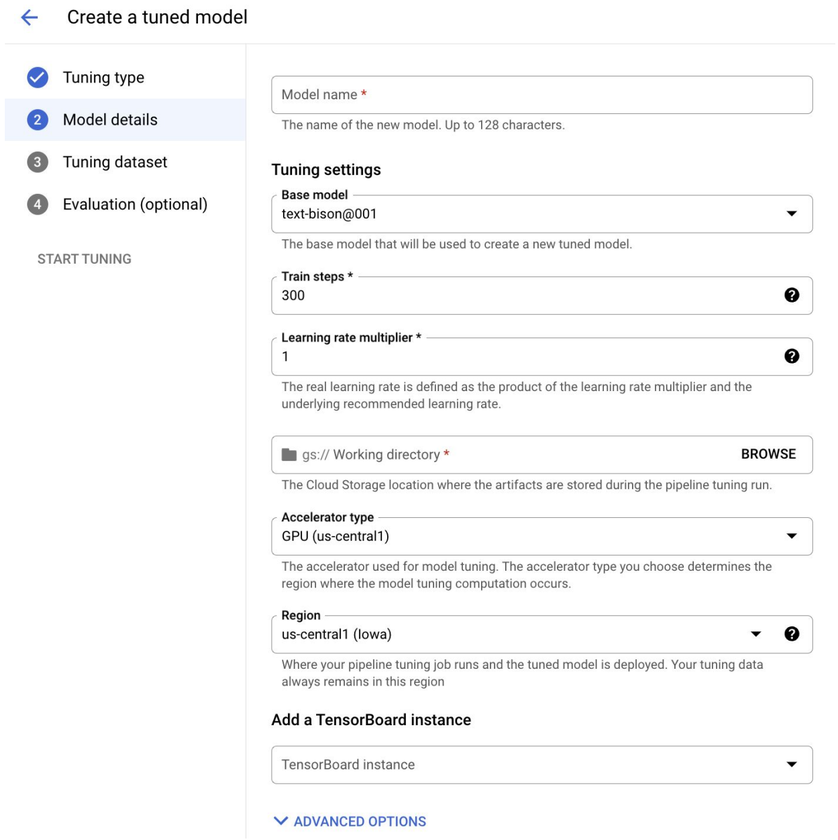
Select the Tune a model task in Vertex AI Studio



Specify the location of the data and the job parameters

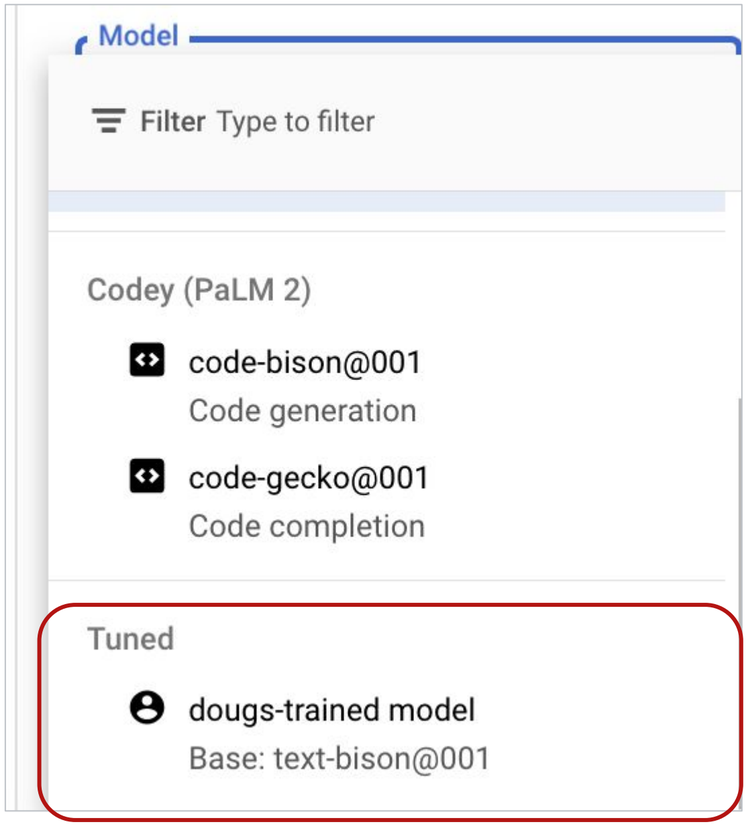




The number of training examples and training steps needed depends on the task

Task	Suggested # of examples	Training steps
Classification	100+	100-500
Summarization	100-500+	200-1000
Extractive QA	100+	100-500

Tuned models are available from Vertex AI Studio



Vertex AI Studio will generate the code for using tuned models

View code

PYTHON | PYTHON COLAB | CURL

Use this script to request a model response in your application.

1. Set up the Vertex AI SDK for Python
2. Use the following code in your application to request a model response

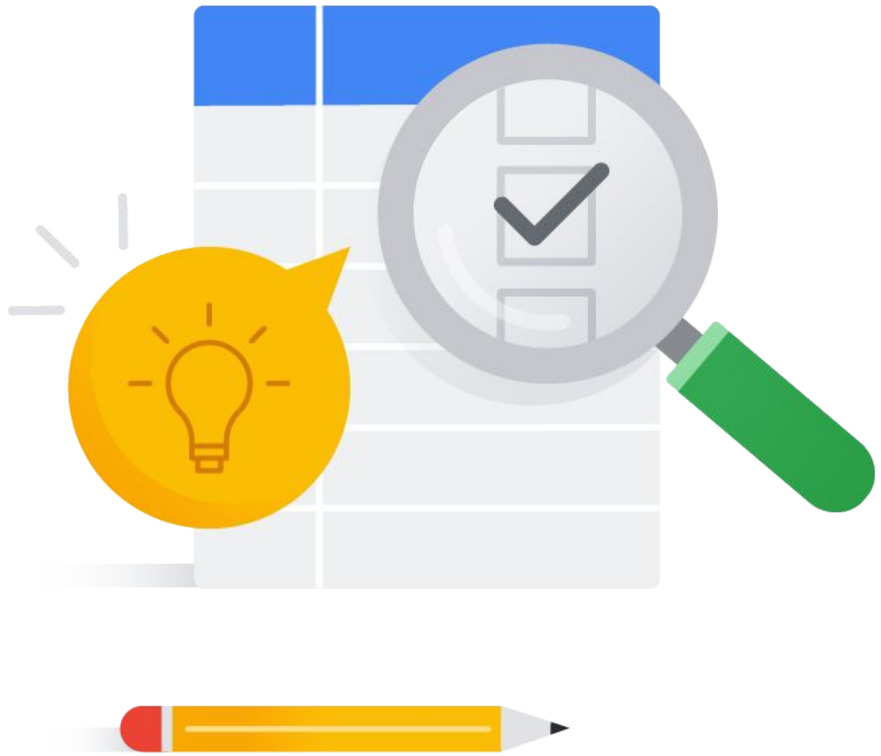
```
import vertexai
from vertexai.preview.language_models import TextGenerationModel

vertexai.init(project="982785856251", location="us-central1")
parameters = {
    "temperature": 0.2,
    "max_output_tokens": 256,
    "top_p": 0.8,
    "top_k": 40
}
model = TextGenerationModel.from_pretrained("text-bison@001")
model = model.get_tuned_model("projects/982785856251/locations/us-central1/models/167990643268360
response = model.predict(
    """,
    **parameters
)
print(f"Response from Model: {response.text}")
```

Demo

15 min

Fine-Tuning Models for Specific Use Cases



Please mark your attendance at

goo.gle/genai-checkin

Thank you for attending this training!

We would love your feedback! Please take 3-5 minutes to complete our survey and help inform content and program related improvements.

1. **Scan** our QR Code
2. **Enter** the attendance code provided by your instructor
3. **Complete** the survey

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