```python
# Copyright 2018 The TensorFlow GAN Authors. All Rights Reserved.
#
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# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
# ==============================================================================
from google.colab import drive
drive.mount('/content/drive')
```

```
    Drive already mounted at /content/drive; to attempt to forcibly remount, call driv
```

```python
# Check that imports for the rest of the file work.
import tensorflow.compat.v1 as tf
!pip install tensorflow-gan
import tensorflow_gan as tfgan
import tensorflow_datasets as tfds
import matplotlib.pyplot as plt
import numpy as np
# Allow matplotlib images to render immediately.
%matplotlib inline
tf.logging.set_verbosity(tf.logging.ERROR)  # Disable noisy outputs.
```

```
    Requirement already satisfied: tensorflow-gan in /usr/local/lib/python3.10/dist-pa
    Requirement already satisfied: tensorflow-hub>=0.2 in /usr/local/lib/python3.10/di
    Requirement already satisfied: tensorflow-probability>=0.7 in /usr/local/lib/pytho
    Requirement already satisfied: numpy>=1.12.0 in /usr/local/lib/python3.10/dist-pac
    Requirement already satisfied: protobuf>=3.19.6 in /usr/local/lib/python3.10/dist-
    Requirement already satisfied: absl-py in /usr/local/lib/python3.10/dist-packages
    Requirement already satisfied: six>=1.10.0 in /usr/local/lib/python3.10/dist-packa
    Requirement already satisfied: decorator in /usr/local/lib/python3.10/dist-package
    Requirement already satisfied: cloudpickle>=1.3 in /usr/local/lib/python3.10/dist-
    Requirement already satisfied: gast>=0.3.2 in /usr/local/lib/python3.10/dist-packa
    Requirement already satisfied: dm-tree in /usr/local/lib/python3.10/dist-packages
    Requirement already satisfied: typing-extensions<4.6.0 in /usr/local/lib/python3.1
```

```python
import tensorflow_datasets as tfds
import tensorflow.compat.v1 as tf
import glob

def input_fn(mode, params):
    assert 'batch_size' in params
    assert 'noise_dims' in params
    bs = params['batch_size']
    nd = params['noise_dims']
    img_size = 28
    just_noise = (mode == tf.estimator.ModeKeys.PREDICT)

    # Генерація шуму
    noise_ds = (tf.data.Dataset.from_tensors(0).repeat()
                .map(lambda _: tf.random.normal([bs, nd])))

    if just_noise:
        return noise_ds

    # Функція для завантаження та обробки зображень
    def load_and_preprocess_image(path):
      image = tf.io.read_file(path)
      image = tf.image.decode_png(image, channels=3)  # Завантаження як RGB
      image = tf.image.resize(image, [img_size, img_size])
      image = tf.image.rgb_to_grayscale(image)  # Перетворення в чорно-біле
      image = (tf.cast(image, tf.float32) - 127.5) / 127.5
      return image

    # Створення набору даних з ваших зображень
    pattern = r"/content/drive/MyDrive/Colab_Notebooks/data/All_leaves/*.png"
    image_paths = glob.glob(pattern)
```

```python
images_ds = (tf.data.Dataset.from_tensor_slices(image_paths)
             .map(load_and_preprocess_image)
             .repeat())

# Перемішування та пакування
if mode == tf.estimator.ModeKeys.TRAIN:
    images_ds = (images_ds.shuffle(buffer_size=10000, reshuffle_each_iteration=True)
                 .batch(bs, drop_remainder=True)
                 .prefetch(tf.data.experimental.AUTOTUNE))
else:
    images_ds = images_ds.batch(bs, drop_remainder=True)

return tf.data.Dataset.zip((noise_ds, images_ds))


import matplotlib.pyplot as plt
import tensorflow_datasets as tfds
import tensorflow_gan as tfgan
import numpy as np

params = {'batch_size': 100, 'noise_dims':64, 'image_size':28}
with tf.Graph().as_default():
  ds = input_fn(tf.estimator.ModeKeys.TRAIN, params)
  numpy_imgs = next(iter(tfds.as_numpy(ds)))[1]
  print(numpy_imgs.shape)
img_grid = tfgan.eval.python_image_grid(numpy_imgs, grid_shape=(10, 10))
plt.axis('off')
plt.imshow(np.squeeze(img_grid))
plt.show()
```
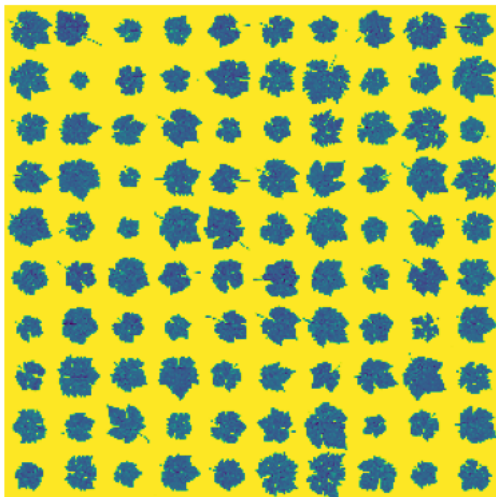
```
(100, 28, 28, 1)
```


- Added highlighting for the `%%python` cell magic
- Launched AI coding features for Pro/Pro+ users in more locales
- Python package upgrades
  - bigframes 0.12.0 -> 0.13.0
- Python package inclusions
  - transformers 4.35.2
  - google-generativeai 0.2.2

2023-11-08
- Launched Secrets, for safe storage of private keys on Colab ([tweet](#))
- Fixed issue where TensorBoard would not load ([#3990](#))
- Python package upgrades
  - lightgbm 4.0.0 -> 4.1.0
  - bigframes 0.10.0 -> 0.12.0
  - bokeh 3.2.2 -> 3.3.0
  - duckdb 0.8.1 -> 0.9.1
  - numba 0.56.4 -> 0.58.1
  - tweepy 4.13.0 -> 4.14.0
  - jax 0.4.16 -> 0.4.20
  - jaxlib 0.4.16 -> 0.4.20

2023-10-23
- Updated the **Open notebook** dialog for better usability and support for smaller screen sizes
- Added smart paste support for data from Google Sheets for R notebooks
- Enabled showing release notes in a tab
- Launched AI coding features for Pro/Pro+ users in Australia AU Canada CA India IN and Japan JP ([tweet](#))
- Python package upgrades
  - earthengine-api 0.1.357 -> 0.1.375
  - flax 0.7.2 -> 0.7.4
  - geemap 0.27.4 -> 0.28.2
  - jax 0.4.14 -> 0.4.16
  - jaxlib 0.4.14 -> 0.4.16
  - keras 2.13.1 -> 2.14.0
  - tensorboard 2.13.0 -> 2.14.1
  - tensorflow 2.13.0 -> 2.14.0
  - tensorflow-gcs-config 2.13.0 -> 2.14.0
  - tensorflow-hub 0.14.0 -> 0.15.0
  - tensorflow-probability 0.20.1 -> 0.22.0
  - torch 2.0.1 -> 2.1.0
  - torchaudio 2.0.2 -> 2.1.0
  - torchtext 0.15.2 -> 0.16.0
  - torchvision 0.15.2 -> 0.16.0
  - xgboost 1.7.6 -> 2.0.0
- Python package inclusions
  - bigframes 0.10.0
  - malloy 2023.1056

2023-09-22
- Added the ability to scope an AI generated suggestion to a specific Pandas dataframe ([tweet](#))
- Added Colab link previews to Docs ([tweet](#))
- Added smart paste support for data from Google Sheets
- Increased font size of dropdowns in interactive forms
- Improved rendering of the notebook when printing
- Python package upgrades
  - tensorflow 2.12.0 -> 2.13.0
  - tensorboard 2.12.3 -> 2.13.0
  - keras 2.12.0 -> 2.13.1
  - tensorflow-gcs-config 2.12.0 -> 2.13.
  - scipy 1.10.1-> 1.11.2
  - cython 0.29.6 -> 3.0.2
- Python package inclusions

```python
def _dense(inputs, units, l2_weight):
  return tf.layers.dense(
      inputs, units, None,
      kernel_initializer=tf.keras.initializers.glorot_uniform,
      kernel_regularizer=tf.keras.regularizers.l2(l=l2_weight),
      bias_regularizer=tf.keras.regularizers.l2(l=l2_weight))

def _batch_norm(inputs, is_training):
  return tf.layers.batch_normalization(
      inputs, momentum=0.999, epsilon=0.001, training=is_training)

def _deconv2d(inputs, filters, kernel_size, stride, l2_weight):
  return tf.layers.conv2d_transpose(
      inputs, filters, [kernel_size, kernel_size], strides=[stride, stride],
      activation=tf.nn.relu, padding='same',
      kernel_initializer=tf.keras.initializers.glorot_uniform,
      kernel_regularizer=tf.keras.regularizers.l2(l=l2_weight),
      bias_regularizer=tf.keras.regularizers.l2(l=l2_weight))

def _conv2d(inputs, filters, kernel_size, stride, l2_weight):
  return tf.layers.conv2d(
      inputs, filters, [kernel_size, kernel_size], strides=[stride, stride],
      activation=None, padding='same',
      kernel_initializer=tf.keras.initializers.glorot_uniform,
      kernel_regularizer=tf.keras.regularizers.l2(l=l2_weight),
      bias_regularizer=tf.keras.regularizers.l2(l=l2_weight))


def unconditional_generator(noise, mode, weight_decay=2.5e-5):
  """Generator to produce unconditional MNIST images."""
  is_training = (mode == tf.estimator.ModeKeys.TRAIN)

  net = _dense(noise, 1024, weight_decay)
  net = _batch_norm(net, is_training)
  net = tf.nn.relu(net)

  net = _dense(net, 7 * 7 * 256, weight_decay)
  net = _batch_norm(net, is_training)
  net = tf.nn.relu(net)

  net = tf.reshape(net, [-1, 7, 7, 256])
  net = _deconv2d(net, 64, 4, 2, weight_decay)
  net = _deconv2d(net, 64, 4, 2, weight_decay)
  # Make sure that generator output is in the same range as `inputs`
  # ie [-1, 1].
  net = _conv2d(net, 1, 4, 1, 0.0)
  net = tf.tanh(net)

  return net


_leaky_relu = lambda net: tf.nn.leaky_relu(net, alpha=0.01)

def unconditional_discriminator(img, unused_conditioning, mode, weight_decay=2.5e-5):
  del unused_conditioning
  is_training = (mode == tf.estimator.ModeKeys.TRAIN)

  net = _conv2d(img, 64, 4, 2, weight_decay)
  net = _leaky_relu(net)

  net = _conv2d(net, 128, 4, 2, weight_decay)
  net = _leaky_relu(net)

  net = tf.layers.flatten(net)

  net = _dense(net, 1024, weight_decay)
  net = _batch_norm(net, is_training)
  net = _leaky_relu(net)

  net = _dense(net, 1, weight_decay)

  return net
```

- Fixed add-apt-repository command on Ubuntu 22.04 runtime ([#3867](#))
- Python package upgrades
  - bokeh 2.4.3 -> 3.2.2
  - cmake 3.25.2 -> 3.27.2
  - cryptography 3.4.8 -> 41.0.3
  - dask 2022.12.1 -> 2023.8.0
  - distributed 2022.12.1 -> 2023.8.0
  - earthengine-api 0.1.358 -> 0.1.364
  - flax 0.7.0 -> 0.7.2
  - ipython-sql 0.4.0 -> 0.5.0
  - jax 0.4.13 -> 0.4.14
  - jaxlib 0.4.13 -> 0.4.14
  - lightgbm 3.3.5 -> 4.0.0
  - mkl 2019.0 -> 2023.2.0
  - notebook 6.4.8 -> 6.5.5
  - numpy 1.22.4 -> 1.23.5
  - opencv-python 4.7.0.72 -> 4.8.0.76
  - pillow 8.4.0 -> 9.4.0
  - plotly 5.13.1 -> 5.15.0
  - prettytable 0.7.2 -> 3.8.0
  - pytensor 2.10.1 -> 2.14.2
  - spacy 3.5.4 -> 3.6.1
  - statsmodels 0.13.5 -> 0.14.0
  - xarray 2022.12.0 -> 2023.7.0
- Python package inclusions
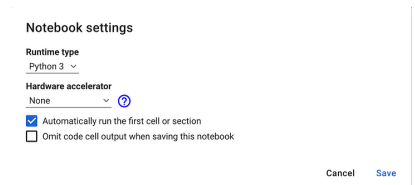 - PyDrive2 1.6.3

2023-07-21

- Launched auto-plotting for dataframes, available using the chart button that shows up alongside datatables ([post](#))

- Added a menu to the table of contents to support running a section or collapsing/expanding sections ([post](#))
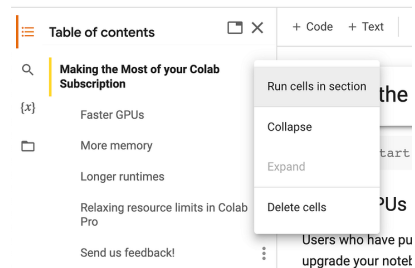
- Added an option to automatically run the first cell or section, available under Edit -> Notebook settings ([post](#))

- Launched Pro/Pro+ to Algeria, Argentina, Chile, Ecuador, Egypt, Ghana, Kenya, Malaysia, Nepal, Nigeria, Peru, Rwanda, Saudi Arabia, South Africa, Sri Lanka, Tunisia, and Ukraine ([tweet](#))
- Added a command, "Toggle tab moves focus" for toggling tab trapping in the editor (Tools -> Command palette, "Toggle tab moves focus")
- Fixed issue where files.upload() was sometimes returning an incorrect filename ([#1550](#))
- Fixed f-string syntax highlighting bug ([#3802](#))

```python
from tensorflow_gan.examples.mnist import util as eval_util
import os

def get_eval_metric_ops_fn(gan_model):
  real_data_logits = tf.reduce_mean(gan_model.discriminator_real_outputs)
  gen_data_logits = tf.reduce_mean(gan_model.discriminator_gen_outputs)
  real_mnist_score = eval_util.mnist_score(gan_model.real_data)
  generated_mnist_score = eval_util.mnist_score(gan_model.generated_data)
  frechet_distance = eval_util.mnist_frechet_distance(
      gan_model.real_data, gan_model.generated_data)
  return {
      'real_data_logits': tf.metrics.mean(real_data_logits),
      'gen_data_logits': tf.metrics.mean(gen_data_logits),
      'real_mnist_score': tf.metrics.mean(real_mnist_score),
      'mnist_score': tf.metrics.mean(generated_mnist_score),
      'frechet_distance': tf.metrics.mean(frechet_distance),
  }
```

```python
train_batch_size = 64 #@param
noise_dimensions = 64 #@param
generator_lr = 0.001 #@param
discriminator_lr = 0.0002 #@param
```

train_batch_size: 64

noise_dimensions: 64

generator_lr: 0.001

discriminator_lr: 0.0002

```python
def gen_opt():
  gstep = tf.train.get_or_create_global_st
  base_lr = generator_lr
  # Halve the learning rate at 1000 steps.
  lr = tf.cond(gstep < 1000, lambda: base_
  return tf.train.AdamOptimizer(lr, 0.5)

gan_estimator = tfgan.estimator.GANEstimat
    generator_fn=unconditional_generator,
    discriminator_fn=unconditional_discrim
    generator_loss_fn=tfgan.losses.wassers
    discriminator_loss_fn=tfgan.losses.was
    params={'batch_size': train_batch_size
    generator_optimizer=gen_opt,
    discriminator_optimizer=tf.train.AdamO
    get_eval_metric_ops_fn=get_eval_metric
```

```python
# Disable noisy output.
tf.autograph.set_verbosity(0, False)
```

steps_per_eval: 250

max_train_steps: 500

```python
import time
steps_per_eval = 250 #@param
max_train_steps = 500 #@param
batches_for_eval_metrics = 100 #@param
```

batches_for_eval_metrics: 100

```python
# Used to track metrics.
steps = []
real_logits, fake_logits = [], []
real_mnist_scores, mnist_scores, frechet_distances = [], [], []

cur_step = 0
start_time = time.time()
while cur_step < max_train_steps:
  next_step = min(cur_step + steps_per_eval, max_train_steps)

  start = time.time()
  gan_estimator.train(input_fn, max_steps=next_step)
  steps_taken = next_step - cur_step
  time_taken = time.time() - start
  print('Time since start: %.2f min' % ((time.time() - start_time) / 60.0))
  print('Trained from step %i to %i in %.2f steps / sec' % (
      cur_step, next_step, steps_taken / time_taken))
  cur_step = next_step

  # Calculate some metrics.
  metrics = gan_estimator.evaluate(input_fn, steps=batches_for_eval_metrics)
  steps.append(cur_step)
  real_logits.append(metrics['real_data_logits'])
  fake_logits.append(metrics['gen_data_logits'])
  real_mnist_scores.append(metrics['real_mnist_score'])
  mnist_scores.append(metrics['mnist_score'])
  frechet_distances.append(metrics['frechet_distance'])
```

- earthengine-api 0.1.357 -> 0.1.358
- GDAL 3.3.2->3.4.3
- google-cloud-bigquery-storage 2.20.0 -> 2.22.2
- gspread-dataframe 3.0.8 -> 3.3.1
- holidays 0.27.1 -> 0.29
- jax 0.4.10 -> jax 0.4.13
- jaxlib 0.4.10 -> jax 0.4.13
- jupyterlab-widgets 3.0.7 -> 3.0.8
- nbformat 5.9.0 -> 5.9.1
- opencv-python-headless 4.7.0.72 -> 4.8.0.74
- pygame 2.4.0 -> 2.5.0
- spacy 3.5.3 -> 3.5.4
- SQLAlchemy 2.0.16 -> 2.0.19
- tabulate 0.8.10 -> 0.9.0
- tensorflow-hub 0.13.0 -> 0.14.0

2023-06-23
- Launched AI coding features to subscribed users starting with Pro+ users in the US (tweet, post)
- Added the Kernel Selector in the Notebook Settings (tweet)
- Fixed double space trimming issue in markdown #3766
- Fixed run button indicator not always centered #3609
- Fixed inconsistencies for automatic indentation on multi-line #3697
- Upgraded Python from 3.10.11 to 3.10.12
- Python package updates:
  - duckdb 0.7.1 -> 0.8.1
  - earthengine-api 0.1.350 -> 0.1.357
  - flax 0.6.9 -> 0.6.11
  - google-cloud-bigquery 3.9.0 -> 3.10.0
  - google-cloud-bigquery-storage 2.19.1 -> 2.20.0
  - grpcio 1.54.0 -> 1.56.0
  - holidays 0.25 -> 0.27.1
  - nbformat 5.8.0 -> 5.9.0
  - prophet 1.1.3 -> 1.1.4
  - pydata-google-auth 1.7.0 -> 1.8.0
  - spacy 3.5.2 -> 3.5.3
  - tensorboard 2.12.2 -> 2.12.3
  - xgboost 1.7.5 -> 1.7.6
- Python package inclusions:
  - gcsfs 2023.6.0
  - geopandas 0.13.2
  - google-cloud-bigquery-connection 1.12.0
  - google-cloud-functions 1.13.0
  - grpc-google-iam-v1 0.12.6
  - multidict 6.0.4
  - tensorboard-data-server 0.7.1

2023-06-02
- Released the new site colab.google
- Published Colab's Docker runtime image to us-docker.pkg.dev/colab-images/public/runtime (tweet, instructions)
- Launched support for Google children accounts (tweet)
- Launched DagsHub integration (tweet, post)
- Upgraded to Monaco Editor Version 0.37.1
- Fixed various Vim keybinding bugs
- Fixed issue where the N and P letters sometimes couldn't be typed (#3664)
- Fixed rendering support for compositional inputs (#3660, #3679)
- Fixed lag in notebooks with lots of cells (#3676)
- Improved support for R by adding a Runtime type notebook setting (Edit -> Notebook settings)
- Improved documentation for connecting to a local runtime (Connect -> Connect to a local runtime)
- Python package updates:
  - holidays 0.23 -> 0.25
  - jax 0.4.8 -> 0.4.10
  - jaxlib 0.4.8 -> 0.4.10
  - pip 23.0.1 -> 23.1.2

```
print( Average discriminator output on Real: %.2f  Fake: %.2f  % (
    real_logits[-1], fake_logits[-1]))
print('Inception Score: %.2f / %.2f  Frechet Distance: %.2f' % (
    mnist_scores[-1], real_mnist_scores[-1], frechet_distances[-1]))


# Vizualize some images.
iterator = gan_estimator.predict(
    input_fn, hooks=[tf.train.StopAtStepHook(num_steps=21)])
try:
  imgs = np.array([next(iterator) for _ in range(20)])
except StopIteration:
  pass
tiled = tfgan.eval.python_image_grid(imgs, grid_shape=(2, 10))
plt.axis('off')
plt.imshow(np.squeeze(tiled))
plt.show()


# Plot the metrics vs step.
plt.title(' distance per step')
plt.plot(steps, frechet_distances)
plt.figure()
plt.title('Score per step')
plt.plot(steps, mnist_scores)
plt.plot(steps, real_mnist_scores)
plt.show()
```

- Released GPU type selection for paid users, allowing them to choose a preferred NVidia GPU
- Upgraded R from 4.2.3 to 4.3.0
- Upgraded Python from 3.9.16 to 3.10.11
- Python package updates:
    - attrs 22.2.0 -> attrs 23.1.0
    - earthengine-api 0.1.349 -> earthengine-api 0.1.350
    - flax 0.6.8 -> 0.6.9
    - grpcio 1.53.0 -> 1.54.0
    - nbclient 0.7.3 -> 0.7.4
    - tensorflow-datasets 4.8.3 -> 4.9.2
    - termcolor 2.2.0 -> 2.3.0
    - zict 2.2.0 -> 3.0.0

2023-04-14
- Python package updates:
    - google-api-python-client 2.70.0 -> 2.84.0
    - google-auth-oauthlib 0.4.6 -> 1.0.0
    - google-cloud-bigquery 3.4.2 -> 3.9.0
    - google-cloud-datastore 2.11.1 -> 2.15.1
    - google-cloud-firestore 2.7.3 -> 2.11.0
    - google-cloud-language 2.6.1 -> 2.9.1
    - google-cloud-storage 2.7.0 -> 2.8.0
    - google-cloud-translate 3.8.4 -> 3.11.1
    - networkx 3.0 -> 3.1
    - notebook 6.3.0 -> 6.4.8
    - jax 0.4.7 -> 0.4.8
    - pandas 1.4.4 -> 1.5.3
    - spacy 3.5.1 -> 3.5.2
    - SQLAlchemy 1.4.47 -> 2.0.9
    - xgboost 1.7.4 -> 1.7.5

2023-03-31
- Improve bash ! syntax highlighting ([GitHub issue](#))
- Fix bug where VIM keybindings weren't working in the file editor
- Upgraded R from 4.2.2 to 4.2.3
- Python package updates:
    - arviz 0.12.1 --> 0.15.1
    - astropy 4.3.1 --> 5.2.2
    - dopamine-rl 1.0.5 --> 4.0.6
    - gensim 3.6.0 --> 4.3.1
    - ipykernel 5.3.4 -> 5.5.6
    - ipython 7.9.0 -> 7.34.0
    - jax 0.4.4 -> 0.4.7
    - jaxlib 0.4.4 -> 0.4.7
    - jupyter_core 5.2.0 -> 5.3.0
    - keras 2.11.0 -> 2.12.0
    - lightgbm 2.2.3 -> 3.3.5
    - matplotlib 3.5.3 -> 3.7.1
    - nltk 3.7 -> 3.8.1
    - opencv-python 4.6.0.66 -> 4.7.0.72
    - plotly 5.5.0 -> 5.13.1
    - pymc 4.1.4 -> 5.1.2
    - seaborn 0.11.2 -> 0.12.2
    - spacy 3.4.4 -> 3.5.1
    - sympy 1.7.1 -> 1.11.1
    - tensorboard 2.11.2 -> 2.12.0
    - tensorflow 2.11.0 -> 2.12.0
    - tensorflow-estimator 2.11.0 -> 2.12.0
    - tensorflow-hub 0.12.0 -> 0.13.0
    - torch 1.13.1 -> 2.0.0
    - torchaudio 0.13.1 -> 2.0.1
    - torchtext 0.14.1 -> 0.15.1
   - torchvision 0.14.1 -> 0.15.1

2023-03-10
- Added the [Colab editor shortcuts](#) example notebook
- Fixed triggering of @-mention and email autocomplete for large comments ([GitHub issue](#))
- Added View Resources to the Runtime menu

```
    return tf.layers.dense(
<ipython-input-10-baae28673f7d>:9: UserWarning: `t
    return tf.layers.batch_normalization(
<ipython-input-10-baae28673f7d>:13: UserWarning: `
    return tf.layers.conv2d_transpose(
<ipython-input-10-baae28673f7d>:21: UserWarning: `
    return tf.layers.conv2d(
<ipython-input-12-b5c3f7fbc183>:13: UserWarning: `
    net = tf.layers.flatten(net)
Time since start: 5.44 min
Trained from step 0 to 250 in 0.77 steps / sec
Average discriminator output on Real: -0.55  Fake:
Inception Score: 1.41 / 1.48  Frechet Distance: 3.
```
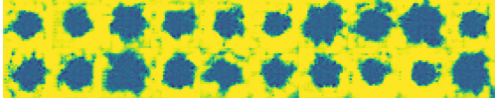
```
Time since start: 10.77 min
Trained from step 250 to 500 in 0.94 steps / sec
Average discriminator output on Real: 0.41  Fake:
Inception Score: 1.49 / 1.48  Frechet Distance: 2.
```

distance per step

Score per step
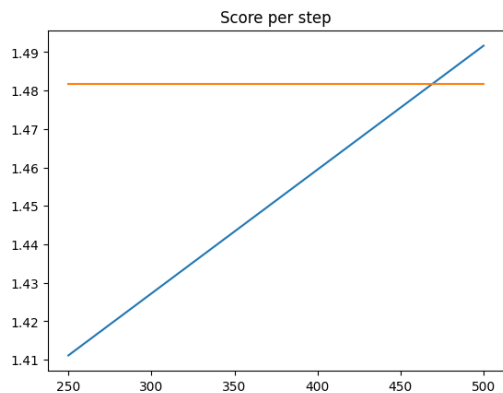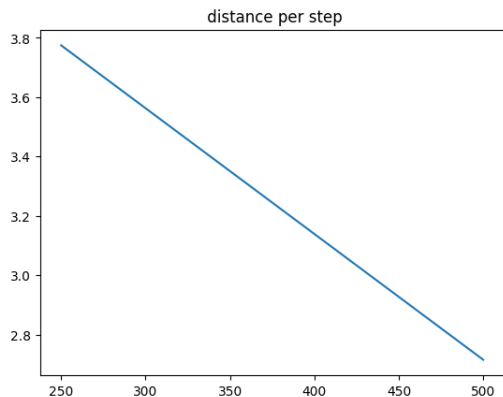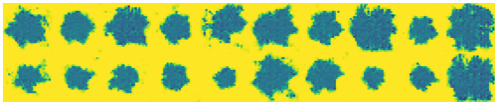
- Python package updates:
  - beautifulsoup4 4.6.3 -> 4.9.3
  - bokeh 2.3.3 -> 2.4.3
  - debugpy 1.0.0 -> 1.6.6
  - Flask 1.1.4 -> 2.2.3
  - jax 0.3.25 -> 0.4.4
  - jaxlib 0.3.25 -> 0.4.4
  - Jinja2 2.11.3 -> 3.1.2
  - matplotlib 3.2.2 -> 3.5.3
  - nbconvert 5.6.1 -> 6.5.4
  - pandas 1.3.5 -> 1.4.4
  - pandas-datareader 0.9.0 -> 0.10.0
  - pandas-profiling 1.4.1 -> 3.2.0
  - Pillow 7.1.2 -> 8.4.0
  - plotnine 0.8.0 -> 0.10.1
  - scikit-image 0.18.3 -> 0.19.3
  - scikit-learn 1.0.2 -> 1.2.2
  - scipy 1.7.3 -> 1.10.1
  - setuptools 57.4.0 -> 63.4.3
  - sklearn-pandas 1.8.0 -> 2.2.0
  - statsmodels 0.12.2 -> 0.13.5
  - urllib3 1.24.3 -> 1.26.14
  - Werkzeug 1.0.1 -> 2.2.3
  - wrapt 1.14.1 -> 1.15.0
  - xgboost 0.90 -> 1.7.4
  - xlrd 1.2.0 -> 2.0.1

2023-02-17

- Show graphs of RAM and disk usage in notebook toolbar
- Copy cell links directly to the clipboard instead of showing a dialog when clicking on the link icon in the cell toolbar
- Updated the Colab Marketplace VM image
- Upgraded CUDA to 11.6.2 and cuDNN to 8.4.0.27
- Python package updates:
  - tensorflow 2.9.2 -> 2.11.0
  - tensorboard 2.9.1 -> 2.11.2
  - keras 2.9.0 -> 2.11.0
  - tensorflow-estimator 2.9.0 -> 2.11.0
  - tensorflow-probability 0.17.0 -> 0.19.0
  - tensorflow-gcs-config 2.9.0 -> 2.11.0
  - earthengine-api 0.1.339 -> 0.1.341
  - flatbuffers 1.12 -> 23.1.21
  - platformdirs 2.6.2 -> 3.0.0
  - pydata-google-auth 1.6.0 -> 1.7.0
  - python-utils 3.4.5 -> 3.5.2
  - tenacity 8.1.0 -> 8.2.1
  - tifffile 2023.1.23.1 -> 2023.2.3
  - notebook 5.7.16 -> 6.3.0
  - tornado 6.0.4 -> 6.2
  - aiohttp 3.8.3 -> 3.8.4
  - charset-normalizer 2.1.1 -> 3.0.1
  - fastai 2.7.0 -> 2.7.1
  - soundfile 0.11.0 -> 0.12.1
  - typing-extensions 4.4.0 -> 4.5.0
  - widgetsnbextension 3.6.1 -> 3.6.2
  - pydantic 1.10.4 -> 1.10.5
  - zipp 3.12.0 -> 3.13.0
  - numpy 1.21.6 -> 1.22.4
  - drivefs 66.0 -> 69.0
  - gdal 3.0.4 -> 3.3.2 GitHub issue
- Added libudunits2-dev for smoother R package installs GitHub issue

2023-02-03

- Improved tooltips for pandas series to show common statistics about the series object
- Made the forms dropdown behave like an autocomplete box when it allows input
- Updated the nvidia driver from 460.32.03 to 510.47.03
- Python package updates:

- packaging 21.3 -> 23.0
- prometheus-client 0.15.0 -> 0.16.0
- pyct 0.4.8 -> 0.5.0
- pydata-google-auth 1.5.0 -> 1.6.0
- python-slugify 7.0.0 -> 8.0.0
- sqlalchemy 1.4.46 -> 2.0.0
- tensorflow-io-gcs-filesystem 0.29.0 -> 0.30.0
- tifffile 2022.10.10 -> 2023.1.23.1
- zipp 3.11.0 -> 3.12.0
- Pinned sqlalchemy to version 1.4.46

2023-01-12

- Added support for @-mention and email autocomplete in comments
- Improved errors when GitHub notebooks can't be loaded
- Increased color contrast for colors used for syntax highlighting in the code editor
- Added terminal access for custom GCE VM runtimes
- Upgraded Ubuntu from 18.04 LTS to 20.04 LTS ([GitHub issue](#))
- Python package updates:
  - GDAL 2.2.2 -> 2.2.3.
  - NumPy from 1.21.5 to 1.21.6.
  - attrs 22.1.0 -> 22.2.0
  - chardet 3.0.4 -> 4.0.0
  - cloudpickle 1.6.0 -> 2.2.0
  - filelock 3.8.2 -> 3.9.0
  - google-api-core 2.8.2 -> 2.11.0
  - google-api-python-client 1.12.11 -> 2.70.0
  - google-auth-httplib2 0.0.3 -> 0.1.0
  - google-cloud-bigquery 3.3.5 -> 3.4.1
  - google-cloud-datastore 2.9.0 -> 2.11.0
  - google-cloud-firestore 2.7.2 -> 2.7.3
  - google-cloud-storage 2.5.0 -> 2.7.0
  - holidays 0.17.2 -> holidays 0.18
  - importlib-metadata 5.2.0 -> 6.0.0
  - networkx 2.8.8 -> 3.0
  - opencv-python-headless 4.6.0.66 -> 4.7.0.68
  - pip 21.1.3 -> 22.04
  - pip-tools 6.2.0 -> 6.6.2
  - prettytable 3.5.0 -> 3.6.0
  - requests 2.23.0 -> 2.25.1
  - termcolor 2.1.1 -> 2.2.0
  - torch 1.13.0 -> 1.13.1
  - torchaudio 0.13.0 -> 0.13.1
  - torchtext 0.14.0-> 0.14.1
  - torchvision 0.14.0 -> 0.14.1

2022-12-06

- Made fallback runtime version available until mid-December ([GitHub issue](#))
- Upgraded to Python 3.8 ([GitHub issue](#))
- Python package updates:
  - jax from 0.3.23 to 0.3.25, jaxlib from 0.3.22 to 0.3.25
  - pyarrow from 6.0.1 to 9.0.0
  - torch from 1.12.1 to 1.13.0
  - torchaudio from 0.12.1 to 0.13.0
  - torchvision from 0.13.1 to 0.14.0
  - torchtext from 0.13.1 to 0.14.0
  - xlrd from 1.1.0 to 1.2.0
  - DriveFS from 62.0.1 to 66.0.3
- Made styling of markdown tables in outputs match markdown tables in text cells
- Improved formatting for empty interactive table rows
- Fixed syntax highlighting for variables with names that contain Python keywords ([GitHub issue](#))

2022-11-11

- Added more dark editor themes for Monaco (when in dark mode, "Editor colorization" appears as an option in the Editor tab of the Tools → Settings dialog)

- google-api-core[grpc] from 1.31.5 to 2.8.2
- google-cloud-bigquery from 1.21.0 to 3.3.5
- google-cloud-core from 1.0.1 to 2.3.2
- google-cloud-datastore from 1.8.0 to 2.9.0
- google-cloud-firestore from 1.7.0 to 2.7.2
- google-cloud-language from 1.2.0 to 2.6.1
- google-cloud-storage from 1.18.0 to 2.5.0
- google-cloud-translate from 1.5.0 to 3.8.4

2022-10-21

- Launched a single-click way to get from BigQuery to Colab to further explore query results ([announcement](#))
- Launched [Pro, Pro+, and Pay As You Go](#) to 19 additional countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Norway, Portugal, Romania, Slovakia, Slovenia, and Sweden ([tweet](#))
- Updated jax from 0.3.17 to 0.3.23, jaxlib from 0.3.15 to 0.3.22, TensorFlow from 2.8.2 to 2.9.2, CUDA from 11.1 to 11.2, and cuDNN from 8.0 to 8.1 ([backend-info](#))
- Added a `readonly` option to `drive.mount`
- Fixed bug where Xarray was not working ([GitHub issue](#))
- Modified Markdown parsing to ignore block quote symbol within MathJax ([GitHub issue](#))

2022-09-30

- Launched [Pay As You Go](#), allowing premium GPU access without requiring a subscription
- Added vim and tcllib to our runtime image
- Fixed bug where open files were closed on kernel disconnect ([GitHub issue](#))
- Fixed bug where the play button/execution indicator was not clickable when scrolled into the cell output ([GitHub issue](#))
- Updated the styling for form titles so that they avoid obscuring the code editor
- Created a GitHub repo, [backend-info](#), with the latest apt-list.txt and pip-freeze.txt files for the Colab runtime ([GitHub issue](#))
- Added `files.upload_file(filename)` to upload a file from the browser to the runtime with a specified filename

2022-09-16

- Upgraded pymc from 3.11.0 to 4.1.4, jax from 0.3.14 to 0.3.17, jaxlib from 0.3.14 to 0.3.15, fsspec from 2022.8.1 to 2022.8.2
- Modified our save flow to avoid persisting Drive filenames as titles in notebook JSON
- Updated our [Terms of Service](#)
- Modified the `Jump to Cell` command to locate the cursor at the end of the command palette input (`Jump to cell` in Tools → Command palette in a notebook with section headings)
- Updated the styling of the Drive notebook comment UI
- Added support for terminating your runtime from code: `python from google.colab import runtime runtime.unassign()`
- Added regex filter support to the Recent notebooks dialog
- Inline google.colab.files.upload JS to fix `files.upload()` not working ([GitHub issue](#))

2022-08-26

- Upgraded PyYAML from 3.13 to 6.0 ([GitHub issue](#)), drivefs from 61.0.3 to 62.0.1
- Upgraded TensorFlow from 2.8.2 to 2.9.1 and ipywidgets from 7.7.1 to 8.0.1 but rolled both back due to a number of user reports ([GitHub issue](#), [GitHub issue](#))
- Stop persisting inferred titles in notebook JSON ([GitHub issue](#))

as [ ] for better consistency with JupyterLab

2022-08-11

- Upgraded ipython from 5.5.0 to 7.9.0, fbprophet 0.7 to prophet 1.1, tensorflow-datasets from 4.0.1 to 4.6.0, drivefs from 60.0.2 to 61.0.3, pytorch from 1.12.0 to 1.12.1, numba from 0.51 to 0.56, and lxml from 4.2.0 to 4.9.1
- Loosened our `requests` version requirement ([GitHub issue](#))
- Removed support for TensorFlow 1
- Added Help → Report Drive abuse for Drive notebooks
- Fixed indentation for Python lines ending in [
- Modified styling of tables in Markdown to left-align them rather than centering them
- Fixed special character replacement when copying interactive tables as Markdown
- Fixed ansi 8-bit color parsing ([GitHub issue](#))
- Configured logging to preempt transitive imports and other loading from implicitly configuring the root logger
- Modified forms to use a value of None instead of causing a parse error when clearing raw and numeric-typed form fields

2022-07-22

- Update scipy from 1.4.1 to 1.7.3, drivefs from 59.0.3 to 60.0.2, pytorch from 1.11 to 1.12, jax & jaxlib from 0.3.8 to 0.3.14, opencv-python from 4.1.2.30 to 4.6.0.66, spaCy from 3.3.1 to 3.4.0, and dlib from 19.18.0 to 19.24.0
- Fix `Open in tab` doc link which was rendering incorrectly ([GitHub issue](#))
- Add a preference for the default tab orientation to the Site section of the settings menu under Tools → Settings
- Show a warning for USE_AUTH_EPHEM usage when running authenticate_user on a TPU runtime ([code](#))

2022-07-01

- Add a preference for code font to the settings menu under Tools → Settings
- Update drivefs from 58.0.3 to 59.0.3 and spacy from 2.2.4 to 3.3.1
- Allow [display_data](#) and [execute_result](#) text outputs to wrap, matching behavior of JupyterLab (does not affect stream outputs/print statements).
- Improve LSP handling of some magics, esp. %%writefile ([GitHub issue](#)).
- Add a [FAQ entry](#) about the mount Drive button behavior and include link buttons for each FAQ entry.
- Fix bug where the notebook was sometimes hidden behind other tabs on load when in single pane view.
- Fix issue with inconsistent scrolling when an editor is in multi-select mode.
- Fix bug where clicking on a link in a form would navigate away from the notebook
- Show a confirmation dialog before performing Replace all from the Find and replace pane.

2022-06-10

- Update drivefs from 57.0.5 to 58.0.3 and tensorflow from 2.8.0 to 2.8.2
- Support more than 100 repos in the GitHub repo selector shown in the open dialog and the clone to GitHub dialog
- Show full notebook names on hover in the open dialog
- Improve the color contrast for links, buttons, and the `ipywidgets.Accordion` widget in dark mode

2022-05-20

- Support URL params for linking to some common pref settings: [force_theme=dark](#), [force_corgi_mode=1](#),

- Added 🦀 mode (under Miscellaneous in Tools → Settings)
- Added "Disconnect and delete runtime" option to the menu next to the Connect button
- Improved rendering of filter options in an interactive table
- Added git-lfs to the base image
- Updated torch from 1.10.0 to 1.11.0, jupyter-core from 4.9.2 to 4.10.0, and cmake from 3.12.0 to 3.22.3
- Added more details to our FAQ about unsupported uses (using proxies, downloading torrents, etc.)
- Fixed issue with apt-get dependencies

2022-04-15

- Add an option in the file browser to show hidden files.