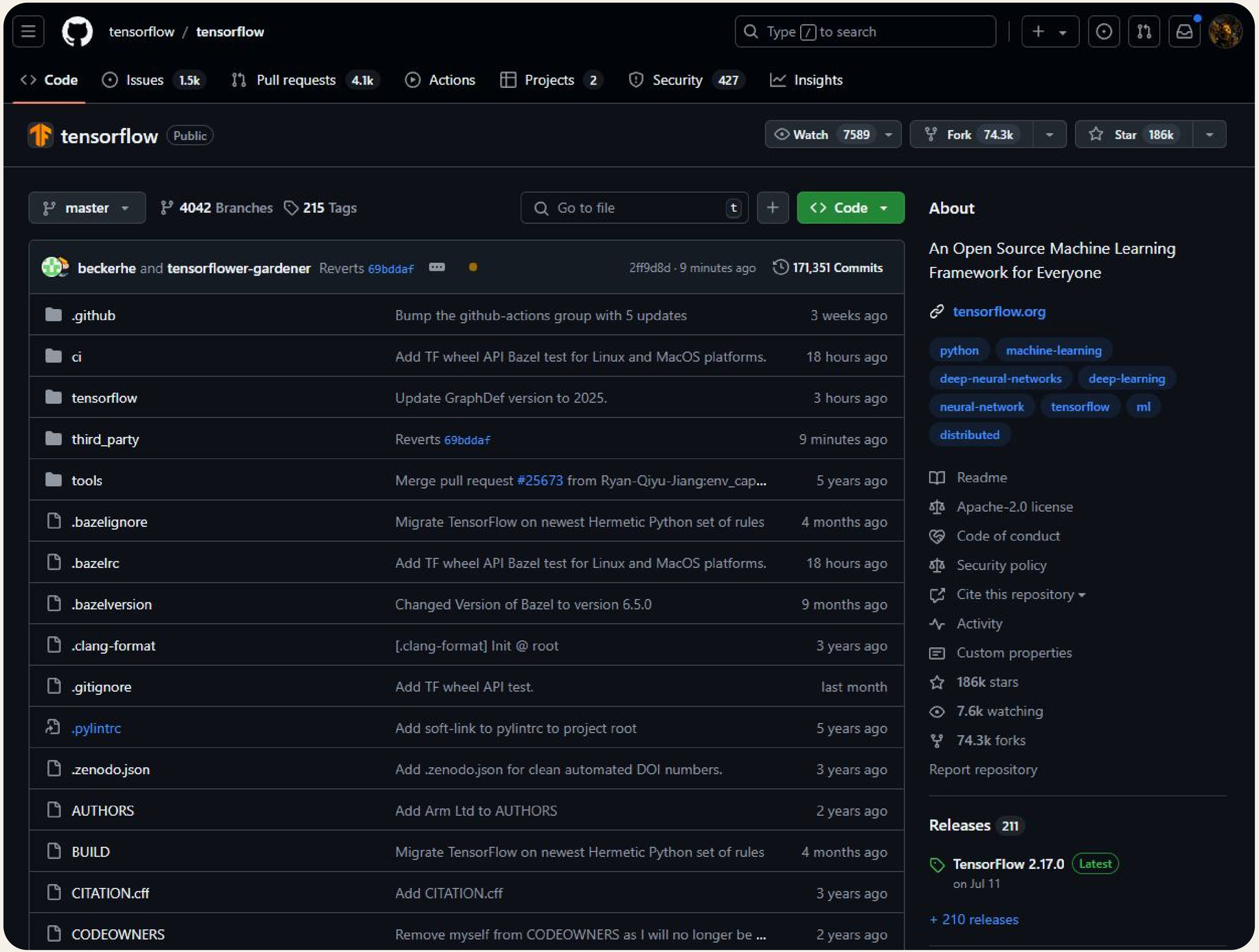

TensorFlow

**TensorFlow – это открытая программная библиотека для машинного обучения, разработанная компанией Google**


tensorflow / tensorflow
Type / to search
Code
Issues 1.5k
Pull requests 4.1k
Actions
Projects 2
Security 427
Insights
tensorflow Public
Watch 7589
Fork 74.3k
Star 186k
master
4042 Branches
215 Tags
Go to file t
Code
beckerhe and tensorflower-gardener Reverts 69bddaf
2ff9d8d · 9 minutes ago
171,351 Commits
.github Bump the github-actions group with 5 updates 3 weeks ago
ci Add TF wheel API Bazel test for Linux and MacOS platforms. 18 hours ago
tensorflow Update GraphDef version to 2025. 3 hours ago
third_party Reverts 69bddaf 9 minutes ago
tools Merge pull request #25673 from Ryan-Qiyu-Jiang:env_cap... 5 years ago
.bazelignore Migrate TensorFlow on newest Hermetic Python set of rules 4 months ago
.bazelrc Add TF wheel API Bazel test for Linux and MacOS platforms. 18 hours ago
.bazelversion Changed Version of Bazel to version 6.5.0 9 months ago
.clang-format [.clang-format] Init @ root 3 years ago
.gitignore Add TF wheel API test. last month
.pylintrc Add soft-link to pylintrc to project root 5 years ago
.zenodo.json Add .zenodo.json for clean automated DOI numbers. 3 years ago
AUTHORS Add Arm Ltd to AUTHORS 2 years ago
BUILD Migrate TensorFlow on newest Hermetic Python set of rules 4 months ago
CITATION.cff Add CITATION.cff 3 years ago
CODEOWNERS Remove myself from CODEOWNERS as I will no longer be ... 2 years ago
About
An Open Source Machine Learning Framework for Everyone
tensorflow.org
python
machine-learning
deep-neural-networks
deep-learning
neural-network
tensorflow
ml
distributed
Readme
Apache-2.0 license
Code of conduct
Security policy
Cite this repository
Activity
Custom properties
186k stars
7.6k watching
74.3k forks
Report repository
Releases 211
TensorFlow 2.17.0 Latest
on Jul 11
+ 210 releases

# Фичи

1. Гибкая система для построения и обучения нейронных сетей
2. Поддержка как CPU, так и GPU вычислений
3. Масштабируемость от мобильных устройств до крупных кластеров
4. Высокоуровневый API Keras для быстрого прототипирования
5. Богатая экосистема инструментов и расширений

# зОчем?

# Комьюнити

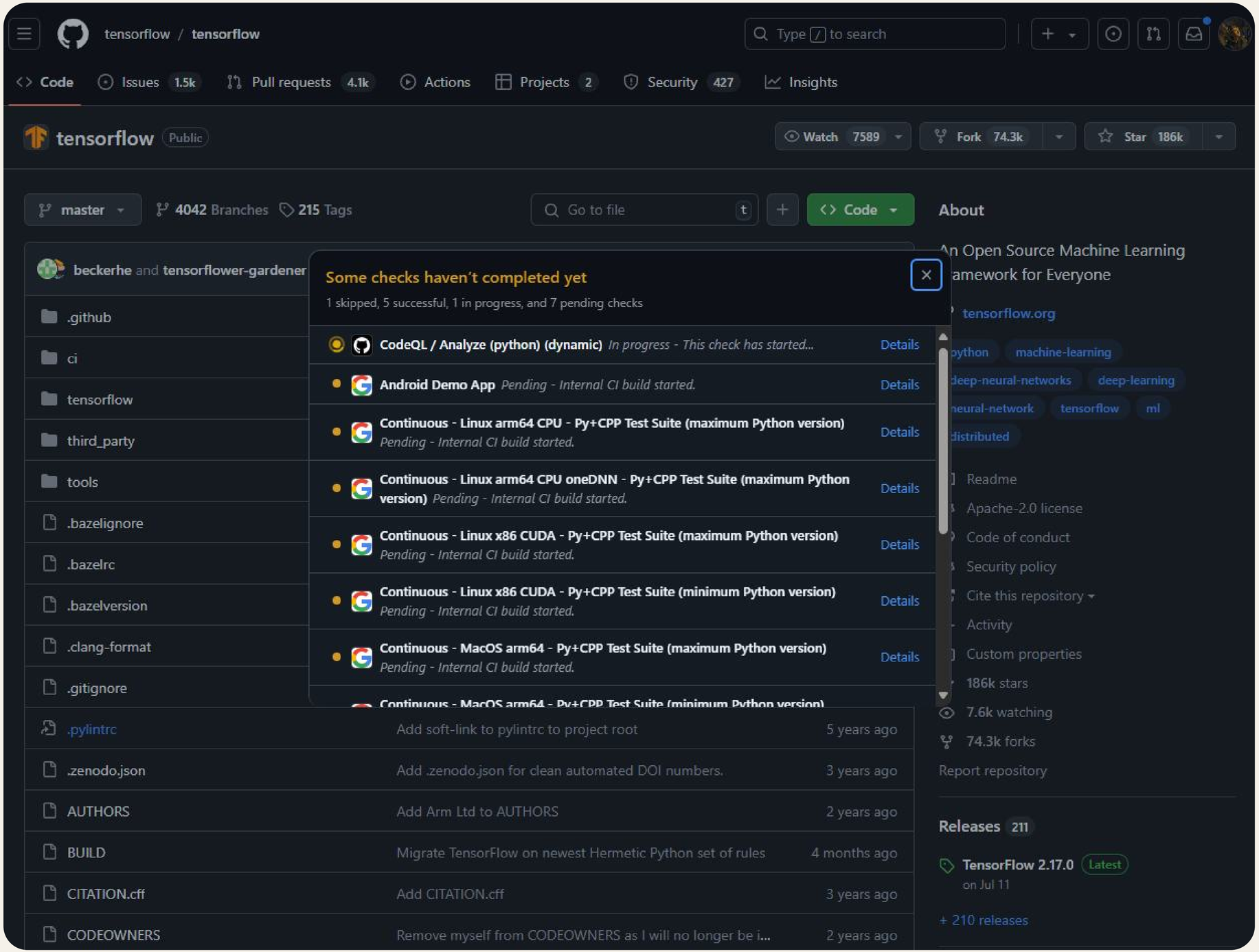
01

# Стандарт

02

# Google

# 03


tensorflow / tensorflow
Type / to search
Code
Issues 1.5k
Pull requests 4.1k
Actions
Projects 2
Security 427
Insights
tensorflow
Public
Watch 7589
Fork 74.3k
Star 186k
master
4042 Branches
215 Tags
Go to file
t
Code
beckerhe and tensorflower-gardener
Some checks haven't completed yet
1 skipped, 5 successful, 1 in progress, and 7 pending checks
CodeQL / Analyze (python) (dynamic) In progress - This check has started...
Details
Android Demo App Pending - Internal CI build started.
Details
Continuous - Linux arm64 CPU - Py+CPP Test Suite (maximum Python version)
Pending - Internal CI build started.
Details
Continuous - Linux arm64 CPU oneDNN - Py+CPP Test Suite (maximum Python version)
Pending - Internal CI build started.
Details
Continuous - Linux x86 CUDA - Py+CPP Test Suite (maximum Python version)
Pending - Internal CI build started.
Details
Continuous - Linux x86 CUDA - Py+CPP Test Suite (minimum Python version)
Pending - Internal CI build started.
Details
Continuous - MacOS arm64 - Py+CPP Test Suite (maximum Python version)
Pending - Internal CI build started.
Details
.github
ci
tensorflow
third_party
tools
.bazelignore
.bazelrc
.bazelversion
.clang-format
.gitignore
.pylintrc
Add soft-link to pylintrc to project root
5 years ago
.zenodo.json
Add .zenodo.json for clean automated DOI numbers.
3 years ago
AUTHORS
Add Arm Ltd to AUTHORS
2 years ago
BUILD
Migrate TensorFlow on newest Hermetic Python set of rules
4 months ago
CITATION.cff
Add CITATION.cff
3 years ago
CODEOWNERS
Remove myself from CODEOWNERS as I will no longer be i...
2 years ago
About
An Open Source Machine Learning
amework for Everyone
tensorflow.org
python
machine-learning
deep-neural-networks
deep-learning
neural-network
tensorflow
ml
distributed
Readme
Apache-2.0 license
Code of conduct
Security policy
Cite this repository
Activity
Custom properties
186k stars
7.6k watching
74.3k forks
Report repository
Releases 211
TensorFlow 2.17.0
Latest
on Jul 11
+ 210 releases


3 hours ago
12 minutes ago
:env_cap...
5 years ago

# Доки

04

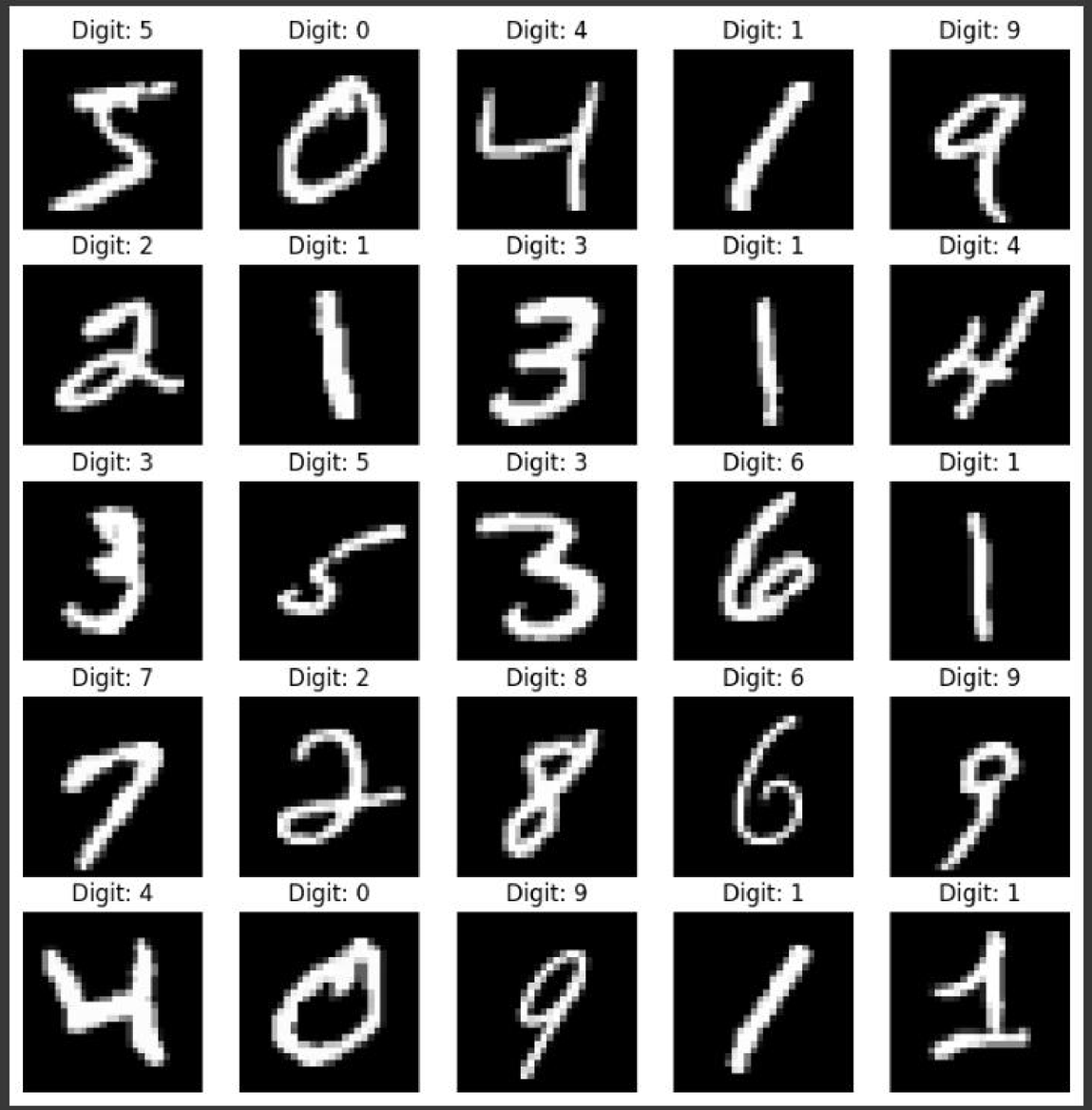
**PyTorch: более гибкий, но менее структурированный**
**Keras: теперь интегрирован в TensorFlow**
**Theano: менее активно развивается**
**CNTK: меньшее сообщество**

```
[ ]  import tensorflow as tf
     print("Tf version: ", tf.__version__)
```

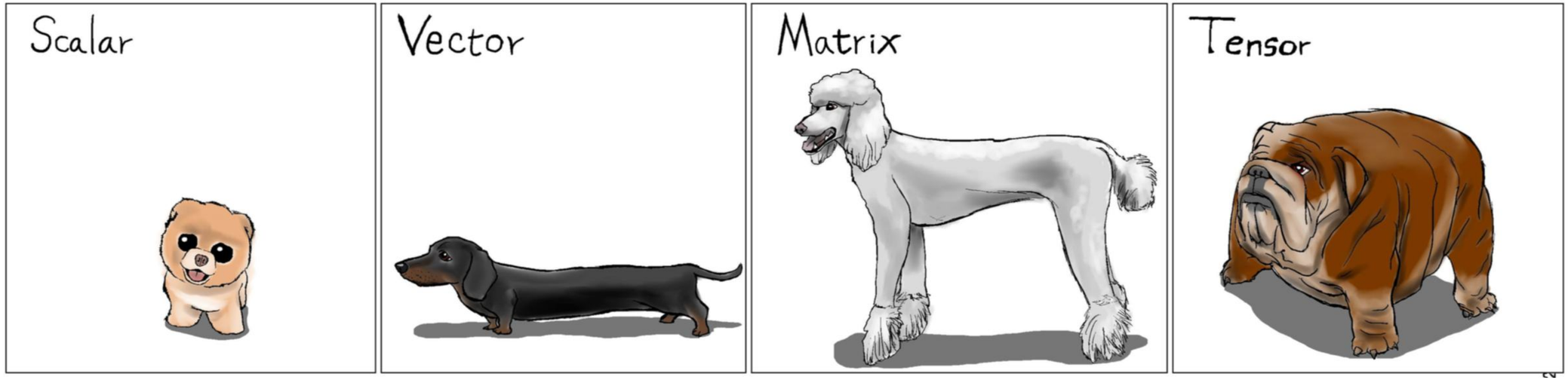
```
Tf version:  2.17.0
```

```
(x_train, y_train), (x_test, y_test) = tf.keras.datasets.mnist.load_data()
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
11490434/11490434 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
```


Digit: 5
Digit: 0
Digit: 4
Digit: 1
Digit: 9
Digit: 2
Digit: 1
Digit: 3
Digit: 1
Digit: 4
Digit: 3
Digit: 5
Digit: 3
Digit: 6
Digit: 1
Digit: 7
Digit: 2
Digit: 8
Digit: 6
Digit: 9
Digit: 4
Digit: 0
Digit: 9
Digit: 1
Digit: 1

```
model = tf.keras.Sequential([
    tf.keras.layers.Dense(128, activation='relu', input_shape=(784,)),
    tf.keras.layers.Dense(64, activation='relu'),
    tf.keras.layers.Dense(10, activation='softmax')
])
```


Scalar
Vector
Matrix
Tensor

```
[ ]  # Нормализация данных
     x_train = x_train / 255.0
     x_test = x_test / 255.0

     # Преобразование формы
     x_train = x_train.reshape(-1, 784)
     x_test = x_test.reshape(-1, 784)
```

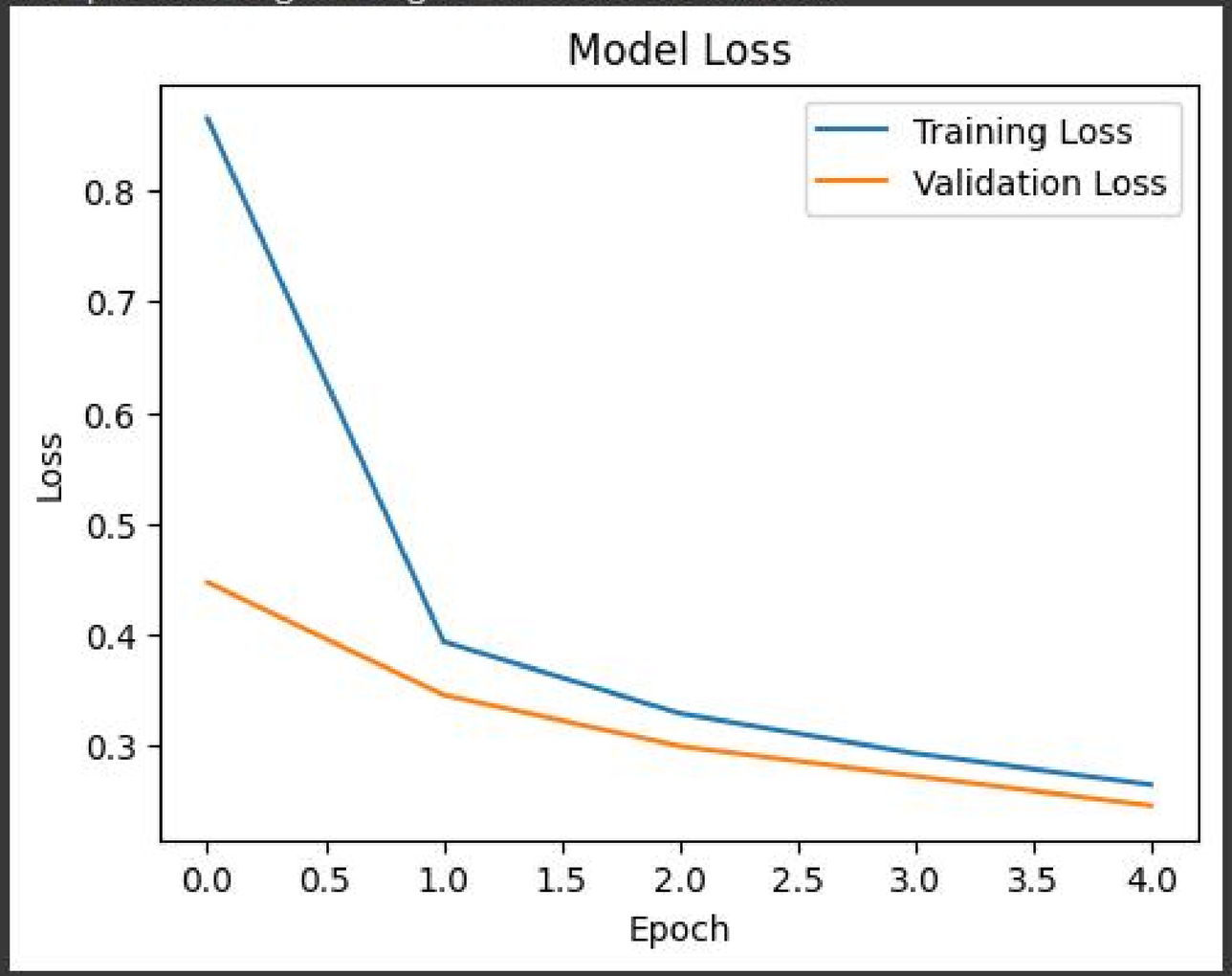
```
model.compile(
    optimizer='adam',
    loss='sparse_categorical_crossentropy',
    metrics=['accuracy']
)

history = model.fit(
    x_train, y_train,
    epochs=10,
    validation_data=(x_test, y_test)
)
```

```
Epoch 1/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 7s 3ms/step - accuracy: 0.9564 - loss: 0.1432 - val_accuracy: 0.9697 - val_loss: 0.0970
Epoch 2/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 7s 4ms/step - accuracy: 0.9744 - loss: 0.0851 - val_accuracy: 0.9738 - val_loss: 0.0831
Epoch 3/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 6s 3ms/step - accuracy: 0.9821 - loss: 0.0573 - val_accuracy: 0.9738 - val_loss: 0.0867
Epoch 4/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 10s 3ms/step - accuracy: 0.9863 - loss: 0.0421 - val_accuracy: 0.9787 - val_loss: 0.0709
Epoch 5/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 7s 4ms/step - accuracy: 0.9898 - loss: 0.0333 - val_accuracy: 0.9762 - val_loss: 0.0851
Epoch 6/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 6s 3ms/step - accuracy: 0.9912 - loss: 0.0247 - val_accuracy: 0.9783 - val_loss: 0.0781
Epoch 7/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 7s 4ms/step - accuracy: 0.9918 - loss: 0.0260 - val_accuracy: 0.9743 - val_loss: 0.1041
Epoch 8/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 9s 3ms/step - accuracy: 0.9932 - loss: 0.0209 - val_accuracy: 0.9774 - val_loss: 0.0823
Epoch 9/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 7s 4ms/step - accuracy: 0.9946 - loss: 0.0162 - val_accuracy: 0.9780 - val_loss: 0.0934
Epoch 10/10
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 10s 4ms/step - accuracy: 0.9952 - loss: 0.0148 - val_accuracy: 0.9761 - val_loss: 0.1094
```

```
[26] import matplotlib.pyplot as plt
```

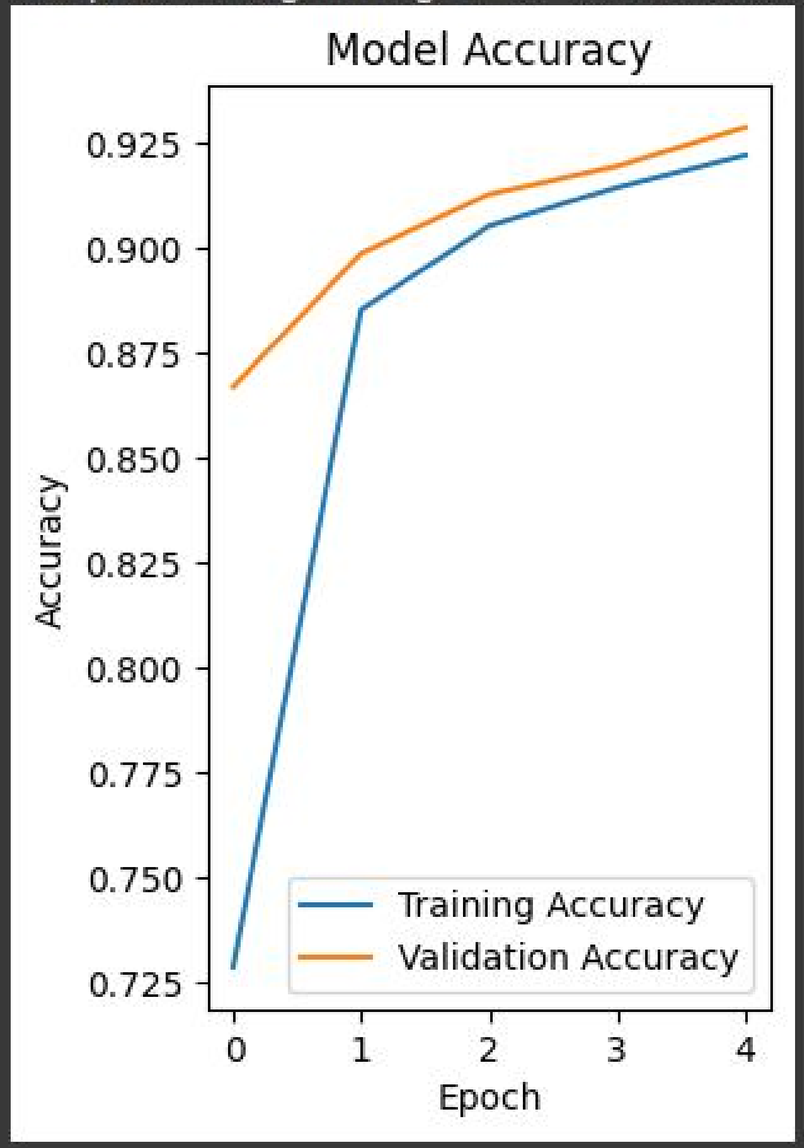
```
plt.figure(figsize=(12, 4))
plt.subplot(1, 2, 1)
plt.plot(history.history['loss'], label='Training Loss')
plt.plot(history.history['val_loss'], label='Validation Loss')
plt.title('Model Loss')
plt.xlabel('Epoch')
plt.ylabel('Loss')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x7b81113e6e60>
```



```
plt.subplot(1, 2, 2)
plt.plot(history.history['accuracy'], label='Training Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.title('Model Accuracy')
plt.xlabel('Epoch')
plt.ylabel('Accuracy')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x7b81110bbaf0>
```



```
[ ]  model.evaluate(x_test,  y_test, verbose=2)
```

```
313/313 - 1s - 2ms/step - accuracy: 0.9516 - loss: 0.1664
[0.16635866463184357, 0.9516000151634216]
```