Experts

TensorFlow Hub: Models, models, and models

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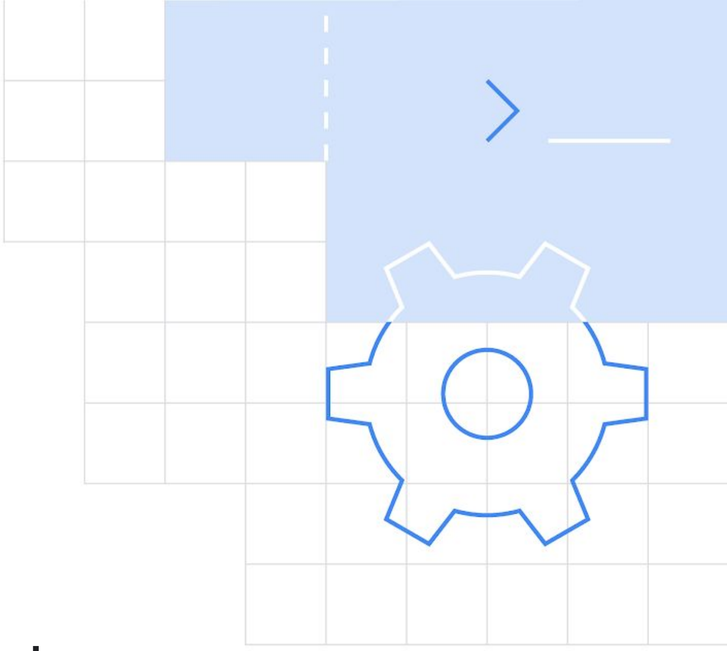
PyImageSearch
@RisingSayak

Google Developers



Ideal audience

- ML Developers that have worked with TensorFlow and Keras

Experts

Agenda

- What is TensorFlow Hub?
- Why it might be useful?
- A closer look at tfhub.dev
- Ease of using TensorFlow Hub
- QA

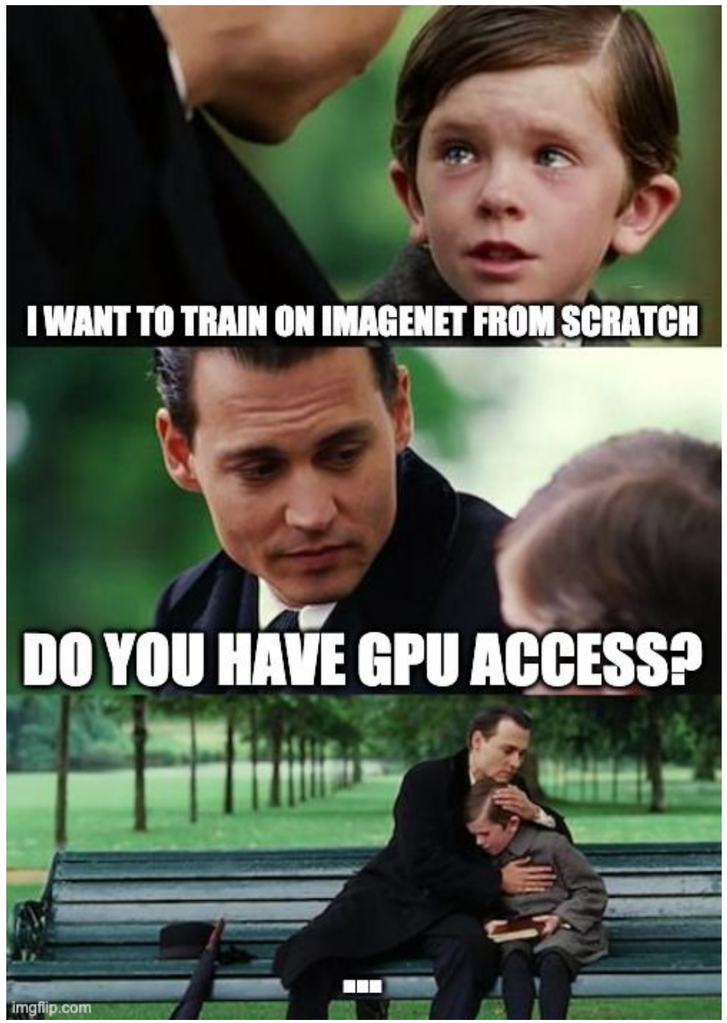
What is TensorFlow Hub?

tfhub.dev

A collection of SoTA* pre-trained models published by different teams as well community contributors.

*State of The Art

Why it might be useful?



Why it might be useful?

- Making SoTA machine learning models more and more accessible.

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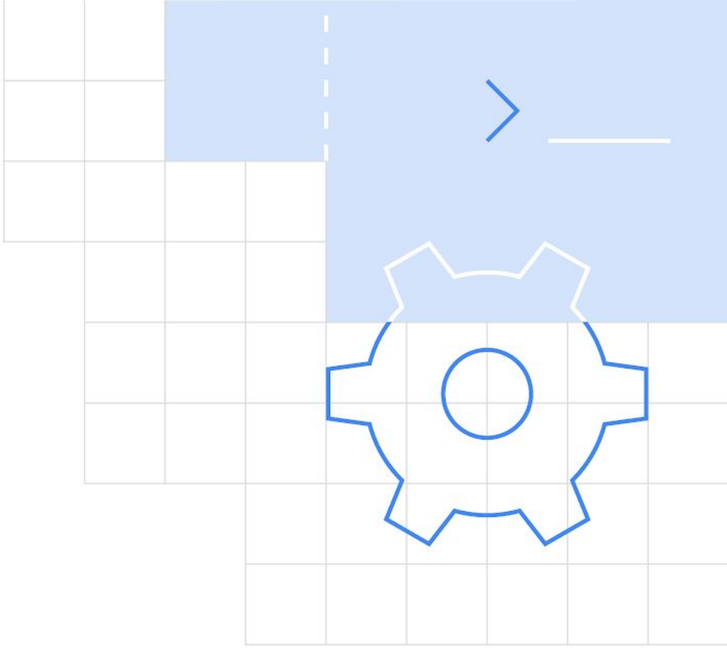
- Making SoTA machine learning models more and more accessible.
- Making it easier for people to take advantage of SoTA models without expertise.
- Transfer learning for different domains including image, text.
- Providing a platform for the developers to give back :)



tfhub.dev 👉

Experts

TensorFlow Hub

Search for anything, from models to data sets

Filters Clear all

- Problem domain
- Saved model format
- Architecture
- Publisher
- Dataset
- Language

Text embedding
nnlm-en-dim128-with-normalization
Published by: Google Updated: 10/24/2019
Token based text embedding trained on English Google News 200B corpus.
NNLM | Google News

Collection
universal-sentence-encoder
Published by: Google Updated: 10/24/2019
Collection of universal sentence encoders trained on variety of data.
DAN,Transformer

Image pose detection .JS
posenet/mobilenet/quantized/1/100
Published by: TensorFlow Updated: 10/24/2019
PoseNet model for pose esimation.

Image classification
imagenet/mobilenet_v1_025_224...
Published by: Google Updated: 10/24/2019
Imagenet (ILSVRC-2012-CLS) classification with MobileNet V1 (depth multiplier 0.25).
MobileNet V1 | ImageNet (ILSVRC-201...

Image classification .JS
imagenet/mobilenet_v2_075_224...
Published by: Google Updated: 10/24/2019
Imagenet (ILSVRC-2012-CLS) classification with MobileNet V2 (depth multiplier 0.75).
MobileNet V2 | ImageNet (ILSVRC-201...

Image classification .JS
imagenet/mobilenet_v1_025_128...
Published by: Google Updated: 10/24/2019
Imagenet (ILSVRC-2012-CLS) classification with MobileNet V1 (depth multiplier 0.25).
MobileNet V1 | ImageNet (ILSVRC-201...

Image segmentation .JS
bodypix_050
Published by: TensorFlow Updated: 10/24/2019
A person segmentation model.

Other
llr-pretrain-adv/latents
Published by: DeepMind Updated: 10/24/2019
LLR-pretrained ResNet-152 on ImageNet then adversarially trained for the unrestricted adversarial
Other | Other

Image generator
compare_gan/s3gan_20_128x128
Published by: Google Updated: 10/24/2019
S3GAN trainend on ImageNet with 20% labels.
Other | ImageNet (ILSVRC-201...

Image pose detection .JS
posenet/mobilenet/quantized/2/050
Published by: TensorFlow Updated: 10/24/2019
PoseNet model for pose esimation.

Text embedding
universal-sentence-encoder-xling/en-fr
Published by: Google Updated: 10/24/2019
English and French language-agnostic text encoder.
Transformer

Publisher
tensorflow
TensorFlow

Image classification
imagenet/pnasnet_large/classification
Published by: Google Updated: 10/24/2019
Imagenet (ILSVRC-2012-CLS) classification with PNASNet-5 (large).
PNASNet-5 (large) | ImageNet (ILSVRC-201...

Image feature vector .JS
imagenet/mobilenet_v1_025_192...
Published by: Google Updated: 10/24/2019
Feature vectors of images with MobileNet V1 (depth multiplier 0.25) trained on ImageNet (ILSVRC-2012-
MobileNet V1 | ImageNet (ILSVRC-201...

Image generator
biggan-deep-256
Published by: DeepMind Updated: 10/24/2019
BigGAN-deep image generator trained on 256x256 ImageNet.
Other | ImageNet (ILSVRC-201...

Image pose detection .JS
posenet/mobilenet/float/050
Published by: TensorFlow Updated: 10/24/2019
PoseNet model for pose esimation.

Image feature vector
vae
Published by: Vtab Updated: 10/24/2019
Visual representation obtained by training a VAE on ImageNet.
Other | ImageNet (ILSVRC-201...

Image generator
compare_gan...
Published by: Google Updated: 10/24/2019
ResNet19 trained on CelebA HQ (128x128) (FID: 35.85).
Other | CelebA HQ

Text embedding
bert_en_cased_L-24_H-1024_A-16
Published by: TensorFlow Updated: 10/24/2019
Bidirectional Encoder Representations from Transformers (BERT).
Transformer | Wikipedia and BooksC...

Text embedding
tf2-preview/nnlm-de-dim50-with-...
Published by: Google Updated: 10/24/2019
Token based text embedding trained on German Google News 30B corpus.
NNLM | Google News

Image feature vector .JS
imagenet/mobilenet_v2_100_160...
Published by: Google Updated: 10/24/2019
Feature vectors of images with MobileNet V2 (depth multiplier 1.00) trained on ImageNet (ILSVRC-2012-
MobileNet V2 | ImageNet (ILSVRC-201...

Text embedding
nnlm-ja-dim128-with-normalization
Published by: Google Updated: 10/24/2019
Token based text embedding trained on Japanese Google News 6B corpus.
NNLM | Google News

Image classification .JS
imagenet/mobilenet_v2_100_224...
Published by: Google Updated: 10/24/2019
Imagenet (ILSVRC-2012-CLS) classification with MobileNet V2 (depth multiplier 1.00).
MobileNet V2 | ImageNet (ILSVRC-201...

Image classification
unsupervised-adversarial-training...
Published by: DeepMind Updated: 10/24/2019
UAT++ adversarially trained WRN-106 (wide residual network) model using 80m@200K unlabeled data and
Other | CIFAR-10

Image feature vector
imagenet/resnet_v2_152/feature_vector
Published by: Google Updated: 10/24/2019
Feature vectors of images with ResNet V2 152 trained on ImageNet (ILSVRC-2012-CLS).
ResNet V2 152 | ImageNet (ILSVRC-201...

Image generator
biggan-deep-512
Published by: DeepMind Updated: 10/24/2019

Image feature vector
rotation
Published by: Vtab Updated: 10/24/2019

Image feature vector
imagenet/mobilenet_v1_100_128...
Published by: Google Updated: 10/24/2019

Image classification TFLite
mobilenet_v1_0.25_224
Published by: TensorFlow Updated: 10/24/2019

Image classification TFLite
mobilenet_v1_0.75_192
Published by: TensorFlow Updated: 10/24/2019

Image classification

(Off-the-shelf inference)

Prediction: Military Uniform

Source

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```
# Specify the URL
classifier_url = \
    "https://tfhub.dev/google/tf2-preview/mobilenet_v2/classification/2"
```

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classifier_url = \
    "https://tfhub.dev/google/tf2-preview/mobilenet_v2/classification/2"

# Prepare HUB module
classifier = tf.keras.Sequential([
    hub.KerasLayer(classifier_url, input_shape=(224, 224, 3)
])
```

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# Specify the URL
classifier_url = \
    "https://tfhub.dev/google/tf2-preview/mobilenet_v2/classification/2"

# Prepare HUB module
classifier = tf.keras.Sequential([
    hub.KerasLayer(classifier_url, input_shape=(224, 224, 3)
])

# Pass the preprocessed image for inference
result = classifier.predict(preprocessed_image)
```

tensorflow.org/tutorials/images/transfer_learning_with_hub

Image classification

(Transfer learning)

Source

Experts

```
# URL for the feature extractor network
feature_extractor_url = \
    "https://tfhub.dev/google/tf2-preview/mobilenet_v2/feature_vector/2"
```

```
# URL for the feature extractor network
feature_extractor_url = \
    "https://tfhub.dev/google/tf2-preview/mobilenet_v2/feature_vector/2"

# Convert to a layer
feature_extractor_layer = hub.KerasLayer(feature_extractor_url,
    input_shape=(224,224,3))
```

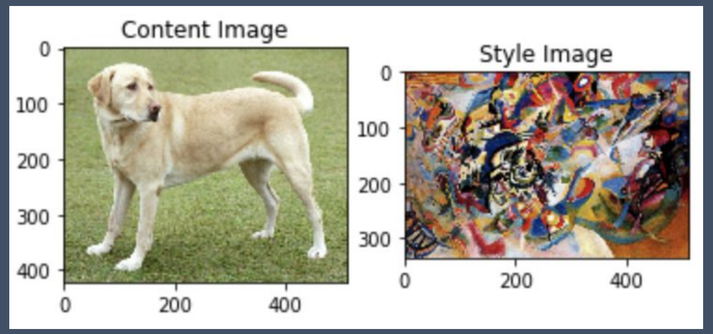
```
# URL for the feature extractor network
feature_extractor_url = \
    "https://tfhub.dev/google/tf2-preview/mobilenet_v2/feature_vector/2"

# Convert to a layer
feature_extractor_layer = hub.KerasLayer(feature_extractor_url,
    input_shape=(224,224,3))

# Define, compile, and train a custom classification model
model = tf.keras.Sequential([
    feature_extractor_layer,
    tf.keras.layers.Dense(len(CLASSES))
])
model.compile(...)
model.fit(...)
```

tensorflow.org/tutorials/images/transfer_learning_with_hub

Style transfer

(Off-the-shelf inference)

Experts



```
hub_handle = 'https://tfhub.dev/google/magenta/arbitrary-image-stylization-v1-256/1'
hub_module = hub.load(hub_handle)
stylized_image = hub_module(tf.constant(content_image), tf.constant(style_image))[0]
tensor_to_image(stylized_image)
```

tensorflow.org/tutorials/generative/style_transfer

Generating novel faces

(Off-the-shelf inference)

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```
# Load the ProGAN module and generate faces like that!
progan = hub.load("https://tfhub.dev/google/progan-128/1").signatures['default']
vectors = tf.random.normal([20, 512])
images = progan(vectors)['default']
```

```
# Load the ProGAN module and generate faces like that!
progan = hub.load("https://tfhub.dev/google/progan-128/1").signatures['default']
vectors = tf.random.normal([20, 512])
images = progan(vectors)['default']

# Visualize
idx = np.random.choice(len(images.numpy()))
plt.imshow(images.numpy()[idx])
plt.show()
```

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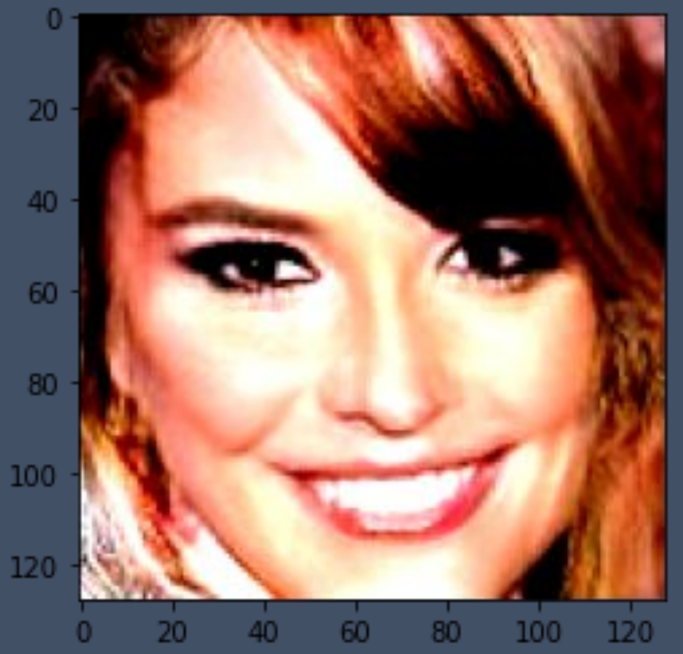
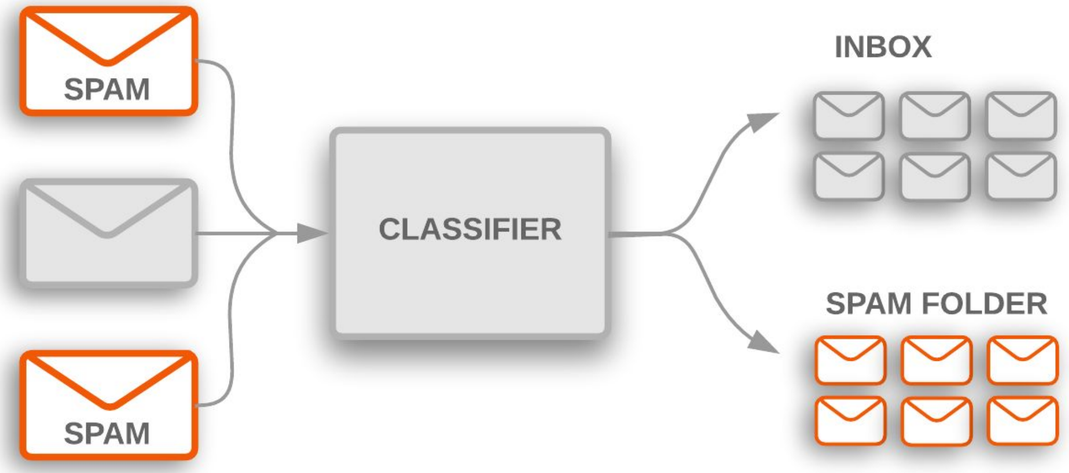


https://tfhub.dev/google/progan-128/1

Text Classification

(Transfer learning)



Source

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```
# Specify the URL and prepare HUB module
embedding = "https://tfhub.dev/google/tf2-preview/gnews-swivel-20dim/1"
hub_layer = hub.KerasLayer(
    embedding, input_shape=[], dtype=tf.string, trainable=True
)
```

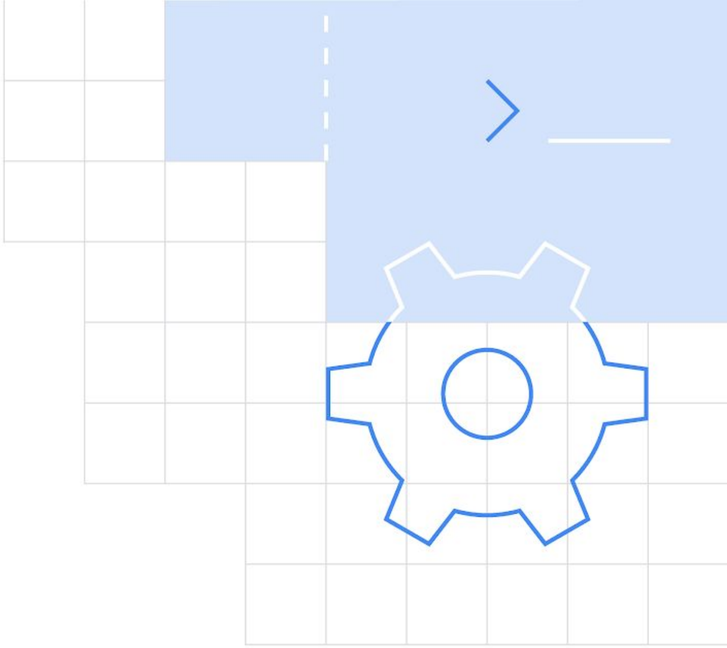
```
# Specify the URL and prepare HUB module
embedding = "https://tfhub.dev/google/tf2-preview/gnews-swivel-20dim/1"
hub_layer = hub.KerasLayer(
    embedding, input_shape=[], dtype=tf.string, trainable=True
)

# Define, compile, and train the model
model = keras.Sequential([
    hub_layer,
    tf.keras.layers.Dense(16, activation="relu"),
    tf.keras.layers.Dense(1, activation="sigmoid)
])
model.compile(...)
model.fit(...)
```

tensorflow.org/tutorials/keras/text_classification_with_hub

tfhub for other tasks

- Enhanced Super Resolution GANs.
- Object detection.
- Question-answering.
- and more (explore on tfhub.dev).



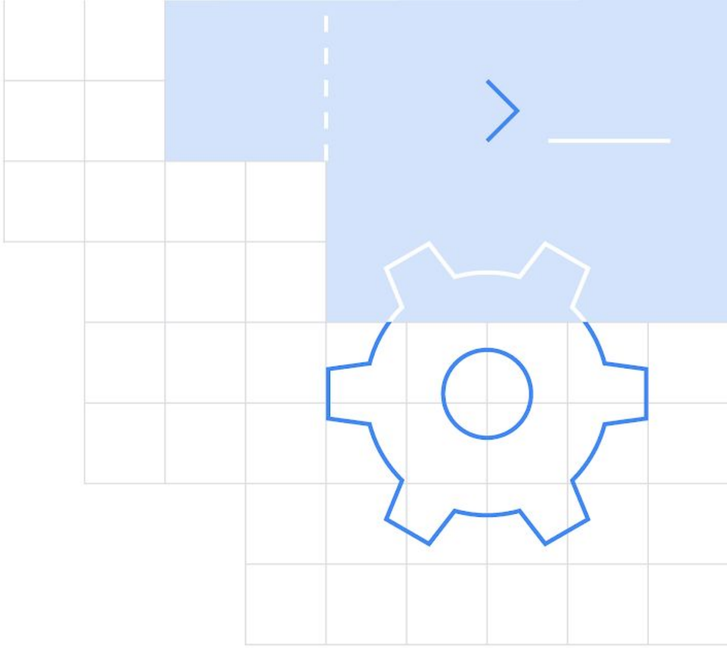
Publish your own models -

https://bit.ly/tfhub-publish

Experts

Slides available here -

https://bit.ly/tf-hub



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Thank You!

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