

# Image retraining with TensorFlow and the Inception-v3 model

Here is a brief explanation of how-to build a new TensorFlow Image Classifier with Transfer Learning in 5 Min: <https://www.youtube.com/watch?v=QfNvhPx5Px8>

The pre-trained inception model v3 is used for image recognition [1][2]. It is trained on more than 1000 different image classes [3].

By changing the very last part in the CNN (Convolutional Neural Network), but continue to use the major first part, one can classify new images with very good accuracy [4]. This process is called Transfer Learning. Using TensorFlow in this way we shorten the process from months to minutes to train an image classifier [4].

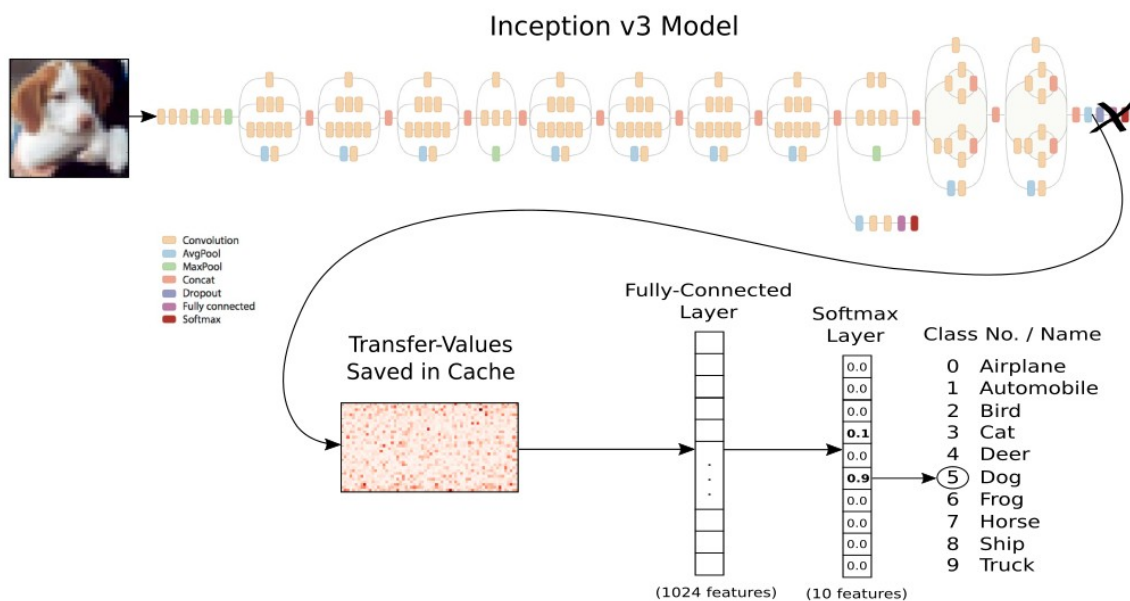


Fig 1. We re-use the pre-trained Inception model and replace the layer that does the final classification.

To train for new classes you need to have a variety of images (classes) which you do the extended training on. If you for example want to classify images according to fig 1 in 10 classes you need around 500 – 1000 images of each class. 80% of the images for each class is used for the training. The other 20% is not used for training but for validation of the classes.

Sources:

- [1] - [https://www.tensorflow.org/hub/modules/google/imagenet/inception\\_v3/classification/1](https://www.tensorflow.org/hub/modules/google/imagenet/inception_v3/classification/1)
- [2] - [https://www.tensorflow.org/tutorials/image\\_recognition](https://www.tensorflow.org/tutorials/image_recognition)
- [3] - <http://image-net.org/challenges/LSVRC/2014/browse-synsets>
- [4] - [https://www.tensorflow.org/tutorials/image\\_retraining](https://www.tensorflow.org/tutorials/image_retraining)

## Task and installation

On Windows, prerequisites: ..., Python and Python editor.

### 1. Install Python 3.6.x (or 3.7.x if supported by Tensorflow)

It may be best to use: python-3.6.x-amd64-webinstall.exe for now. TensorFlow seems not to be fully supported with python-3.7.x-amd64-webinstall.exe yet.

Needed packages as numpy etc. will be installed automatically later on when performing step 2.

### 2. Install TensorFlow and TensorFlow-Hub

```
pip install tensorflow
```

(or with whl: <https://www.lfd.uci.edu/~gohlke/pythonlibs/#tensorflow>  
pip install .\tensorflow-1.9.0-cp37-cp37m-win\_amd64.whl)

```
pip install tensorflow-hub
```

A lot of extra packages will be installed during the install. Check with:  
pip list

Now you are ready to begin training your own “AI brain” that can classify images. You have to do the lab with something else than the Google guide at:

[https://www.tensorflow.org/hub/tutorials/image\\_retraining](https://www.tensorflow.org/hub/tutorials/image_retraining) Most of the scripts can however be reused from this guide into your own solution.

A useful function for a solution like this at a later stage in the development could be to run the Python scripts from a web browser or make an interactive Python menu.

## Other good resources

### Batch download many similar pictures

In chrome there is extensions that can batch download many similar pictures:

<https://chrome.google.com/webstore/search/batch%20image%20download?hl=en&category=extensions>

### TensorFlow

<https://github.com/tensorflow/tensorflow>

<https://github.com/tensorflow/hub>

Playground: <https://playground.tensorflow.org>

## Free preview course

<https://www.udemy.com/complete-guide-to-tensorflow-for-deep-learning-with-python/>

## Deep: learning with Tensorflow etc.

<https://towardsdatascience.com/deep-learning-with-tensorflow-part-1-b19ce7803428>

<https://towardsdatascience.com/deep-learning-with-tensorflow-part-2-image-classification-58fcdffa7b84>

## Best alternative resource for learning Python and Tensorflow

<https://github.com/MicrocontrollersAndMore/>

1. [https://www.youtube.com/watch?v=oXWVuK\\_NjbY](https://www.youtube.com/watch?v=oXWVuK_NjbY)
2. <https://www.youtube.com/watch?v=oXpsAiSajE0>
3. <https://www.youtube.com/watch?v=rWFg6R5ccOc>

## Python Computer Vision -- Transfer Learning With Tensorflow

<https://github.com/moondra2017>

1. <https://www.youtube.com/watch?v=Qv2QHPvYvwo>
2. <https://www.youtube.com/watch?v=6Zyto2qktvs>
3. <https://www.youtube.com/watch?v=DfJhQTV71lg&t=681s>
4. <https://www.youtube.com/watch?v=0LwvDDjVjPE&t=20s>