Inception-v3 image recognition neural network

Transfer learning is a machine learning method which utilizes a pre-trained neural network. For example, the image recognition model called Inception-v3 consists of two parts:

- Feature extraction part with a convolutional neural network.
- Classification part with fully-connected and softmax layers.

The pre-trained Inception-v3 model achieves state-of-the-art accuracy for recognizing general objects with 1000 classes, like "Zebra", "Dalmatian", and "Dishwasher". The model extracts general features from input images in the first part and classifies them based on those features in the second part.

In transfer learning, when we build a new model to classify our original dataset, we reuse the feature extraction part and re-train the classification part with our dataset. Since we don't have to train the feature extraction part (which is the most complex part of the model), we can train the model with less computational resources and training time.

Transfer learning is taking the weights from a previously trained network and use them as the basis for the weights in a new network. Since there is a difference in number of categories between data sets we normally remove the top layers of the network and re-instantiate them to match the number of categories we're trying to choose between. Using Transfer Learning will significantly speed up your training process by utilizing things like edge detection that the previous training has already learned then you can fine tune the network to your data set.

A commonly used transfer learning base is the ImageNet data set weights.

"What is ImageNet? ImageNet is an image dataset organized according to the WordNet hierarchy. Each meaningful concept in WordNet, possibly described by multiple words or word phrases, is called a "synonym set" or "synset". There are more than 100,000 synsets in WordNet, majority of them are nouns (80,000+). In ImageNet, we aim to provide on average 1000 images to illustrate each synset. Images of each concept are quality-controlled and human-annotated. In its completion, we hope ImageNet will offer tens of millions of cleanly sorted images for most of the concepts in the WordNet hierarchy."

http://image-net.org/about-overview