

- **Transfer learning & fine-tuning**
- **Freezing layers: understanding the trainable attribute • weights is the list of all weights variables of the layer.**
- **trainable\_weights is the list of those that are meant to be updated (via gradient descent) to minimize the loss during training.**
- **non\_trainable\_weights is the list of those that aren't meant to be trained.**  
**Typically they are updated by the model during the forward pass.**
- **Example: the Dense layer has 2 trainable weights (kernel & bias)**
- **Example: setting trainable to False**
- **Recursive setting of the trainable attribute**
- **The typical transfer-learning workflow**
- **Fine-tuning**
- **Transfer learning & fine-tuning with a custom training loop**
- **An end-to-end example: fine-tuning an image classification model on a cats vs. dogs (Code Example)**
- **Getting the data**
- **Standardizing the data**
- **Using random data augmentation**
- **Build a model**
- **Train the top layer**
- **Do a round of fine-tuning of the entire model**