Image Captioning with RNNs

In this exercise you will implement a vanilla recurrent neural networks and use them to train a model that can generate novel captions for images.

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In [1]: %cd drive/MyDrive/cs231n/assignments/cs231n/datasets
        !bash get_coco_captioning.sh
        !bash get_3_coco.sh
        !bash get_pretrained_coco.sh
        !bash get_image_net_tiny.sh
        !bash get_pretrained_image_net.sh
        !bash get_pascal_voc_2007_data.sh
        !bash get_pretrained_pascal_voc_2007.sh
        !bash get_NIRCAM_data.sh
        !bash get_pretrained_NIRCAM.sh
        !bash get_MNIST_data.sh
        !bash get_CIFAR10_data.sh
        !bash get_CIFAR100_data.sh
        !bash get_EuroSAT_RGB_data.sh
        !bash get_pretrained_EuroSAT_RGB.sh
        !bash get_Sentinel_2_data.sh
        !bash get_pretrained_Sentinel_2.sh
        !bash get_Sentinel_2_EuroSAT_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT.sh
        !bash get_Sentinel_2_EuroSAT_MS_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS.sh
        !bash get_Sentinel_2_EuroSAT_MS_RGB_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_RGB.sh
        !bash get_Sentinel_2_EuroSAT_MS_NIR_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NIR.sh
        !bash get_Sentinel_2_EuroSAT_MS_SWIR_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_SWIR.sh
        !bash get_Sentinel_2_EuroSAT_MS_VNIR_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_VNIR.sh
        !bash get_Sentinel_2_EuroSAT_MS_RE_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_RE.sh
        !bash get_Sentinel_2_EuroSAT_MS_BAND_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_BAND.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDWI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDWI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDMI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDMI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDRE_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDRE.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDBI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDBI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDSI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDSI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDBSI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDBSI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_NDBI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_NDBI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI.sh
        !bash get_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_data.sh
        !bash get_pretrained_Sentinel_2_EuroSAT_MS_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDBSI_NDVI_NDWI_NDMI_NDRE_NDBI_NDSI_NDB
```

```
CV LAB-7 from google.colab import drive
drive.mount('/content/drive', force_remove_extracted=True, datalock=False, timeout_ms=300)
!pip install -q -U keras-nlp tensorflow
!pip install -q -U tensorflow-text==2.15.0
!pip install -q -U keras==3.0.5
os.environ["KERAS_BACKEND"] = "jax"
os.environ["XLA_PYTHON_CLIENT_MEM_FRACTION"] = "0.90"
os.environ["TF_CPP_MIN_LOG_LEVEL"] = "2"
from keras_nlp.models import CLIPImageConverter, CLIPTokenizer, CLIPTextEncoder, CLIPVisionEncoder
from keras_nlp.utils import load_image, load_text, resize_image, display_image_grid, normalize
import numpy as np, matplotlib.pyplot as plt, keras, tqdm, os, glob, random, shutil
from keras.utils import image_dataset_from_directory, plot_model, get_file, get_custom_objects
from keras.layers import Input, Dense, Dropout, Flatten, Conv2D, MaxPooling2D, BatchNormalization, GlobalAveragePooling2D
from keras.models import Sequential, Model, load_model
```

Step

CV LAB-7 [ ] image = load_image("/content/drive/MyDrive/cv/1.jpg")
display_image(image)

Step

CV LAB-7 [ ] image = load_image("/content/drive/MyDrive/cv/2.jpg")
display_image(image)

Step

CV LAB-7 [ ] image = load_image("/content/drive/MyDrive/cv/3.jpg")
display_image(image)

Step

CV LAB-7 [ ] image = load_image("/content/drive/MyDrive/cv/4.jpg")
display_image(image)

Step

CV LAB-7 [ ] image = load_image("/content/drive/MyDrive/cv/5.jpg")
display_image(image)