

```
In [1]: import math
from model import EncoderCNN, DecoderRNN
# from model_GRU import EncoderCNN, DecoderRNN
from data_loader_val import get_loader as val_get_loader
from pycocotools.coco import COCO
from torchvision import transforms
from tqdm.notebook import tqdm
import torch.nn as nn
import torch
import torch.utils.data as data
from collections import defaultdict
import json
import os
import sys
import numpy as np
from nlp_utils import clean_sentence, bleu_score

%load_ext autoreload
%autoreload 2
```

```
In [2]: # Setting hyperparameters
batch_size = 256 # batch size
vocab_threshold = 5 # minimum word count threshold
vocab_from_file = True # if True, load existing vocab file
embed_size = 256 # dimensionality of image and word embeddings
hidden_size = 512 # number of features in hidden state of the RNN decoder
coco_data = r"C:\Users\harsh\Documents"
```

```
In [3]: transform_test = transforms.Compose(
    [
        transforms.Resize(224),
        transforms.ToTensor(),
        transforms.Normalize(
            (0.485, 0.456, 0.406), # normalize image for pre-trained model
            (0.229, 0.224, 0.225),
        ),
    ]
)

# Create the data loader.
val_data_loader = val_get_loader(
    transform=transform_test, mode="valid", cocoapi_loc=coco_data
)
# val_loss = validate(encoder, decoder, criterion, val_data_loader, device)
encoder_file = "encoder-final-5.pkl"
decoder_file = "decoder-final-5.pkl" #-3

vocab_size = 11543#len(data_loader.dataset.vocab) #1
embed_size = 256 # dimensionality of image and word embeddings
hidden_size = 512 # number of features in hidden state of the RNN decoder

# Initializing the encoder and decoder
encoder = EncoderCNN(embed_size)
decoder = DecoderRNN(embed_size, hidden_size, vocab_size)

checkpoint = torch.load("models/LSTM/LSTM_checkpoint-5.pkl")
# checkpoint = torch.load("models/GRU/GRU_checkpoint-5.pkl")

encoder.load_state_dict(checkpoint['encoder_state_dict'])
decoder.load_state_dict(checkpoint['decoder_state_dict'])
# CUDA is available.
device = torch.device("cuda" if torch.cuda.is_available() else "cpu")
```

```
encoder.to(device)
decoder.to(device)

encoder.eval()
decoder.eval()
```

Vocabulary successfully loaded from vocab.pkl file!

```
c:\Users\harsh\anaconda3\envs\img-caption\Lib\site-packages\torchvision\models\_utils.p
y:208: UserWarning: The parameter 'pretrained' is deprecated since 0.13 and may be remov
ed in the future, please use 'weights' instead.
  warnings.warn(
c:\Users\harsh\anaconda3\envs\img-caption\Lib\site-packages\torchvision\models\_utils.p
y:223: UserWarning: Arguments other than a weight enum or `None` for 'weights' are depre
cated since 0.13 and may be removed in the future. The current behavior is equivalent to
passing `weights=ResNet50_Weights.IMAGENET1K_V1`. You can also use `weights=ResNet50_Wei
ghts.DEFAULT` to get the most up-to-date weights.
  warnings.warn(msg)
```

```
Out[3]: DecoderRNN(
  (embed): Embedding(11543, 256)
  (lstm): LSTM(256, 512, batch_first=True)
  (linear): Linear(in_features=512, out_features=11543, bias=True)
)
```

```
In [4]: vocab_size
```

```
Out[4]: 11543
```

```
In [6]: # infer captions for all images
from tqdm import tqdm
predicted_captions = defaultdict(list)

for image_id, image_tensor in tqdm(val_data_loader):
    image_tensor = image_tensor.to(device)

    with torch.no_grad():
        image_features = encoder(image_tensor).unsqueeze(1)
        generated_output = decoder.generate_caption(image_features)

    generated_sentence = clean_sentence(generated_output, val_data_loader.dataset.vocab)

    predicted_captions[image_id.item()].append(generated_sentence)
```

```
100%|██████████| 5000/5000 [07:26<00:00, 11.21it/s]
```

```
In [7]: import random
import matplotlib.pyplot as plt
from collections import defaultdict
from tqdm import tqdm
import torch

def clean_sentence(output, idx2word):
    sentence = ' '.join([idx2word[word_idx] for word_idx in output])
    return sentence

def show_image_with_caption(img, caption):
    plt.imshow(img)
    plt.title(caption)
    plt.axis('off')
    plt.show()

num_samples = 5
random_indices = random.sample(range(len(val_data_loader.dataset)), num_samples)
print(random_indices)
pred_result = defaultdict(list)
transform_test_2 = transforms.Compose(
```

```

[
    transforms.Resize(224),
    transforms.ToTensor(),
]
)

val_data_loader_no_tx = val_get_loader(
    transform=transform_test_2, mode="valid", cocoapi_loc=coco_data
)

for idx in tqdm(random_indices):
    print(idx)
    _, img = val_data_loader.dataset[idx]
    _, img2 = val_data_loader_no_tx.dataset[idx]

    print(_)
    img = img.unsqueeze(0).to(device)

    with torch.no_grad():
        features = encoder(img).unsqueeze(1)
        output = decoder.generate_caption(features)

    sentence = clean_sentence(output, val_data_loader.dataset.vocab.idx2word)
    pred_result[idx].append(sentence)

    img2 = img2.cpu().squeeze(0).permute(1, 2, 0)
    img2 = img2.numpy()
    img2 = img2 * 255.0
    img2 = img2.astype('uint8')

    img = img.cpu().squeeze(0).permute(1, 2, 0)
    img = img.numpy()
    img = img * 255.0
    img = img.astype('uint8')

    show_image_with_caption(img2, sentence)

```

[2686, 3207, 26, 3410, 2244]

Vocabulary successfully loaded from vocab.pkl file!

0% | 0/5 [00:00<?, ?it/s]

2686

537355

<start> a horse is standing in the grass near a fence . <end>



20% | 1/5 [00:00<00:01, 3.59it/s]
3207
523100

<start> a person cutting a piece of bread with a knife . <end>



40% | 2/5 [00:00<00:00, 4.86it/s]
26
153299

<start> a giraffe standing next to a wooden fence . <end>



60% | 3/5 [00:00<00:00, 5.51it/s]
3410
80932

<start> a man and a woman sitting at a table with a cake . <end>



80% | ██████████ | 4/5 [00:00<00:00, 5.79it/s]

2244

127530

<start> a man holding a tennis racquet on a tennis court . <end>



100% | ██████████ | 5/5 [00:00<00:00, 5.57it/s]

```
In [8]: with open(os.path.join(coco_data, "cocoapi", "annotations/captions_val2017.json"), "r")
        captions_data = json.load(file)

validation_annotations = captions_data["annotations"]
validation_results = defaultdict(list)

for annotation in validation_annotations:
    validation_results[annotation["image_id"]].append(annotation["caption"].lower())
```

In [13]: predicted_captions

```
Out[13]: defaultdict(list,
    {231237: [' a vase with flowers on a table'],
      92053: [' a plate with a sandwich and some fries on it'],
      113051: [' a boat is docked in a harbor with a bridge in the background
    .'],
      122217: [' a man riding a skateboard on a ramp .'],
      551215: [' a man playing tennis on a tennis court .'],
      130465: [" a large clock tower with a clock on each of it 's sides ."],
      76416: [' a man walking down a street with a red umbrella .'],
      246454: [' a woman riding a horse in a field'],
      161609: [' a man sitting on a bench with a dog on his lap .'],
      502732: [' a refrigerator with a magnet on top of it .'],
      545407: [' a large airplane flying through a blue sky .'],
      115885: [' a cat is sitting on a laptop keyboard'],
      60899: [' a woman sitting on a chair in front of a laptop computer .'],
      356347: [' a pot of stew with a spoon in it'],
      554595: [' a surfboard on a beach with a large ship in the background .'],
      402433: [' a pizza sitting on top of a pan on top of a table .'],
      182021: [' a baseball player is getting ready to hit a ball .'],
      451155: [' a bedroom with a bed and a window'],
      503755: [' a man holding a tennis racquet on a tennis court .'],
      488664: [' a train on tracks with a sky background'],
      197022: [' a pizza with cheese and pepperoni on a pan .'],
      190236: [' a desk with a laptop and a monitor'],
      528862: [' a giraffe and a zebra in a zoo enclosure .'],
      402118: [' a man riding a snowboard on top of a snow covered slope .'],
      245764: [' a cat sitting on top of a toilet seat .'],
      166642: [' a large elephant standing next to a tree .'],
      461009: [' a man holding a banana up to his face .'],
      482275: [' a man sitting on a bench with a cell phone .'],
      260261: [' a man is holding a sign on a street corner .'],
      455267: [' a pot of stew with a spoon in a pot .'],
      106912: [' a man is jumping in the air on a skateboard .'],
      336232: [' a man on a motorcycle driving down the street'],
      161781: [' a man riding skis down a snow covered slope .'],
      193884: [' a stop sign on a street corner with a building in the background
    .'],
      553669: [' a man sitting on a bench with a dog on his lap .'],
      158956: [' a woman is playing a video game on a wi .'],
      335954: [' a plate of food with a salad and a glass of wine .'],
      514376: [' a bus is driving down a street with a red traffic light .'],
      140840: [' a group of people on a beach with a kite .'],
      115245: [' a room with a bed , chair , and a window .'],
      368982: [' a pair of scissors and a pair of scissors on a table .'],
      451879: [' a baseball player is getting ready to hit a ball .'],
      172977: [' a zebra standing in a field next to a fence .'],
      89670: [' a piece of cake on a plate with a fork .'],
      455301: [' a little girl sitting on a bed with a stuffed bear .'],
      456865: [' a large air plane on a run way'],
      431693: [' a man playing tennis on a tennis court .'],
      340175: [' a living room with a couch , chair and a television .'],
      341719: [' a group of people riding skis on a snowy surface'],
      80659: [' a man riding a horse on a dirt road .'],
      31620: [' a man is standing in a room with a large bed .'],
      131273: [' a cat is sitting on a car seat'],
      521259: [' a group of young men standing next to each other holding skatebo
ards .'],
      554838: [' a man in a kitchen with a refrigerator and a stove top .'],
      516143: [' a bus is parked on the side of the street .'],
      390902: [' a man holding a tennis racquet on a tennis court .'],
      154087: [' a group of people standing on top of a snow covered slope .'],
      471567: [' a giraffe standing next to a wooden fence .'],
      385719: [' a desk with a laptop and a monitor'],
      135673: [' a plane flying in the air with a sky background'],
```


287714: [' a bathroom with asink , mirror and toilet .'],
572388: [' a small hamster eating a carrot and a banana .'],
475779: [' a large elephant standing in a field of tall grass .'],
126110: [' a red bus is parked in front of a building .'],
62692: [' a man playing tennis on a tennis court .'],
384808: [' a bathroom with asink and a mirror'],
479099: [' a garden with a bench and a garden area'],
81394: [' a truck with a large satellite dish on the side of it .'],
232489: [' a pizza sitting on top of a white plate on a table .'],
11813: [' a laptop computer sitting on top of a wooden desk .'],
311950: [' a plate with a bunch of different foods on it'],
196843: [' a large bus is parked on the side of the street .'],
284991: [' a man holding a cell phone in his hand .'],
507081: [' a kitchen with a refrigerator and a table'],
505169: [' a bathroom with a toilet and asink'],
28452: [' a kitchen with a refrigerator and asink'],
210855: [' a bathroom with asink , mirror and toilet .'],
441442: [' a man riding a horse over a wooden fence .'],
464786: [' a hot dog with mustard and ketchup on a bun .'],
537812: [' a toilet in a small bathroom with a toilet and asink .'],
423617: [' a bus is parked on the side of the street .'],
357816: [' a baseball player is swinging at a ball .'],
493019: [' a zebra standing next to a wooden fence .'],
563604: [' a fire hydrant on the corner of a street'],
78266: [' a large industrial kitchen with a large window .'],
128372: [' a man standing on a bus in front of a bus .'],
258883: [' a person cutting a pizza with a knife and fork .'],
83531: [' a bunch of carrots and a hot dog on a table'],
352582: [' a man is playing frisbee in the park .'],
261161: [' a dog sitting on a bench in a park .'],
227985: [' a plate with a sandwich and salad on it .'],
356432: [' a living room with a couch , chair and a television .'],
473406: [' a little girl sitting on a toilet in a bathroom .'],
494869: [' a man and a dog sitting on a couch with a dog .'],
429530: [' a vase with a bunch of flowers inside of it'],
276024: [' a group of people walking down a dirt road .'],
384850: [' a bathroom with a toilet and asink'],
510329: [' a man sitting on a bench with a dog on his lap .'],
346638: [' a laptop computer sitting on top of a wooden desk .'],
482477: [' a bird with a long neck standing on a branch .'],
103585: [' a bathroom with asink and a mirror'],
477118: [' a street sign on a pole on a street .'],
110211: [' a group of zebras standing in a field .'],
11760: [' a group of zebras standing around in a field .'],
466156: [' a cat sitting on a car dashboard with a cat on top of it .'],
108440: [' a train on tracks with a train on it .'],
561009: [' a bird sitting on a branch in a tree .'],
259571: [' a man is sitting on a bench with a dog .'],
246963: [' a group of people riding motorcycles on a street .'],
193674: [' a man on a surfboard riding a wave .'],
252507: [' a person on skis going down a snowy hill .'],
31050: [' a vase with a bunch of flowers inside of it'],
207306: [' a fire hydrant with a hose attached to it'],
192871: [' a bowl of fruit and a banana on a table .'],
307598: [' a train on a train track with power lines above'],
84431: [' a pizza sitting on top of a white plate on a table .'],
321557: [' a motorcycle parked in front of a garage door .'],
186632: [' a man sitting at a table with a glass of wine .'],
171382: [' a man riding a skateboard down a street .'],
550426: [' a vase with flowers on a table'],
315187: [' a bus is driving down a street with a traffic light .'],
256916: [' a pizza sitting on top of a white plate on a table .'],
245651: [' a toy car is sitting on a table .'],
157756: [' a street with a clock on the top of it'],
56127: [' a room with a bed , chair , and a fireplace .'],
426297: [' a zebra standing in the shade of a tree .'],

177213: [' a slice of pizza on a white plate'],
183104: [' a giraffe is standing in front of a fence .'],
125257: [' a person on skis going down a snowy hill .'],
258388: [' a man jumping up into the air on a skateboard .'],
175443: [' a teddy bear sitting on a chair with a red flower in it .'],
434996: [' a dog sitting on a bed with a stuffed animal'],
365766: [' a kitchen with a stove and a refrigerator'],
320664: [' a plate with a sandwich and salad on it .'],
552612: [' a sheep and a dog are in a field .'],
323828: [' a train on tracks with a train on the tracks .'],
176799: [' a man is sitting on a bench with a sign on it .'],
270705: [' a bird sitting on a window sill looking out of a window .'],
259382: [' a giraffe standing next to a wooden fence .'],
146498: [' a stop sign on a street corner with a street sign on top of it
.'],

256192: [' a man on a motorcycle is on a street .'],
52007: [' a bus is parked on the side of the street .'],
376442: [' a cat sitting on top of a toilet seat .'],
492282: [' a group of people riding horses on a street .'],
18770: [' a man wearing a suit and tie with a beard'],
166563: [' a man riding a skateboard down a street .'],
537153: [' a person on a beach flying a kite .'],
572408: [' a giraffe is standing in the grass near a tree .'],
395180: [' a man riding a horse on a dirt path .'],
534601: [' a small dog laying on a bed with a stuffed animal .'],
127092: [' a street sign on a pole on a city street'],
39670: [' a train on a track near many trees'],
1000: [' a group of people standing on top of a tennis court .'],
215072: [' a man sitting on a bench with a surfboard .'],
97679: [' a car is parked in front of a parking meter .'],
400367: [' a street with cars parked on the side of the road .'],
53624: [' a baby elephant standing next to a larger elephant .'],
73118: [' a teddy bear with a red bow on it .'],
424975: [' a man walking down a street with a red umbrella .'],
113720: [' a woman sitting at a table with a plate of pizza .'],
395343: [' a vase with a bunch of flowers inside of it'],
135872: [' a desk with a laptop and a monitor'],
160728: [' a group of people on a beach with a large ship in the background
.'],

139883: [' a red fire hydrant is in the middle of a grassy area .'],
383384: [' a baseball player is getting ready to hit a ball .'],
129945: [' a baseball player is swinging at a ball .'],
274708: [' a person on a snowboard on a mountain .'],
126592: [' a stop sign on a street corner with a street sign on top of it
.'],

377486: [' a man riding a horse on a dirt road .'],
534605: [' a man on a motorcycle is driving down the street .'],
364587: [' a train is going down the tracks in a field .'],
200162: [' a train on a train track with a sky background'],
516038: [' a baseball player is getting ready to hit a ball .'],
97230: [' a large elephant standing in the middle of a field .'],
328683: [' a parking meter with a sign on it .'],
253386: [' a dog is sitting on a bench in the grass .'],
238013: [' a man is playing tennis on a tennis court'],
410878: [' a motorcycle parked on the side of a road .'],
266768: [' a woman sitting on a bench with a dog .'],
175535: [' a plate with a sandwich and chips on it .'],
51008: [' a cat is sitting on a laptop keyboard'],
147745: [' a large truck is parked in a parking lot .'],
352491: [' a train is parked at a station in the city .'],
430377: [' a man and a woman on skis in the snow .'],
482585: [' a train is stopped on the tracks at a station .'],
488673: [' a man and a woman are sitting at a table with a cake .'],
266981: [' a man is standing in front of a large clock .'],
443844: [' a man riding a skateboard on a ramp .'],
459195: [' a man sitting on a bench with a dog .'],

293044: [' a tray of food with a cup of coffee and a cup of coffee .'],
90956: [' a person on skis going down a snowy hill .'],
270677: [' a man in a red shirt is playing frisbee'],
42296: [' a polar bear swims in a zoo enclosure .'],
360960: [' a woman walking down a street holding an umbrella .'],
294163: [' a clock tower with a sky background'],
42178: [' a train on tracks with a train on it .'],
532481: [' a man is surfing on a wave in the ocean .'],
324258: [' a man playing a game with a remote controller .'],
56350: [' a person taking a picture of a mirror in a bathroom .'],
490936: [' a man is sitting on a motorcycle with a woman on the back .'],
360564: [' a bathroom with a sink , toilet and mirror .'],
334530: [' a man riding a wave on top of a surfboard .'],
416885: [' a plate with a bunch of food on it'],
9378: [' a man holding a frisbee with a banana on it .'],
241297: [' a train on a train track with trees in the background'],
429690: [' a baseball player is getting ready to hit a ball .'],
290768: [' a kitchen with a refrigerator and a sink'],
65736: [' a woman is playing tennis on a tennis court .'],
375430: [' a piece of cake on a plate with a fork .'],
57238: [' a kitchen with a refrigerator and a sink'],
8532: [' a man wearing a suit and tie with a hat on .'],
208423: [' a person on a skateboard does a trick in the air .'],
107087: [' a person taking a photo in a mirror'],
437392: [' a stuffed animal is sitting on a toilet .'],
376112: [' a group of people on skis in the snow .'],
391140: [' a man in a suit and tie standing in front of a mirror .'],
228981: [' a cell phone sitting on top of a wooden table .'],
166166: [' a living room with a couch , chair and a television .'],
450686: [' a person holding a cell phone in their hand .'],
121417: [' a woman walking down a street holding an umbrella .'],
284445: [' a group of people walking down a street with umbrellas .'],
332351: [' a group of people on a beach with a dog .'],
373353: [' a street scene with a bus and a car .'],
69356: [' a man is standing in front of a store selling bananas .'],
187249: [' a television screen with a clock on the top .'],
542856: [' a bus is driving down a street with a bus in the background .'],
555009: [' a desk with a laptop and a keyboard on it'],
351589: [' a bench sitting in front of a window .'],
84270: [' a train station with a train on the tracks .'],
182202: [' a laptop computer sitting on top of a wooden desk .'],
429011: [' a white truck parked in front of a building .'],
524850: [' a plane parked on the runway of an airport .'],
396863: [' a woman riding a horse in a field .'],
3553: [' a man riding a skateboard down a street .'],
79034: [' a fire hydrant with a red top on top of it .'],
10977: [' a bathroom with a toilet and a sink'],
205514: [' a living room with a couch , chair and a television .'],
129492: [' a woman sitting on a couch with a remote .'],
348216: [' a white toilet sitting in a bathroom next to a window .'],
345469: [' a display case filled with lots of different types of food .'],
486104: [' a baseball player is swinging at a ball .'],
110884: [' a bathroom with a sink and a mirror'],
262487: [' a baseball player is swinging at a ball .'],
530457: [' a bunch of green bananas are in a vase .'],
184762: [' a clock with a large clock on it'],
209972: [' a small boat in the water with a large ship in the background
.
'],

222455: [' a large red bus is parked in front of a building .'],
306893: [' a train station with a train on the tracks .'],
553776: [' a man riding a motorcycle down a street .'],
226417: [' a group of people riding bicycles down a street .'],
479953: [' a man swinging a tennis racket on a tennis court .'],
543528: [' a plane flying in the air with a sky background'],
7818: [' a table with a vase of flowers on it'],
28285: [' a clock tower with a bell on top of it .'],

160556: [' a man playing a game with a remote controller .'],
 52565: [' a cow standing on a beach near the ocean .'],
 2685: [' a man is playing a video game with a remote controller .'],
 176847: [' a black bird standing on a tree branch .'],
 497867: [' a bus is parked on the side of the street .'],
 44590: [' a group of people riding motorcycles on a street .'],
 140987: [' a woman sitting at a table with a plate of pizza .'],
 115870: [' a group of people sitting on a couch with remotes .'],
 79188: [' a giraffe standing in the middle of a field .'],
 547854: [' a woman is holding a plate of food'],
 23666: [' a bathroom with a toilet and asink'],
 212800: [' a man is sitting on a boat with a dog .'],
 253452: [' a plate of food with a sandwich and chips .'],
 463542: [' a person on skis going down a snowy hill'],
 16451: [' a beach with a lot of people on the beach .'],
 151480: [' a man is playing tennis on a court'],
 2157: [' a table with a plate of food and a cup of coffee .'],
 138550: [' a fire hydrant on the side of the street .'],
 407403: [' a white toilet with a blue seat and a white sheet .'],
 2532: [' a person on skis going down a mountain .'],
 145620: [' a man riding a horse through a forest .'],
 316404: [' a man and a woman standing next to each other holding tennis rac
 kets .'],
 20247: [' a brown bear walking across a dirt field .'],
 282037: [' a baseball player is getting ready to hit a ball .'],
 192699: [' a man and a woman riding a motorcycle on a road .'],
 186929: [' a bunch of fruit and vegetables are on a table .'],
 320232: [' a street sign on a city street with a sky background'],
 40471: [' a kitchen with a refrigerator and asink'],
 466602: [' a person on skis going down a snowy hill'],
 475365: [' a large truck is parked in a parking lot .'],
 110042: [' a man is holding a sign with a dog on it .'],
 462614: [' a bathroom with a toilet and asink'],
 511384: [' a man flying a kite in a field .'],
 547336: [' a woman is holding a skateboard in front of a house .'],
 48396: [' a woman standing in front of a cake on a table .'],
 57149: [' a street with cars parked on the side of the road .'],
 476491: [' a street sign on a street corner with a clock on it .'],
 350019: [' a man sitting on a toilet in a bathroom .'],
 119088: [' a man riding a wave on top of a surfboard .'],
 41488: [' a street sign with a picture of a street sign on it .'],
 500478: [' a baseball player is swinging at a ball .'],
 302107: [' a baseball player is getting ready to hit a ball .'],
 573094: [' a living room with a couch , chair and a television .'],
 554328: [' a man in a baseball uniform standing in front of a fence .'],
 283113: [' a hot dog with onions and mustard on a bun .'],
 522713: [' a bench sitting on a grassy hill next to a lake .'],
 274066: [' a man riding a surfboard on top of a wave .'],
 293390: [' a bathroom with a toilet and asink'],
 99053: [' a bowl of noodles and vegetables on a table .'],
 183049: [' a table with a laptop and a book on it'],
 390301: [' a fire hydrant that is spraying water out of the side .'],
 323496: [' a woman is playing tennis on a tennis court .'],
 85157: [' a group of people sitting around a table with a cake .'],
 12062: [' a sheep with a tag on its ear'],
 208208: [' a plane flying in the sky over a lake .'],
 425361: [' a man sitting at a table with a laptop computer .'],
 292997: [' a street with a traffic light and a car'],
 197796: [' a bathroom with asink , mirror and toilet .'],
 166426: [' a plate of food with a fork and knife .'],
 374083: [' a woman cutting a cake with a knife .'],
 396200: [' a man riding a skateboard on a ramp .'],
 41872: [' a bedroom with a bed and a window'],
 571857: [' a group of people standing on top of a sandy beach .'],
 96427: [' a woman is playing tennis on a tennis court .'],
 57027: [' a group of elephants standing around a watering hole .'],

384651: [' a living room with a couch , chair and a television .'],
32901: [' a group of people standing around a table with a cake .'],
354547: [' a man in a suit and tie standing in front of a building .'],
181859: [' a cat is sitting on the toilet in the bathroom .'],
100582: [' a pizza with tomatoes , onions , and peppers on a plate .'],
106048: [' a bus is parked in front of a building .'],
233238: [' a group of people sitting around a table with food .'],
189226: [' a fire hydrant sitting on the side of a road .'],
361103: [' a man is walking down the street with a skateboard .'],
200152: [' a street sign on a pole on a street .'],
84674: [' a group of people standing around a table with a cake .'],
130599: [' a man is feeding a giraffe a cracker through a fence .'],
392481: [' a fighter jet flying through a cloudy sky .'],
77396: [' a cat sitting on a chair in front of a television .'],
60932: [' a man in a suit and tie standing in front of a window .'],
281929: [' a man riding a bike down a street next to a traffic light .'],
50149: [' a bunch of bananas are hanging on a wall .'],
180792: [' a bathroom with a toilet and asink'],
564023: [' a bathroom with a toilet and asink'],
213593: [' a street with a traffic light and a street sign .'],
216516: [' a man on skis going down a hill .'],
15278: [' a plate of food with broccoli and a fork .'],
579655: [' a woman with a toothbrush in her mouth .'],
565989: [' a clock tower with a clock on the top .'],
90062: [' a cow standing in a pen next to a fence .'],
478862: [' a large air plane on a run way'],
480275: [' a man sitting on a bench with a dog in his lap .'],
489014: [' a boat is in the water with a boat in the background .'],
379476: [' a large clock on a wall in a room .'],
263474: [' a white toilet sitting next to a white toilet .'],
82715: [' a man riding a wave on top of a surfboard .'],
51309: [' a couple of horses standing on top of a grass covered field .'],
388927: [' a person holding a remote control in their hand .'],
275791: [' a train on a track near many trees'],
370270: [' a woman is standing in front of a refrigerator .'],
481582: [' a man is sitting on a horse in a barn .'],
85665: [' a person holding a colorful kite in a field .'],
415238: [' a vase with flowers on it and a cat sitting on a table .'],
80274: [' a large elephant standing next to a tree .'],
10092: [' a bedroom with a bed and a window'],
549220: [' a dog is sitting on a skateboard in the street .'],
82986: [' a man is standing in front of a giraffe .'],
339442: [' a plate with a sandwich and a cup of coffee .'],
383621: [' a plane flying in the air over a field .'],
82846: [' a bus is parked on the side of the street .'],
314177: [' a man in a bathroom with a large mirror .'],
350488: [' a zebra standing in the grass near a tree .'],
396568: [' a train on tracks with a mountain behind it .'],
234607: [' a woman standing in front of a tv holding a wii remote .'],
418696: [' a street with a clock tower and a flag'],
395575: [' a man is standing on a bridge over a river .'],
293804: [' a living room with a couch , chair and a television .'],
569273: [' a fire hydrant is in the middle of a field .'],
571804: [' a toilet with a white lid and a white toilet'],
553731: [' a man wearing a helmet holding a baseball bat .'],
17178: [' a cow standing in the middle of a road .'],
546717: [' a young boy sitting on a bed with a laptop .'],
98497: [' a large clock tower with a sky background'],
53505: [' a bathroom with a toilet and asink'],
327306: [' a man riding a skateboard up the side of a ramp .'],
242060: [' a table with a plate of food and a cup of coffee .'],
465836: [' a woman in a red jacket is skiing down a hill .'],
530052: [' a person is holding a bunch of bananas .'],
565469: [" a large clock tower with a clock on it 's side ."],
300276: [' a man and a woman sitting at a table with a cake .'],
184321: [' a train on a train track with power lines above'],

498747: [' a woman and a man are playing a video game .'],
 420281: [' a man eating a hot dog in a restaurant .'],
 14888: [' a dog is sitting on a bench in the grass .'],
 226130: [' a plate with a sandwich and chips on it .'],
 165351: [' a plate of food with a sandwich and chips .'],
 358923: [' a woman holding a cell phone in her hand .'],
 512657: [' a man and a woman playing a game with nintendo wii controllers
 .'],
 470924: [' a group of people sitting around a table with food .'],
 464358: [' a bedroom with a bed and a window'],
 39551: [' a woman is playing tennis on a tennis court .'],
 312237: [' a beach with a lot of people flying kites .'],
 151516: [' a man riding a wave on top of a surfboard .'],
 325114: [' a bathroom with a toilet and asink'],
 251065: [' a toilet with a white lid and a white toilet'],
 179653: [' a clock on a pole on a street .'],
 66523: [' a bedroom with a bed and a window'],
 434297: [' a plate of food with a sandwich and salad .'],
 560911: [' a man sitting on a couch with a laptop .'],
 333237: [' a bed with a canopy over it and a white table'],
 68387: [' a baseball player is swinging at a ball .'],
 573008: [' a large boat is in the water with a bridge in the background
 .'],
 50679: [' a yellow and blue fire hydrant sitting on the side of a road .'],
 454750: [' a zebra is standing in the grass near a fence .'],
 540466: [' a red umbrella is sitting on the side of a road .'],
 383606: [' a bathroom with asink , mirror and toilet .'],
 116825: [' a cat is sitting on a chair with a remote control .'],
 120572: [' a clock tower with a bell on top of it .'],
 267670: [' a bathroom with a white toilet and asink'],
 580418: [' a cow standing in the middle of a street .'],
 9914: [' a plate of food with a sandwich and chips .'],
 101022: [' a street sign on a pole on a street .'],
 417465: [' a bear that is sitting on a rock .'],
 146825: [' a train is parked on the tracks at a station .'],
 58393: [' a man sitting on a bench with a dog on it .'],
 176037: [' a bus is driving down a street with a traffic light .'],
 491090: [' a man sitting on a motorcycle in front of a building .'],
 153011: [' a group of people walking down a street with a bus .'],
 1761: [' a plane flying in the sky over a city .'],
 412531: [' a street sign on a pole on a sidewalk .'],
 236784: [' a dog laying on a bed with a cat sleeping on top of it .'],
 443969: [' a group of people standing around a table with umbrellas .'],
 89045: [' a living room with a couch , chair and a television .'],
 414795: [' a group of elephants are standing in a field .'],
 211042: [' a cat sitting on a toilet seat in a bathroom .'],
 60449: [' a laptop computer sitting on top of a wooden bench .'],
 295138: [' a man riding a skateboard down a street .'],
 560279: [' a bathroom with a toilet and asink'],
 232649: [' a bathroom with a toilet and asink'],
 533958: [' a plate with a piece of cake and a fork on it .'],
 220858: [' a boat is sitting in the water with a bunch of people on it .'],
 121591: [' a man riding a skateboard up the side of a ramp .'],
 39951: [' a man playing tennis on a tennis court .'],
 309495: [' a bathroom with a toilet and asink'],
 173091: [' a bottle of wine sitting on a table next to a bottle of wine
 .'],
 308328: [' a man is standing in front of a train .'],
 303653: [' a man riding a horse in a field with a dog .'],
 480122: [' a kitchen with a stove and a refrigerator'],
 343706: [' a person holding a skateboard with a dog in the background .'],
 158227: [' a young boy holding a baseball bat in a field .'],
 253695: [' a baseball pitcher is throwing a baseball on the mound .'],
 261061: [' a man throwing a frisbee in a park .'],
 111207: [' a man riding a skateboard on top of a cement block .'],
 338718: [' a car is parked in front of a parking meter .'],

467776: [' a black and white cow standing in a field .'],
 381639: [' a man is standing in front of a fire hydrant .'],
 304404: [' a baseball player is getting ready to hit a ball .'],
 419408: [' a man is sitting on a bench with a skateboard .'],
 484029: [' a street sign on a pole on a street .'],
 498919: [' a bunch of fruit and vegetables are on a table .'],
 227898: [' a horse drawn carriage on a street with a man on top of it .'],
 453341: [' a room with a bed and a chair and a lamp'],
 499313: [' a pizza sitting on top of a white plate on a table .'],
 369323: [' a woman is playing tennis on a tennis court .'],
 269632: [' a yellow bus is driving down a street .'],
 309391: [' a busy street with cars and a traffic light .'],
 76625: [' a train on tracks with a train on it'],
 267191: [' a man riding on the back of an elephant .'],
 274460: [' a group of people on a beach with surfboards .'],
 94326: [' a woman sitting on a bench with a dog .'],
 188906: [' a plate with a sandwich and salad on it .'],
 304560: [' a cat sitting on a bench in a grassy area .'],
 457848: [' a bike parked in front of a parking meter .'],
 506178: [' a woman standing in a kitchen holding a nintendo wii controller
 .'],
 172396: [' a pizza is cooking in a pan on top of a stove .'],
 342295: [' a bathroom with a toilet and asink'],
 311789: [' a cat is sitting on a laptop keyboard .'],
 74256: [' a woman in a dress is standing in front of a mirror .'],
 229849: [' a tennis player is swinging his racket to hit the ball .'],
 383443: [' a bathroom with asink , toilet and shower .'],
 154425: [' a man holding a tennis racquet on a tennis court .'],
 329219: [' a dog is sitting on a chair in a living room .'],
 62025: [' a bathroom with asink and a mirror'],
 476258: [' a man riding a skateboard on a ramp .'],
 45596: [' a street sign on a city street'],
 42563: [' a man riding a snowboard down a snow covered slope .'],
 330554: [' a microwave and a cup on a table'],
 259830: [' a bike parked next to a parking meter .'],
 354072: [' a bathroom with a toilet and asink'],
 563653: [' a street with a street sign on the sidewalk .'],
 121673: [' a man riding a wave on top of a surfboard .'],
 212453: [' a white toilet sitting next to a whitesink .'],
 104666: [' a living room with a couch , chair and a television .'],
 243867: [' a bus is parked on the side of the street .'],
 134722: [' a train on a track near a building'],
 442161: [' a woman and a man are standing in a kitchen .'],
 499768: [' a fire hydrant is on the side of the street .'],
 168593: [' a kitchen with a stove and a refrigerator'],
 94944: [' a man on skis is going down a mountain .'],
 413552: [' a young girl is holding a toothbrush in her mouth .'],
 568981: [' a man riding a skateboard on top of a cement block .'],
 550939: [' a street sign with a street name and a traffic light .'],
 476787: [' a person cutting a pizza with a knife and fork .'],
 278848: [' a group of people walking down a street with umbrellas .'],
 166165: [' a man is playing tennis on a tennis court .'],
 18519: [' a man riding a skateboard up the side of a ramp .'],
 10764: [' a baseball player is swinging at a ball .'],
 53909: [' a person holding a cell phone in their hand .'],
 473237: [' a young boy eating a piece of pizza .'],
 481159: [' a horse is standing in a fenced in area .'],
 273715: [' a man is standing in front of a large plane'],
 189475: [' a group of people sitting at a table with food and drink .'],
 458410: [' a living room with a couch , chair and a television .'],
 399560: [' a cat sitting on a chair in front of a window .'],
 396903: [' a large air plane on a run way'],
 328337: [' a man is sitting on a bench with a dog .'],
 567197: [' a large clock on the side of a building .'],
 231879: [' a woman sitting on a bench with a cell phone .'],
 185409: [' a herd of zebras in a field with a mountain in the background

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 156372: [' a couple of boats sitting on top of a beach .'],
 442463: [' a man riding a skateboard on top of a cement block .'],
 174231: [' a blue umbrella is sitting on a table'],
 367818: [' a horse is standing in the grass near a fence .'],
 21604: [' a man in a suit and tie standing in front of a mirror .'],
 460229: [' a stop sign on a street corner with a building in the background
 .'],
 173799: [' a group of people standing around a baby elephant .'],
 562581: [' a man is playing tennis on a tennis court .'],
 154947: [' a sheep standing on a lush green hillside .'],
 159458: [' a bedroom with a bed and a dresser in it .'],
 544444: [' a person on skis going down a hill .'],
 35770: [' a bathroom with a white toilet and asink .'],
 234660: [' a man is sitting on a train while holding a surfboard .'],
 6012: [' a bunch of bananas and a banana are on a table .'],
 92939: [' a woman cutting a cake with a knife .'],
 33707: [' a giraffe standing next to a wooden fence .'],
 565563: [' a street sign on a city street'],
 561958: [' a group of people on skis in the snow .'],
 455085: [' a red bus is parked in a parking lot .'],
 184791: [' a large clock sitting on top of a table .'],
 226802: [' a city street with a bus and a man on a bike .'],
 314264: [' a man is holding a large knife in front of a cake .'],
 531495: [' a large boat is docked at a pier .'],
 353518: [' a group of people sitting on a beach with surfboards .'],
 5586: [' a man on a tennis court with a racket'],
 246968: [' a woman standing in a kitchen with a large cake on top of it
 .'],
 100489: [' a bird sitting on a branch of a tree .'],
 579893: [' a street sign with a street name and a street sign on top of it
 .'],
 173044: [' a clock tower with a weather vane on top .'],
 347456: [' a couple of elephants standing in a field .'],
 106757: [' a man is standing in front of an elephant .'],
 281409: [' a baseball player is swinging at a ball .'],
 148783: [' a zebra standing in the shade of a tree .'],
 108026: [' a man sitting in a chair with a laptop and a keyboard .'],
 136772: [' a plate of fruit and a penny'],
 184400: [' a train on a train track with a sky background'],
 293245: [' a motorcycle parked in front of a building .'],
 555597: [' a large clock tower towering over a city street .'],
 440475: [' a living room with a couch , chair and a fireplace .'],
 400922: [' a clock on a pole on a street .'],
 206994: [' a train on a track near many trees'],
 188439: [' a truck is parked on the side of the road .'],
 74646: [' a man flying a kite on a beach .'],
 571943: [' a street sign with a street name and a traffic light .'],
 426795: [' a woman is eating a piece of pizza .'],
 153527: [' a fire hydrant in front of a house with a fire hydrant .'],
 42889: [' a person holding a cell phone with a picture of a man .'],
 369757: [' a table with a bunch of cakes on it'],
 542127: [' a person on a snowboard doing a trick .'],
 494427: [' a laptop computer sitting on top of a wooden desk .'],
 512929: [' a young boy sitting at a table with a plate of food .'],
 382743: [' a group of people flying a kite in the sky .'],
 469067: [' a man laying on a bed with a cat .'],
 464522: [' a dog is standing in the grass with a frisbee in its mouth .'],
 304984: [' a plate of food and a cup of coffee .'],
 430286: [' a bed with a pillow and a pillow on it'],
 295231: [' a group of cows standing in a field'],
 352684: [' a group of people standing around a white toilet .'],
 45090: [' a surfer is riding a wave in the ocean .'],
 491213: [' a motorcycle parked on the side of a road .'],
 105264: [' a man and a woman walking on a beach with a dog .'],
 143998: [' a pair of scissors and a knife on a cutting board'],

229553: [' a man riding a skateboard on a ramp .'],
213445: [' a cat sitting on a chair in a room .'],
154644: [' a man holding a cell phone in his hand .'],
272136: [' a plane is parked on the runway of an airport .'],
342971: [' a man in a red shirt is holding a frisbee .'],
563882: [' a man holding a cell phone in his hand .'],
269682: [' a traffic light with a street sign on top of it .'],
404484: [' a dog sitting on a chair in a living room .'],
526751: [' a boat is sitting in the water with a boat on it .'],
272212: [' a couple of animals that are standing in the grass .'],
30504: [' a person on skis going down a mountain'],
423519: [' a bus is parked on the side of the street .'],
32941: [' a fire hydrant is on the side of the street .'],
139099: [' a man is standing in front of a store .'],
165713: [' a fire hydrant with a hose attached to it .'],
106281: [' a train on tracks with a train on the tracks .'],
268375: [' a couple of elephants standing next to each other .'],
21465: [' a man is sitting on a toilet with a plastic toy .'],
300842: [' a small airplane is flying over a field .'],
34452: [' a man is sitting on a bench in the woods .'],
227765: [' a pot of stew with a spoon in a pot .'],
289059: [' a man holding a tennis racquet on a tennis court .'],
370813: [' a man riding a skateboard down a ramp .'],
171757: [' a man in a bathroom blow-drying his hair and a woman .'],
365642: [' a man riding a skateboard down a street .'],
407518: [' a bird sitting on a branch in a field .'],
219271: [' a black and white photo of a man on a motorcycle .'],
352760: [' a man is flying a kite on a clear day .'],
85772: [' a man playing tennis on a tennis court .'],
203294: [' a man is walking a bus with a dog on the back .'],
316054: [' a train is traveling down the tracks in the country .'],
67616: [' a street with a traffic light and a street sign .'],
269932: [' a red and white fire hydrant sitting on the side of a road .'],
557501: [' a bathroom with a toilet and asink'],
182441: [' a group of people on a beach with a kite .'],
250619: [' a beach with a lot of umbrellas on the beach .'],
533493: [' a man is holding a frisbee in a field .'],
106881: [' a bird sitting on a branch in a tree .'],
170739: [' a man and a woman are riding on an elephant .'],
209829: [' a man riding a wave on top of a surfboard .'],
432085: [' a man sitting at a table with a plate of food .'],
342367: [' a man sitting in front of a laptop computer .'],
407574: [' a bunch of bananas are hanging from a tree .'],
464872: [' a zebra is standing in the grass near a tree .'],
284106: [' a plate with a sandwich and salad on it .'],
109441: [' a large clock tower with a sky background'],
119641: [' a group of people riding on the backs of horses .'],
84752: [' a large airplane is parked on the runway .'],
80671: [' a person on skis going down a hill .'],
144798: [' a bathroom with asink and a mirror'],
235057: [' a giraffe standing next to a rock wall .'],
519688: [' a man holding a dog with a dog in his mouth .'],
385029: [' a table with a plate of food and a glass of wine .'],
305695: [' a white car parked in a parking lot .'],
181542: [' a man riding a motorcycle with a dog on the back .'],
132116: [' a plate of food with broccoli and a fork .'],
420472: [' a giraffe standing in the middle of a field .'],
255917: [' a street with a traffic light and a street sign .'],
456496: [' a man sitting on a bench with a dog on his shoulders .'],
12280: [' a man is walking down the street with a skateboard .'],
91615: [' a kitchen with a stove top oven and microwave .'],
530061: [' a young boy is eating a piece of pizza .'],
507975: [' a man riding a horse on a dirt road .'],
522156: [' a plate with a piece of cake and a fork on it .'],
567825: [' a plate with a sandwich and a cup of coffee .'],
166768: [' a man wearing a tie and a shirt .'],

499181: [' a street with a traffic light and a street sign .'],
 57232: [' a pile of boxes of different types of doughnuts .'],
 121242: [' a man is riding a horse on a dirt road .'],
 384661: [' a kitchen with a stove and a microwave'],
 260106: [' a woman riding a horse in a field'],
 458992: [' a woman is holding a pizza in front of a pizza .'],
 447088: [' a baseball player is getting ready to hit a ball .'],
 1425: [' a plate with a piece of cake and a fork on it .'],
 137576: [' a group of people standing around a table with a dog .'],
 439522: [' a man on a snowboard is going down a hill .'],
 11699: [' a woman sitting on a bench with a laptop .'],
 314709: [' a person on skis going down a snowy hill .'],
 14831: [' a cat is sleeping on a bed with a stuffed animal .'],
 564336: [' a man sitting at a table with a laptop computer .'],
 215723: [' a man is standing in front of a bus .'],
 409867: [' a cat sitting on top of a window sill .'],
 263068: [' a person jumping a skate board in the air'],
 306139: [' a group of people sitting around a table with laptops .'],
 459662: [' a young boy is holding a toothbrush in his mouth .'],
 470779: [' a group of people on skis in the snow .'],
 329080: [' a bedroom with a bed and a window'],
 73533: [' a little boy sitting on a couch with a laptop .'],
 224664: [' a person on a beach flying a kite .'],
 176778: [' a bathroom with a toilet and asink'],
 451308: [' a room with a bed , a chair and a lamp .'],
 473121: [' a person on skis going down a snowy hill'],
 112298: [' a man holding a camera in front of a mirror .'],
 257865: [' a man holding a tennis racquet on a tennis court .'],
 245576: [' a cat is sitting on a laptop keyboard'],
 418062: [' a man and a woman sitting at a table with a bottle of wine .'],
 129135: [' a train is parked at a train station .'],
 6818: [' a toilet with a white seat and a white toilet .'],
 320490: [' a man swinging a tennis racquet on a tennis court .'],
 85682: [' a group of people riding skis on a snowy surface'],
 377393: [' a train station with a train on the tracks .'],
 183648: [' a man standing next to a large elephant .'],
 397303: [' a man sitting on a chair with a laptop computer .'],
 541773: [' a man and a woman are playing a video game .'],
 495732: [' a man and a woman playing a game with nintendo wii controllers
 .'],
 372718: [' a vase with flowers on it and a cat sitting on top of it .'],
 365387: [' a bathroom with a toilet and asink'],
 408696: [' a man is holding a white toilet in a bathroom .'],
 22755: [' a traffic light with a street sign attached to it'],
 413404: [' a man sitting on a bench with a dog on it .'],
 288862: [' a man is jumping high on a skateboard .'],
 183709: [' a man sitting on a bench with a cell phone .'],
 233370: [' a man sitting on a bench with a surfboard .'],
 328286: [' a large bridge spanning the width of a river .'],
 435081: [' a table topped with lots of different flavored donuts .'],
 59920: [' a bathroom with a toilet and asink'],
 523229: [' a toilet with a white toilet seat in a bathroom .'],
 426253: [' a microwave is sitting on top of a stove top oven .'],
 421923: [' a vase with flowers on a table'],
 117914: [' a bathroom with a toilet and asink'],
 309467: [' a person on skis going down a mountain'],
 15597: [' a man riding a skateboard up the side of a ramp .'],
 417085: [' a cow standing on a dirt road in front of a fence .'],
 80153: [' a person on skis going down a hill .'],
 269316: [' a group of people playing frisbee in a field'],
 503855: [' a group of people sitting on a bench in the grass .'],
 343218: [' a man playing tennis on a tennis court .'],
 43314: [' a man riding skis on top of a snow covered slope .'],
 531036: [' a double decker bus is parked in front of a building .'],
 335427: [' a white plate with broccoli and a fork on it .'],
 33104: [' a group of people on skis in the snow .'],

260266: [' a street light with a street sign attached to it .'],
166521: [' a living room with a tv and a tv'],
420069: [' a man is playing with a frisbee in the grass .'],
20571: [' a boat is docked in the water near a dock .'],
337055: [' a woman sitting on a bench with a cell phone .'],
369037: [' a man is standing next to an elephant .'],
492758: [' a living room with a couch , chair and a television .'],
190753: [' a group of people sitting on a bench in front of a lake .'],
128051: [' a white truck is parked in a parking lot .'],
462371: [' a group of people standing around a table with a cake .'],
278749: [' a man walking down a street with a skateboard .'],
494863: [' a train is parked at a train station .'],
404128: [' a small airplane flying over a field of grass .'],
300039: [' a person holding a cell phone in their hand .'],
107554: [' a green bench with a green chair on top of it .'],
147729: [' a man holding a remote control in his hand .'],
172330: [' a dog sitting in the back of a car .'],
146358: [' a man and a woman sitting on a couch with a cake .'],
81061: [' a bench with a chair and a table'],
134034: [' a group of giraffes in a fenced in area .'],
521282: [' a vase with a bunch of flowers inside of it'],
80413: [' a dog sitting in a car with a cat on top of it .'],
401991: [' a dog laying on a bed with a stuffed animal'],
322429: [' a table with a bunch of different vases on it'],
537991: [' a woman sitting at a desk with a laptop and a computer .'],
373705: [' a fire hydrant that is on the side of the street .'],
236730: [' a zebra standing on top of a dirt field .'],
231169: [' a train on tracks with a mountain behind it .'],
523100: [' a person cutting a piece of bread with a knife .'],
404534: [' a street sign on a pole on a city street'],
333956: [' a parking meter sitting on the side of a road .'],
178028: [' a bathroom with asink , toilet , and mirror .'],
160864: [' a baseball player is swinging at a ball .'],
423971: [' a toilet with a wooden seat and a white toilet .'],
317024: [' a zebra standing next to a wooden fence .'],
9772: [' a bathroom with asink , mirror and toilet .'],
465718: [' a laptop computer sitting on top of a wooden desk .'],
3501: [' a plate of food with broccoli and a fork .'],
159791: [' a refrigerator with a magnet collection in it .'],
570736: [' a bathroom with a toilet and asink'],
445602: [' a group of people riding skis on a snowy surface'],
98392: [' a street with a clock and a traffic light .'],
199681: [' a cat sitting on top of a microwave .'],
12748: [' a woman is petting a horse in a corral .'],
289594: [' a street sign on a pole on a street .'],
127263: [' a man is playing soccer on a field'],
421060: [' a person on skis going down a mountain'],
36660: [' a pair of scissors sitting on a table .'],
76468: [' a man playing tennis on a tennis court .'],
424135: [' a large clock on top of a building'],
447917: [' a group of young people playing soccer on a field .'],
283785: [' a man is sitting on a bench with a dog .'],
240049: [' a man is sitting on a bench with a dog .'],
32081: [' a woman is playing tennis on a tennis court .'],
447789: [' a street sign with a street name and a street sign on top of it .'],
.'],

516871: [' a plate of food with a side of broccoli .'],
44279: [' a man in a kitchen preparing food on a counter .'],
351096: [' a person holding a pair of scissors in front of a mirror .'],
206411: [' a toilet with a white lid and a white toilet'],
427500: [' a fire hydrant is on the side of the street .'],
311002: [' a man in a baseball uniform is holding a bat .'],
509699: [' a man is sitting on a toilet in a bathroom .'],
574297: [' a man riding a horse on a dirt road .'],
400161: [' a man in a suit and tie sitting on a bed .'],
168883: [' a group of people standing around a table with a cake .'],

562818: [' a person on skis going down a mountain'],
138954: [' a plate of food with a side of broccoli .'],
479248: [' a living room with a fireplace and a fireplace .'],
306700: [' a woman is holding a pizza in front of a pizza .'],
124636: [' a cow standing in a pen with a cow in it .'],
553664: [' a laptop computer sitting on top of a wooden desk .'],
292024: [' a man is holding a pizza in front of a pizza .'],
224093: [' a herd of sheep grazing in a field .'],
273420: [' a man sitting on a toilet in a bathroom .'],
431140: [' a white toilet sitting next to a white sink .'],
480842: [' a giraffe standing in the middle of a field .'],
257370: [' a man playing a game with a remote controller .'],
142472: [' a street with a sign on the side of the road .'],
100510: [' a horse is standing in a fenced in area .'],
131386: [' a fighter jet flying through a blue sky .'],
525322: [' a plane flying in the air with a sky background'],
52996: [' a group of people standing around a kitchen preparing food .'],
17379: [' a bathroom with a sink and a mirror'],
34071: [' a pair of scissors sitting on a table next to a cup .'],
383386: [' a teddy bear with a tag on it .'],
27186: [' a woman is sitting on a bed with a laptop .'],
406570: [' a bunch of fruit and vegetables are on a table .'],
546826: [' a pair of scissors and a pair of scissors .'],
202001: [' a woman in a dress shirt and a black tie'],
496954: [' a plate with a sandwich and a cup of coffee .'],
32570: [' a man riding a wave on top of a surfboard .'],
473974: [' a group of zebras standing in the grass .'],
785: [' a man riding skis down a snow covered slope .'],
724: [' a stop sign on a street corner with a street sign on top of it .'],
292908: [' a man riding a wave on top of a surfboard .'],
286708: [' a cat sitting on a chair with a pink bow tie .'],
527616: [' a sign on a wall in a room .'],
405970: [' a living room with a couch , chair and a television .'],
192607: [' a man is sitting on a motorcycle in the desert .'],
287874: [' a train on a train track with power lines above'],
66231: [' a group of people standing around a kitchen preparing food .'],
282912: [' a giraffe standing next to a tree in a zoo exhibit .'],
297084: [' a woman is holding a plate of food'],
338560: [' a fire hydrant on the side of the street .'],
86483: [' a street sign on a pole on a sidewalk .'],
271116: [' a man and a woman sitting on a couch together .'],
460682: [' a black and white photo of a man standing on a beach .'],
502336: [' a man is walking down the street with a skateboard .'],
187271: [' a kitchen with a refrigerator and a sink'],
180798: [' a person holding a cell phone in their hand .'],
228214: [' a man in a suit and tie standing in front of a building .'],
201934: [' a train is going down the tracks in a city .'],
470952: [' a man on skis is standing in the snow .'],
357501: [' a pair of scissors and a pair of scissors .'],
306136: [' a man in a suit and a woman standing in front of a bus .'],
553221: [' a man is surfing on the water on a sunny day .'],
79651: [' a glass of wine sitting on a table next to a bottle of wine .'],
11511: [' a man riding a skateboard down a street .'],
250205: [' a bird standing on a rock in the water .'],
417779: [' a fire hydrant on the side of the street .'],
67406: [' a man flying a kite in a field with a sky background'],
397133: [' a man standing in a kitchen with a large pot .'],
283412: [' a small dog sitting on a chair with a cup of coffee .'],
336309: [' a plane flying in the air with a sky background'],
540502: [' a bathroom with a toilet and a sink'],
376322: [' a group of people sitting around a table eating food .'],
74092: [' a man playing tennis on a tennis court .'],
299609: [' a horse is standing in the grass near a mountain .'],
484351: [' a group of people sitting around a table with a cake .'],
62808: [' a man sitting at a table with a pizza on it .'],
151000: [' a man in a suit and tie standing in front of a building .'],


```

362520: [' a man riding a skateboard down a ramp .'],
368212: [' a little boy that is sitting on a toilet'],
271457: [' a bench sitting on a grassy hill next to a lake .'],
232692: [' a man riding a wave on top of a surfboard .'],
90631: [' a large plane flying through a blue sky .'],
14226: [' a woman sitting at a table with a laptop .'],
561256: [' a woman standing in a kitchen with a white refrigerator .'],
525083: [' a kitchen with a stove and a refrigerator'],
479126: [' a woman sitting on a bench with a laptop .'],
529939: [' a man is holding a surfboard on the beach .'],
342186: [' a pizza with cheese and pepperoni on a pan .'],
376900: [' a man playing tennis on a tennis court .'],
429281: [' a bunch of bananas and other food on a table .'],
423944: [' a woman holding a red umbrella in front of a building .'],
65074: [' a bed with a red blanket and pillows on top of it .'],
356248: [' a group of people sitting around a table eating food .'],
562121: [' a zebra standing in the middle of a forest .'],
370042: [' a man sitting on a bench with a bunch of bananas on it .'],
452784: [' a bowl of food with carrots and broccoli .'],
359219: [' a pizza sitting on top of a pan on a stove top .'],
396338: [' a man in a yellow jacket is standing in front of a yellow bus
.'],

50844: [' a teddy bear with a red bow on it .'],
342397: [' a person on skis going down a snowy hill .'],
530820: [' a man holding a tennis racquet on a tennis court .'],
308587: [' a group of people on a beach with a kite .'],
348045: [' a white toilet sitting next to a white toilet .'],
236914: [' a teddy bear sitting on a chair with a book on it .'],
131131: [' a cat sitting on a desk next to a laptop computer .'],
33221: [' a man and a woman are walking on the beach .'],
72281: [' a man riding a skateboard on top of a cement block .'],
92660: [' a pizza sitting on top of a white plate on a table .'],
573258: [' a person on skis going down a snowy hill .'],
463730: [' a bus is driving down the street with a car behind it .'],
557672: [' a woman holding an umbrella in front of a building .'],
527695: [' a plate of food with broccoli and a fork .'],
...})

```

```

In [15]: from nltk.translate.meteor_score import meteor_score
from nltk.tokenize import word_tokenize
from collections import Counter, defaultdict
import math
import numpy as np

def calculate_meteor_score(true_sentences, predicted_sentences):
    meteor_scores = []
    common_keys = set(true_sentences.keys()).intersection(set(predicted_sentences.keys()))

    for img_id in common_keys:
        references = [word_tokenize(cap.lower()) for cap in true_sentences[img_id]]
        hypothesis = word_tokenize(predicted_sentences[img_id][0].lower())
        # print("references,:", references, "HYPO:", hypothesis)

        score = meteor_score(references, hypothesis)
        meteor_scores.append(score)

    avg_meteor_score = sum(meteor_scores) / len(meteor_scores) if meteor_scores else 0.0
    return avg_meteor_score

from nltk.translate.bleu_score import corpus_bleu, SmoothingFunction
from nltk.translate.bleu_score import SmoothingFunction, sentence_bleu

def calculate_bleu_score(true_sentences, predicted_sentences):
    hypotheses = []
    references = []

```

```

# Find the intersection of keys between true and predicted sentences
common_keys = set(true_sentences.keys()).intersection(set(predicted_sentences.keys()))

# Prepare the hypotheses and references
for img_id in common_keys:
    img_refs = [cap.split() for cap in true_sentences[img_id]]
    references.append(img_refs)
    hypotheses.append(predicted_sentences[img_id][0].strip().split())

# Use a smoothing function to avoid issues with zero counts
smoothing_function = SmoothingFunction().method4

# Calculate BLEU score for each sentence and average them
bleu_scores = [sentence_bleu(refs, hyp, smoothing_function=smoothing_function) for r
avg_bleu_score = sum(bleu_scores) / len(bleu_scores) if bleu_scores else 0.0

return avg_bleu_score

meteor_score = calculate_meteor_score(validation_results, predicted_captions)
bleu_score = calculate_bleu_score(validation_results, predicted_captions)
print(f"METEOR Score: {meteor_score}")
print(f"BLEU Score: {bleu_score}")

```

METEOR Score: 0.23598731195602813
BLEU Score: 0.2829747282462953

```

In [16]: from PIL import Image
def load_image(image_path, transform=None):
    image = Image.open(image_path).convert('RGB')
    if transform is not None:
        image = transform(image).unsqueeze(0)
    return image

def generate_caption(image_path, encoder, decoder, transform, device):
    image = load_image(image_path, transform)
    image = image.to(device)

    with torch.no_grad():
        features = encoder(image).unsqueeze(1)
        output = decoder.generate_caption(features)

    sentence = clean_sentence(output, val_data_loader.dataset.vocab.idx2word)
    return sentence

```

```

In [ ]: # Define the path to your image.
image_path = "test.jpg"

# Generate and print the caption.
caption = generate_caption(image_path, encoder, decoder, transform_test, device)
print("Generated Caption:", caption)

```

```

In [ ]: import torch
from PIL import Image
import matplotlib.pyplot as plt

def display_image_with_caption(image_path, caption, transform=None):
    # Load and transform the image
    image = Image.open(image_path).convert('RGB')
    if transform is not None:
        image = transform(image)

    # Display the image with the caption
    plt.figure(figsize=(10, 10))

```

```
plt.imshow(image)
plt.title(caption, fontsize=15, wrap=True)
plt.axis('off')
plt.show()

display_image_with_caption(image_path, caption, transform=None)
```