

In [24]:

```
history = caption_model.fit(
    train_dataset,
    epochs=EPOCHS,
    validation_data=val_dataset,
    callbacks=[early_stopping]
)
```

Epoch 1/20

1750/1750 [=====] - 589s 325ms/step - loss: 3.7189 - acc: 0.3206 - val_loss: 3.2894 - val_acc: 0.4052

Epoch 2/20

1750/1750 [=====] - 411s 233ms/step - loss: 3.1377 - acc: 0.4102 - val_loss: 3.1456 - val_acc: 0.4192

Epoch 3/20

1750/1750 [=====] - 412s 233ms/step - loss: 2.9568 - acc: 0.4285 - val_loss: 3.0774 - val_acc: 0.4281

Epoch 4/20

1750/1750 [=====] - 411s 232ms/step - loss: 2.8446 - acc: 0.4392 - val_loss: 3.0646 - val_acc: 0.4305

Epoch 5/20

1750/1750 [=====] - 401s 227ms/step - loss: 2.7568 - acc: 0.4481 - val_loss: 3.0533 - val_acc: 0.4332

Epoch 6/20

1750/1750 [=====] - 400s 227ms/step - loss: 2.6863 - acc: 0.4561 - val_loss: 3.0505 - val_acc: 0.4349

Epoch 7/20

1750/1750 [=====] - 385s 218ms/step - loss: 2.6256 - acc: 0.4612 - val_loss: 3.0583 - val_acc: 0.4349

Epoch 8/20

1750/1750 [=====] - 403s 228ms/step - loss: 2.5744 - acc: 0.4664 - val_loss: 3.0655 - val_acc: 0.4341

Epoch 9/20

1750/1750 [=====] - 407s 230ms/step - loss: 2.5278 - acc: 0.4725 - val_loss: 3.0872 - val_acc: 0.4350

In [25]:

```
history = caption_model.fit(
    train_dataset,
    epochs=EPOCHS,
    validation_data=val_dataset,
    callbacks=[early_stopping]
)
```

Epoch 1/20

1750/1750 [=====] - 368s 208ms/step - loss: 2.6317 - acc: 0.4607 - val_loss: 3.0519 - val_acc: 0.4338

Epoch 2/20

1750/1750 [=====] - 403s 228ms/step - loss: 2.5766 - acc: 0.4668 - val_loss: 3.0606 - val_acc: 0.4339

Epoch 3/20

1750/1750 [=====] - 403s 228ms/step - loss: 2.5294 - acc: 0.4720 - val_loss: 3.0943 - val_acc: 0.4354

Epoch 4/20

1750/1750 [=====] - 401s 227ms/step - loss: 2.4855 - acc: 0.4771 - val_loss: 3.0967 - val_acc: 0.4365

In [26]:

```
history = caption_model.fit(
    train_dataset,
    epochs=EPOCHS,
    validation_data=val_dataset,
    callbacks=[early_stopping]
)
```

Epoch 1/20

1750/1750 [=====] - 401s 227ms/step - loss: 2.5804 - acc: 0.4669 - val_loss: 3.0673 - val_acc: 0.4354

Epoch 2/20

1750/1750 [=====] - 403s 228ms/step - loss: 2.5321 - acc: 0.4722 - val_loss: 3.0858 - val_acc: 0.4336

Epoch 3/20

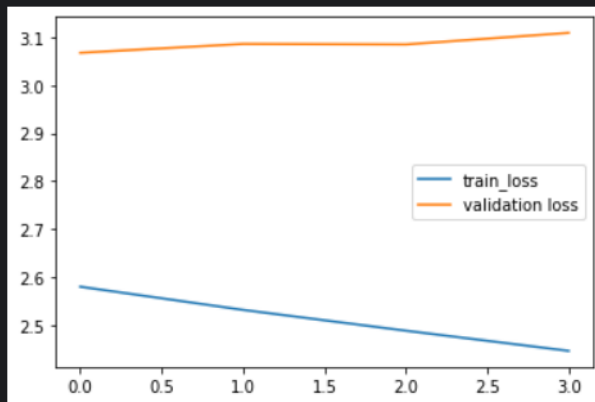
1750/1750 [=====] - 404s 229ms/step - loss: 2.4888 - acc: 0.4768 - val_loss: 3.0848 - val_acc: 0.4350

Epoch 4/20

1750/1750 [=====] - 405s 229ms/step - loss: 2.4468 - acc: 0.4820 - val_loss: 3.1088 - val_acc: 0.4342

In [27]:

```
plt.plot(history.history['loss'], label='train_loss')
plt.plot(history.history['val_loss'], label='validation loss')
plt.legend()
plt.show()
```



```
idx = random.randrange(0, len(captions))  
img_path = captions.iloc[idx].image  
  
pred_caption = generate_caption(img_path)  
print('Predicted Caption:', pred_caption)  
print()  
Image.open(img_path)
```

Predicted Caption: a living room with a couch and a table



Predicted Caption: a baseball player holding a bat in a baseball game

