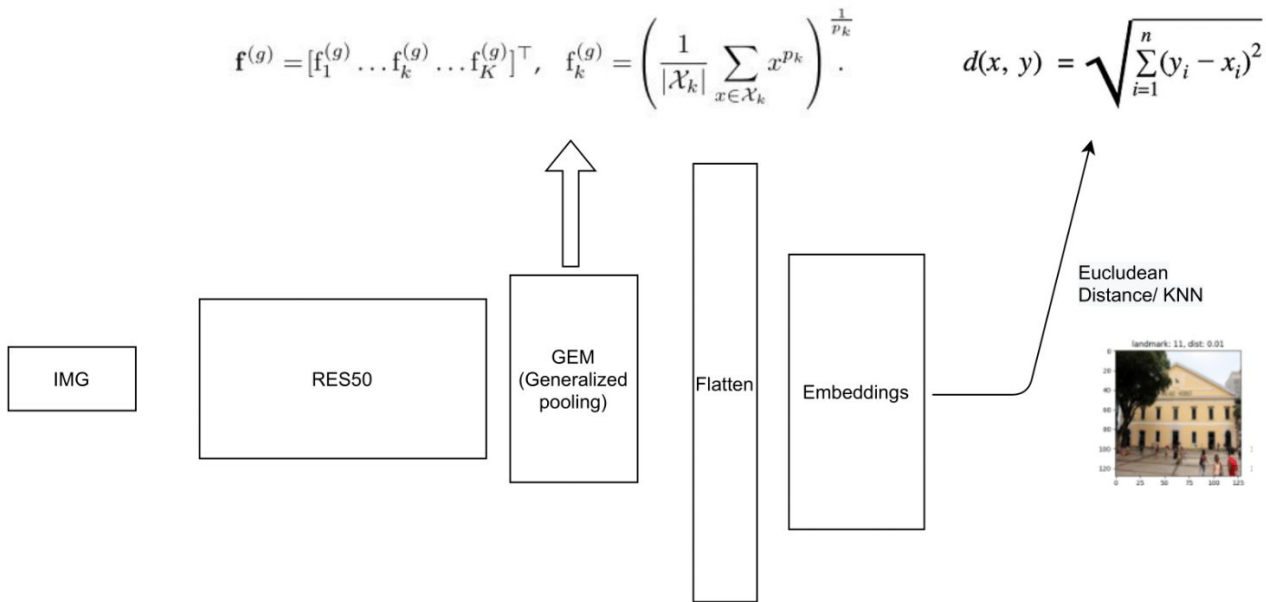
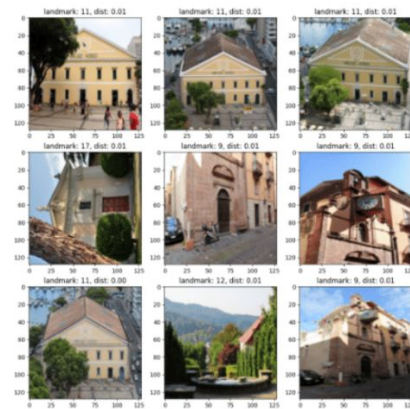


My custom model architecture for image retrieval



Harry - model architecture for image retrieval



Evaluation metrics:

- mAP@P
- mAP@R
- P@1
- R@1

```
## losses.CircleLoss(m=0.4, gamma=80)
Computing validation set accuracy for epoch 9
100%|████████████████████████████████████████| 1875/1875 [00:14<00:00,
100%|████████████████████████████████████████| 313/313 [00:02<00:00,
Computing accuracy
INFO:PML:running k-nn with k=1
INFO:PML:embedding dimensionality is 50
-----Evaluation Results-----
{'mean_average_precision': 4949.99495,
 'mean_average_precision_at_r': 49499949.5,
 'precision_at_1': 0.9899,
 'r_precision': 9899.0}
```

```
### losses.TripletMarginLoss()
Computing validation set accuracy for epoch 9
100%|████████████████████████████████████████| 1875/1875 [00:14<00:00,
100%|████████████████████████████████████████| 313/313 [00:02<00:00,
Computing accuracy
INFO:PML:running k-nn with k=1
INFO:PML:embedding dimensionality is 50
-----Evaluation Results-----
{'mean_average_precision': 4936.99365,
 'mean_average_precision_at_r': 49369936.5,
 'precision_at_1': 0.9873000000000001,
 'r_precision': 9873.0}
```

```
## losses.ArcFaceLoss(10, 50, margin=28.6, scale=64)
Computing validation set accuracy for epoch 9
100%|████████████████████████████████████████| 1875/1875 [00:14<00:00,
100%|████████████████████████████████████████| 313/313 [00:02<00:00,
Computing accuracy
INFO:PML:running k-nn with k=1
INFO:PML:embedding dimensionality is 50
-----Evaluation Results-----
{'mean_average_precision': 4922.99225,
 'mean_average_precision_at_r': 49229922.5,
 'precision_at_1': 0.9845,
 'r_precision': 9845.0}
```

```
# CosFaceLoss(10, 50, margin=0.35, scale=64)
Computing validation set accuracy for epoch 9
100%|████████████████████████████████████████| 1875/1875 [00:15<00:00,
100%|████████████████████████████████████████| 313/313 [00:02<00:00,
Computing accuracy
INFO:PML:running k-nn with k=1
INFO:PML:embedding dimensionality is 50
-----Evaluation Results-----
{'mean_average_precision': 4916.4916,
 'mean_average_precision_at_r': 49164916.0,
 'precision_at_1': 0.9832000000000001,
 'r_precision': 9832.0}
```

Arcface Loss - 14 epochs

```
244/465 [=====>.....] - ETA: 28:44 - loss: 0.1081 - acc: 0.9665 - top_5_accu
245/465 [=====>.....] - ETA: 28:36 - loss: 0.1083 - acc: 0.9664 - top_5_accu
246/465 [=====>.....] - ETA: 28:28 - loss: 0.1084 - acc: 0.9664 - top_5_accu
247/465 [=====>.....] - ETA: 28:21 - loss: 0.1083 - acc: 0.9664 - top_5_accu
248/465 [=====>.....] - ETA: 28:13 - loss: 0.1083 - acc: 0.9665 - top_5_accu
249/465 [=====>.....] - ETA: 28:05 - loss: 0.1085 - acc: 0.9664 - top_5_accu
250/465 [=====>.....] - ETA: 27:57 - loss: 0.1085 - acc: 0.9664 - top_5_accu
251/465 [=====>.....] - ETA: 27:49 - loss: 0.1085 - acc: 0.9664 - top_5_accu
252/465 [=====>.....] - ETA: 27:41 - loss: 0.1087 - acc: 0.9662 - top_5_accu
253/465 [=====>.....] - ETA: 27:34 - loss: 0.1085 - acc: 0.9663 - top_5_accu
254/465 [=====>.....] - ETA: 27:26 - loss: 0.1083 - acc: 0.9664 - top_5_accu
255/465 [=====>.....] - ETA: 27:18 - loss: 0.1084 - acc: 0.9663 - top_5_accu
256/465 [=====>.....] - ETA: 27:10 - loss: 0.1086 - acc: 0.9662 - top_5_accu
257/465 [=====>.....] - ETA: 27:03 - loss: 0.1085 - acc: 0.9663 - top_5_accu
258/465 [=====>.....] - ETA: 26:55 - loss: 0.1086 - acc: 0.9663 - top_5_accu
259/465 [=====>.....] - ETA: 26:47 - loss: 0.1087 - acc: 0.9662 - top_5_accu
260/465 [=====>.....] - ETA: 26:40 - loss: 0.1087 - acc: 0.9662 - top_5_accu
261/465 [=====>.....] - ETA: 26:32 - loss: 0.1087 - acc: 0.9661 - top_5_accu
262/465 [=====>.....] - ETA: 26:24 - loss: 0.1087 - acc: 0.9662 - top_5_accu
263/465 [=====>.....] - ETA: 26:16 - loss: 0.1091 - acc: 0.9660 - top_5_accu
264/465 [=====>.....] - ETA: 26:09 - loss: 0.1091 - acc: 0.9661 - top_5_accu
acc: 0.9992
```

Circle Loss - 2 epochs

Circle Loss converges faster!

```
127/128 [=====>.....] - ETA: 8s - loss: 29.6233 - acc: 0.5582 - top_5_accuracy
128/128 [=====>.....] - ETA: 0s - loss: 29.6020 - acc: 0.5583 - top_5_accuracy
128/128 [=====>.....] - 1453s 11s/step - loss: 29.6020 - acc: 0.5583 - top_5_a
ccuracy: 0.7797 - val_loss: 119.3862 - val_acc: 0.0000e+00 - val_top_5_accuracy: 0.9661
```

```
Activities Visual Studio Code
harry@pc (192.168.61.4) - byobu
File Edit View Search Terminal Tabs Help
merge@workstation-1:~/... x merge@mt-1 (192.168.61.4) x harry@pc (192.168.61.4) x merge@workstation-2 (192.168.61.4) x

1 [||||| 52.9%] 19 [||||| 52.8%] 37 [||||| 50.3%] 55 [||||| 51.3%]
2 [||||| 51.9%] 20 [||||| 60.3%] 38 [||||| 50.3%] 56 [||||| 56.1%]
3 [||||| 50.0%] 21 [||||| 55.1%] 39 [||||| 49.7%] 57 [||||| 59.9%]
4 [||||| 60.9%] 22 [||||| 55.1%] 40 [||||| 51.0%] 58 [||||| 53.2%]
5 [||||| 60.3%] 23 [||||| 53.5%] 41 [||||| 71.5%] 59 [||||| 55.3%]
6 [||||| 50.0%] 24 [||||| 53.2%] 42 [||||| 52.3%] 60 [||||| 53.2%]
7 [||||| 50.6%] 25 [||||| 68.8%] 43 [||||| 50.7%] 61 [||||| 51.0%]
8 [||||| 50.6%] 26 [||||| 54.8%] 44 [||||| 55.6%] 62 [||||| 53.8%]
9 [||||| 52.6%] 27 [||||| 64.1%] 45 [||||| 49.7%] 63 [||||| 67.7%]
10 [||||| 51.3%] 28 [||||| 56.0%] 46 [||||| 51.0%] 64 [||||| 52.9%]
11 [||||| 49.7%] 29 [||||| 52.6%] 47 [||||| 50.6%] 65 [||||| 57.6%]
12 [||||| 51.0%] 30 [||||| 58.3%] 48 [||||| 51.0%] 66 [||||| 54.8%]
13 [||||| 48.4%] 31 [||||| 57.7%] 49 [||||| 52.5%] 67 [||||| 70.7%]
14 [||||| 50.7%] 32 [||||| 52.9%] 50 [||||| 51.0%] 68 [||||| 54.8%]
15 [||||| 78.5%] 33 [||||| 56.7%] 51 [||||| 51.0%] 69 [||||| 59.4%]
16 [||||| 51.3%] 34 [||||| 78.2%] 52 [||||| 52.2%] 70 [||||| 54.1%]
17 [||||| 50.3%] 35 [||||| 54.5%] 53 [||||| 51.3%] 71 [||||| 56.1%]
18 [||||| 51.0%] 36 [||||| 54.4%] 54 [||||| 50.7%] 72 [||||| 75.2%]
Mem[|||||] 22.2G/252G
Swp[|||||] 58.2M/8.00G
Tasks: 136, 1676 thr; 72 running
Load average: 23.58 9.37 6.55
Uptime: 28 days, 16:24:51

Every 2.0s: nvidia-smi workstation-1: Wed Jun 2 03:39:10 2021
Wed Jun 2 03:39:10 2021
-----+-----+-----+
| NVIDIA-SMI 460.73.01 | Driver Version: 460.73.01 | CUDA Version: 11.2 |
|-----+-----+-----+
| GPU Name Persistence-M | Bus-Id Disp.A | Volatile Uncorr. ECC |
| Fan Temp Perf Pwr:Usage/Cap | Memory-Usage | GPU-Util Compute M. |
|-----+-----+-----+
| 0 GeForce RTX 3090 Off | 00000000:3B:00.0 Off | N/A |
| 0% 42C P2 328W / 350W | 20499MiB / 24268MiB | 93% Default |
|-----+-----+-----+
| 1 GeForce RTX 3090 Off | 00000000:5E:00.0 Off | N/A |
| 0% 48C P2 329W / 350W | 20499MiB / 24268MiB | 90% Default |
|-----+-----+-----+
| 2 GeForce RTX 3090 Off | 00000000:86:00.0 Off | N/A |
| 0% 49C P2 320W / 350W | 20499MiB / 24268MiB | 99% Default |
|-----+-----+-----+
| 3 GeForce RTX 3090 Off | 00000000:AF:00.0 Off | N/A |
| 0% 44C P2 320W / 350W | 20499MiB / 24265MiB | 99% Default |
|-----+-----+-----+
| u* 18.04 0.../gg retrieval#1- | 1:watch* 36!! 21d1h 0.32 16x 51.2G60v 468G55% 2021-06-02 12:40:18
```

- Top 3 solution on Kaggle -> 3 - 4 days (it requires TPU).
- My model architecture -> 25-27h (~1 day).