컴비 과제 5

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```python
# 시작
image_dir = "./images"
images = [f for f in os.listdir(image_dir) if f.endswith('.jpg')]
images = images[7:]
images
```

```
['KakaoTalk_20240530_125615705_07.jpg',
 'KakaoTalk_20240530_125615705_08.jpg',
 'KakaoTalk_20240530_125615705_09.jpg',
 'KakaoTalk_20240530_125615705_10.jpg',
 'KakaoTalk_20240530_125615705_11.jpg',
 'KakaoTalk_20240530_125615705_12.jpg',
 'KakaoTalk_20240530_125615705_13.jpg',
 'KakaoTalk_20240530_125615705_14.jpg',
 'KakaoTalk_20240530_125615705_15.jpg',
 'KakaoTalk_20240530_125615705_16.jpg',
 'KakaoTalk_20240530_125615705_17.jpg',
 'KakaoTalk_20240530_125615705_18.jpg',
 'KakaoTalk_20240530_125615705_19.jpg',
 'KakaoTalk_20240530_125615705_20.jpg',
 'KakaoTalk_20240612_164344960.jpg',
 'KakaoTalk_20240612_164344960_01.jpg',
 'KakaoTalk_20240612_164344960_02.jpg']
```

```python
# sift
for image in images:
    image_path = os.path.join(image_dir, image)
    image, corners, ids = detect_markers(image_path)

    _image = image_path.split(".")[1]

    with open(f".{_image}.sift", "w") as output:
        output.write(f"{len(corners)*4} 128\n")

        image, corners, ids = detect_markers(image_path)
        for i, corner in enumerate(corners):
            for j, c in enumerate(corner[0]):
                output.write(f"{c[0]} {c[1]} 0 0\n")
                output.write("0 " * 128+"\n")  # Write the

                # Check if this is not the last element
                # if not (i == len(corners) - 1 and j == l
                    # output.write("\n")
        output.close()
```

```
for index1, image1 in enumerate(images):
    for index2, image2 in enumerate(images):
        if index1 == index2:
            continue
        write_match_file(image1, image2, index1, index2)
```

C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240530_125615705_05.jpg
12
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240530_125615705_06.jpg
8
0 1 2 3 8 9 10 11
20 21 22 23 32 33 34 35
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240530_125615705_07.jpg
4
4 5 6 7
4 5 6 7
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240530_125615705_08.jpg
8
4 5 6 7 8 9 10 11
8 9 10 11 12 13 14 15
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240530_125615705_11.jpg
12
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 8 9 10 11 16 17 18 19
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960.jpg
12
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_02.jpg
C:\cv_assignment_5\images\KakaoTalk_20240612_164344960_01.jpg
12
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11
```

VisualSFM - [Thumbnails] - [0]

File  SfM  View  Tools  Help

Log Window

```
############################
+6: [Kak..05_12] sees 143 (+26) 3D points
Focal Length in EXIF  [3282.612]
Estimated Focal Length [3283][0.81N]
# 2 projs (0 pts and 0 merges)
ERROR: too few projections are initiated

############################
#6: [Kak..05_18] sees 136 (+5) 3D points
Focal Length in EXIF  [3282.612]
Estimated Focal Length [3283][0.81N]
# 8 projs (0 pts and 0 merges)
ERROR: too few projections are initiated
END: No more images to add [0 projs]

############################
Failed to find two images for initialization
Resuming SfM finished, 6 sec used

----------------------------------------
5 cams, 74 pts (3+: 36)
218 projections (3+: 153)
----------------------------------------
2 model(s) reconstructed from 9 images;
7 modeled; 3 reused; 9 EXIF;
0MB(0) used to store feature location.
----------------------------------------

########-------timing------#########
Structure-From-Motion finished, 7 sec used
5.4(5.4) seconds on Bundle Adjustment (+)
5.3(5.3) seconds on Bundle Adjustment (*)
############################
----------------------------------------------------
Run full 3D reconstruction, finished
Totally 7.000 seconds used
```

#5: KakaoTalk_20240530_125615705_16 [4032x3024] [72]

File   SfM   View   Tools   Help

Log Window

```
############################
+6: [Kak..05_12] sees 143 (+26) 3D points
Focal Length in EXIF  [3282.612]
Estimated Focal Length [3283][0.81N]
# 2 projs (0 pts and 0 merges)
ERROR: too few projections are initiated

############################
#6: [Kak..05_18] sees 136 (+5) 3D points
Focal Length in EXIF  [3282.612]
Estimated Focal Length [3283][0.81N]
# 8 projs (0 pts and 0 merges)
ERROR: too few projections are initiated
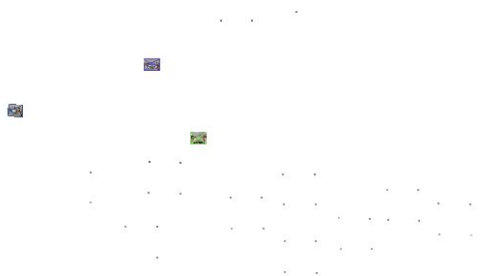END: No more images to add [0 projs]

############################
Failed to find two images for initialization
Resuming SfM finished, 6 sec used

--------------------------------------------
5 cams, 74 pts (3+: 36)
218 projections (3+: 153)
--------------------------------------------
2 model(s) reconstructed from 9 images;
7 modeled; 3 reused; 9 EXIF;
0MB(0) used to store feature location.
--------------------------------------------

########-------timing------########
Structure-From-Motion finished, 7 sec used
5.4(5.4) seconds on Bundle Adjustment (+)
5.3(5.3) seconds on Bundle Adjustment (*)
############################
--------------------------------------------
Run full 3D reconstruction, finished
Totally 7.000 seconds used
```

Work thread terminated!

VisualSFM - [Sparse Reconstruction] - [0] - []

File SfM View Tools Help

Log Window

############################
+6: [Kak..05_12] sees 143 (+26) 3D points
Focal Length in EXIF [3282.612]
Estimated Focal Length [3283][0.81N]
2 projs (0 pts and 0 merges)
ERROR: too few projections are initiated

############################
#6: [Kak..05_18] sees 136 (+5) 3D points
Focal Length in EXIF [3282.612]
Estimated Focal Length [3283][0.81N]
8 projs (0 pts and 0 merges)
ERROR: too few projections are initiated
END: No more images to add [0 projs]

############################
Failed to find two images for initialization
Resuming SfM finished, 6 sec used

----
5 cams, 74 pts (3+: 36)
218 projections (3+: 153)
----
2 model(s) reconstructed from 9 images;
7 modeled; 3 reused; 9 EXIF;
0MB(0) used to store feature location.

#########-------timing------#########
Structure-From-Motion finished, 7 sec used
5.4(5.4) seconds on Bundle Adjustment (+)
5.3(5.3) seconds on Bundle Adjustment (*)
############################

Run full 3D reconstruction, finished
Totally 7.000 seconds used

Work thread terminated!

```
NVM_V3 FixedK 3282.61157227 2024.03051758 3288.85351563 1453.08410645 1

5
images\KakaoTalk_20240530_125615705_13.jpg  3282.61157227 0.975055533997 -0.00184530042216 -0.219462412954 -0.0331597225623 -0.139767449496 -0.00605225033307 -0.0713442615091
images\KakaoTalk_20240530_125615705_14.jpg  3282.61157227 0.995171486885 0.0322477206074 -0.0925756150983 0.00484208740477 0.977675460506 -0.376602580453 -0.698353100996 0 0
images\KakaoTalk_20240530_125615705_19.jpg  3282.61157227 0.999999988311 0 0 0 1.36906091831 0.212298999169 -3.02445395102 0.999999937563 0
images\KakaoTalk_20240530_125615705_17.jpg  3282.61157227 0.916441828276 0.00825686800823 0.394683046684 -0.0655088778568 6.64744185655 0.788949710985 -0.256559759031 0.99999
images\KakaoTalk_20240530_125615705_16.jpg  3282.61157227 0.952127186969 -0.0151471022504 0.298966449319 -0.0619943137475 4.99165842488 0.672656094654 -0.414737189048 0.99999

36
2.05752567378 1.03682454602 3.65685378925 155 163 179 5 0 0 345.469482422 736.016357422 1 0 171.469482422 815.864501953 2 0 328.469482422 394.665405273 3 0 -141.530517578 273
1.62334157883 0.694435350152 3.73596071023 138 146 163 5 0 24 5.46948242188 511.443389893 1 8 -141.530517578 568.335205078 2 16 118.469482422 229.97857666 3 12 -276.530517578
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5
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```