PROJECT ACTIVITY LOG

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24. Integrating Machine Learning Feature Detection into Visual SLAM

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|--|---|
| Thursday | 19/05/2022 | - Go to CS Department to confirm the CS email | - CS email confirmed. | - Access the Blaze |
| Friday | 20/05/2022 | Access the BlazeGo to CS Department to ask about Blaze | Log in through knuckles.cs.ucl.ukAccess blaze through knuckles | - Access the Blaze for GPU processing |
| Saturday | 21/05/2022 | Follow the manual instruction to access the GPU Install Tensorflow in the filespace (by manual instruction) Test the Tensorflow computation using the GPU rather than the CPU | The output shows the GPU list Testing Tensorflow is success Testing GPU is failed | - Testing the Tensorflow computation using GPU |
| Sunday | 22/05/2022 | Test the Tensorflow computation in Linux OS Test the Tensorflow computation in MAC OS | - The Tensorflow computation shows that it is using the CPU | - Testing the Tensorflow computation using GPU in another laptop |
| Monday | 23/05/2022 | Test the Tensorflow computation in the windows version Find the problem of why the computation always uses the CPU, but it is shown that GPU is available in Blaze | The Tensorflow computation still shows that it is using the CPU The GPU is not used, although it is available on the server | - Consult to the Technical Support |
| Tuesday | 24/05/2022 | - Go to CS Department to ask about GPU processing using Blaze | The CUDA and Tensorflow version is not matched The environment PATH is not set properly The Tensorflow computation using GPU processing through Blaze is success | - Find how to transfer data from server to the home directory |
| Wednesday | 25/05/2022 | - Find how to transfer data from server to local machine | Data Transfer from server to local machine success Use 2 ways: Command in terminal or FileZilla application | Run the SuperPoint code with multiple datasetsCheck the data space available on server |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|--|--|
| Thursday | 26/05/2022 | Run the SuperPoint code through Blaze using GPU processing Check the data space on blaze | Python 3.6.1 version problem (Resulting import torch: error) Tensorflow version problem (The python code uses v1 but v2 is installed on Blaze) Data space is only 10 GB and 70% is already used. | Consult to the Tehnical Support for updating the Python version Change the Tensorflow version to 1.14.0 Ask the Technical Support about the Blaze data space |
| Friday | 27/05/2022 | Go to CS Department to ask about Python version and data space Solve the Tensorflow version problem Training MagicPoint on Synthetic Shapes | Python version problem solved -> 3.6.8 Data space upgraded -> 20 GB Tensorflow version solved -> 1.14.0 Model training is running | - Training MagicPoint on Synthetic Shapes |
| Saturday | 28/05/2022 | - Training MagicPoint on Synthetic Shapes | - Model training in progress | - Training MagicPoint on Synthetic Shapes |
| Sunday | 29/05/2022 | - Training MagicPoint on Synthetic Shapes | - Model training in progress | - Training MagicPoint on Synthetic Shapes |
| Monday | 30/05/2022 | - Training MagicPoint on Synthetic Shapes | - (Step 1) Pre-train an initial interest point detector on synthetic data finished (runs, logs/magicpoint_synth, datasets) | - Exporting Detections on KITTI dataset |
| Tuesday | 31/05/2022 | - Exporting Detections on KITTI dataset | The required KITTI dataset defined in the code very large (data space not enough) Datasets not found Log folders not found | - Exporting Detections on KITTI dataset |
| Wednesday | 01/06/2022 | - Exporting Detections on KITTI dataset | (Step 2) Homography Adaptation (HA) to export pseudo ground truth for joint training in progress | (Step 2) Exporting Detections on KITTI dataset using different pretrained model and set of videos |

| Day | Date | Description | Result | What To Do |
|-----------|------------|--|--|--|
| Thursday | 02/06/2022 | - Exporting Detections on KITTI dataset using different pretrained model and set of videos | - (Step 2) Homography Adaptation (HA) in progress | (Step 2) Exporting Detections on KITTI dataset using different pretrained model and set of videos Compare the results |
| Friday | 03/06/2022 | Exporting Detections on KITTI dataset Compare the results using different pretrained model result from step 1 and set of videos | (Step 2) Homography Adaptation (HA) to export pseudo ground truth for joint training finished | - (Step 3) Training SuperPoint on KITTI dataset |
| Saturday | 04/06/2022 | - Training SuperPoint on KITTI dataset | Config file settingLogfolders not foundDatasets not found | - (Step 3) Training SuperPoint on KITTI dataset |
| Sunday | 05/06/2022 | - Training SuperPoint on KITTI dataset | Num of samples [val] = 0 -> error Check Config file setting Logfolders and Datasets problem solved | - (Step 3) Training SuperPoint on KITTI dataset |
| Monday | 06/06/2022 | - Training SuperPoint on KITTI dataset | Config file setting appropriateNum of samples [val] = 0 -> error | - (Step 3) Training SuperPoint on KITTI dataset |
| Tuesday | 07/06/2022 | Exporting Detections on KITTI dataset [validation]Training SuperPoint on KITTI dataset | Export KITTI on validation set finished Training SuperPoint on KITTI dataset in progress | (Step 3) Training SuperPoint on KITTI dataset (Step 2) Exporting Detections on TUM dataset |
| Wednesday | 08/06/2022 | Exporting Detections on TUM datasetUsing RGB and Depth dataset | Training SuperPoint on KITTI dataset in progress (Step 2) Homography Adaptation (HA) to export pseudo ground truth for joint training in progress | (Step 3) Training SuperPoint on TUM dataset Define baseline for each step of SuperPoint |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|---|--|
| Thursday | 09/06/2022 | - Training SuperPoint on KITTI dataset | Training SuperPoint on KITTI dataset finished (Finished at 9 p.m. UK time) | - (Step 2) Exporting Detections on TUM dataset |
| Friday | 10/06/2022 | Separate the TUM dataset for train and validation Make the configs file to run the HA for the TUM dataset | TUM dataset separated for training and validation magicpoint_tum_export configs file in progress | - Make the configs file to run the HA for the TUM dataset |
| Saturday | 11/06/2022 | - Make the configs file to run the HA for the TUM dataset | magicpoint_tum_export configs file finished | - Make the configs file to run the Joint Training for the TUM dataset |
| Sunday | 12/06/2022 | - Make the configs file to run the Joint Training for the TUM dataset | superpoint_tum_train_heatmap configs file in progress | - Make the configs file to run the Joint Training for the TUM dataset |
| Monday | 13/06/2022 | - Make the configs file to run the Joint Training for the TUM dataset | superpoint_tum_train_heatmap configs file finished | - Define baseline for each step of SuperPoint |
| Tuesday | 14/06/2022 | - Define baseline for each step of SuperPoint | - Evaluate the metrics for each step in progress | - Define baseline for each step of SuperPoint |
| Wednesday | 15/06/2022 | Testing both of the configs file to run the Superpoint using the TUM dataset Define baseline for each step of SuperPoint | Configs file to run the Superpoint using the TUM dataset is currently testing Evaluate the metrics for each step in progress | Run the evaluation metrics testing file Define baseline for each step of SuperPoint Testing both of the configs file Continue the training with the TUM dataset |

| Day | Date | Description | Result | What To Do |
|-----------|------------|--|--|---|
| Thursday | 16/06/2022 | - Edit the config files for evaluating the metrics on HPatches dataset | - magicpoint_repeatability_heatmap.yaml in progress | - Modify the config file for evaluating the metrics on HPatches dataset |
| Friday | 17/06/2022 | - Edit the config files for evaluating the metrics on HPatches dataset | - magicpoint_repeatability_heatmap.yaml in progress | - Modify the config file for evaluating the metrics on HPatches dataset |
| Saturday | 18/06/2022 | Edit the config files for evaluating the metrics on HPatches dataset Download HPatches dataset Put the HPatches dataset into the server | magicpoint_repeatability_heatmap.yaml finishedHPatches dataset ready | - Export the metrics on HPatches dataset |
| Sunday | 19/06/2022 | Export keypoints, descriptors, matching on HPatches dataset using export.py | - Keypoints, descriptors and matching successfully exported in numpy array file | Evaluate homography estimation / repeatability / matching scores |
| Monday | 20/06/2022 | Evaluate homography estimation / repeatability / matching scores on HPatches dataset using evaluation.py using pretrained model provided | - Evaluate the metrics on HPatches finished | Evaluate homography estimation / repeatability / matching scores using another pretrained model |
| Tuesday | 21/06/2022 | Evaluate homography estimation / repeatability / matching scores on HPatches dataset using pretrained model done | - Evaluate the metrics on HPatches finished | - Check the exported and evaluated metrics result |
| Wednesday | 22/06/2022 | Check the exported and evaluated metrics result Compare the results between different pretrained model | Check each metrics evaluation result in progress Compare the results between different pretrained model in progress | Check each metrics evaluation result Compare the results between different pretrained model Run the Superpoint on the TUM dataset |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|--|---|
| Thursday | 23/06/2022 | Check metrics evaluation result using COCO pretrained model and KITTI_helmi pretrained model done in the previous step. | - Evaluate the metrics on HPatches finished using COCO and KITTI_helmi pretrained model | Evaluate homography estimation / repeatability / matching scores using KITTI pretrained model |
| Friday | 24/06/2022 | Evaluate homography estimation / repeatability / matching scores on HPatches dataset using KITTI pretrained model | - Evaluate the metrics on HPatches finished using KITTI pretrained model | - Compare the results between different pretrained model |
| Saturday | 25/06/2022 | Check 3 metrics evaluation result from different pretrained model Compare the results | COCO: nn mean AP: 0.7714677789324594 matching score: 0.4491385750719317 KITTI: nn mean AP: 0.7568183122053906 matching score: 0.4383227453901716 KITTI_helmi: nn mean AP: 0.2258599420358754 matching score:0.060602221596776196 | - Project Introduction Report |
| Sunday | 26/06/2022 | - Project Report : Introduction | - Project Report : Introduction in progress | - Project Introduction Report |
| Monday | 27/06/2022 | - Project Report : Introduction | - Project Report : Introduction in progress | - Project Introduction Report |
| Tuesday | 28/06/2022 | - Project Report : Introduction | - Project Report : Introduction in progress | - Project Introduction Report |
| Wednesday | 29/06/2022 | - Project Report : Introduction | - Project Report : Introduction in progress | Run the Superpoint on the TUM dataset Check how superpoint works when run on consecutive frame (TUM) |

| Day | Date | Description | Result | What To Do |
|-----------|------------|--|---|---|
| Thursday | 30/06/2022 | - Project Report : Introduction | - Project Report : Introduction in progress | - Project Report : Introduction |
| Friday | 01/07/2022 | Project Report : Introduction Install the dependencies for running the SuperPoint Weights File Run the Superpoint on the TUM dataset | Project Report : Introduction finished Run the demo on TUM dataset in progress | - Run the Superpoint on the TUM dataset |
| Saturday | 02/07/2022 | Run the demo on TUM dataset using pretrained model from MagicLeap (superpoint_v1.pth) | - Run the demo on TUM dataset in progress | - Run the Superpoint on the TUM dataset |
| Sunday | 03/07/2022 | Run the demo on TUM dataset using pretrained model from MagicLeap (superpoint_v1.pth) | - Run the demo on TUM dataset finished | - Run the Superpoint on the KITTI dataset |
| Monday | 04/07/2022 | Run the demo on KITTI dataset using pretrained model from MagicLeap (superpoint_v1.pth) | - Run the demo on KITTI dataset finished | - Edit the code to extract the pretrained weights |
| Tuesday | 05/07/2022 | Edit the code to extract the pretrained weightsusing superpoint_kitti.pth.tar | - Edit the code to extract the pretrained weights in progress | - Edit the code to extract the pretrained weights |
| Wednesday | 06/07/2022 | - Edit the code to extract the pretrained weights in progress | - Edit the code to extract the pretrained weights in progress | Modify demo_superpoint code to change the structure of SuperPoint network Compare between SuperPoint and ORB-SLAM run on KITTI and TUM dataset |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|---|---|
| Thursday | 07/07/2022 | Modify demo_superpoint code to change the structure of SuperPoint network | - New demo_superpoint code in progress | Modify demo_superpoint code to change the structure of SuperPoint network |
| Friday | 08/07/2022 | - Modify demo_superpoint code | - New demo_superpoint code in progress | Modify demo_superpoint code to change the structure of SuperPoint network |
| Saturday | 09/07/2022 | - Modify demo_superpoint code | - New demo_superpoint code in progress | Modify demo_superpoint code to change the structure of SuperPoint network |
| Sunday | 10/07/2022 | Project Report : Related WorkModify demo_superpoint code | Project Report : Related Work in progressNew demo_superpoint code in progress | Modify demo_superpoint code to change the structure of SuperPoint network |
| Monday | 11/07/2022 | Project Report : Related WorkModify demo_superpoint code | Project Report : Related Work in progressNew demo_superpoint code in progress | Modify demo_superpoint code to change the structure of SuperPoint network |
| Tuesday | 12/07/2022 | Project Report : Related WorkModify demo_superpoint code | Project Report : Related Work in progressNew demo_superpoint code in progress | Modify demo_superpoint code to change the structure of SuperPoint network |
| Wednesday | 13/07/2022 | Project Report : Related WorkModify demo_superpoint code | Project Report: Related Work in progress New demo_superpoint code in progress Result: done for changing the network structure. Problem: new code worked for best-pretrained model provided; however not work for my own pretrained model. This problem will try to be solved in the next week. | Modify demo_superpoint code to change the structure of SuperPoint network Compare between SuperPoint and ORB-SLAM run on KITTI and TUM dataset |

| Day | Date | Description | Result | What To Do |
|-----------|------------|--|---|---|
| Thursday | 14/07/2022 | Project Report : Related Work Modify demo_superpoint code to change the structure of SuperPoint network Training SuperPoint (step 3) with different configurations | Project Report : Related Work in progress New demo_superpoint code in progress Training SuperPoint (step 3) in progress | - Modify demo_superpoint code to change the structure of SuperPoint network |
| Friday | 15/07/2022 | Project Report : Related WorkModify demo_superpoint codeTraining SuperPoint (step 3) | Project Report : Related Work in progress New demo_superpoint code in progress Training SuperPoint (step 3) in progress | - Modify demo_superpoint code to change the structure of SuperPoint network |
| Saturday | 16/07/2022 | Project Report : Related WorkModify demo_superpoint codeTraining SuperPoint (step 3) | Project Report : Related Work in progress New demo_superpoint code in progress Training SuperPoint (step 3) finished | - Modify demo_superpoint code to change the structure of SuperPoint network |
| Sunday | 17/07/2022 | Project Report : Related WorkModify demo_superpoint code | Project Report : Related Work in progressNew demo_superpoint code in progress | - Modify demo_superpoint code to change the structure of SuperPoint network |
| Monday | 18/07/2022 | - Modify demo_superpoint code | - New demo_superpoint code in progress | - Modify demo_superpoint code to change the structure of SuperPoint network |
| Tuesday | 19/07/2022 | - Modify demo_superpoint code | - New demo_superpoint code in progress | - Modify demo_superpoint code to change the structure of SuperPoint network |
| Wednesday | 20/07/2022 | Project Report : Related WorkModify demo_superpoint code | Project Report : Related Work in progressNew demo_superpoint code in progress | - Modify demo_superpoint code to change the structure of SuperPoint network |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|--|---|
| Thursday | 21/07/2022 | Modify demo_superpoint code to change the structure of SuperPoint network | - Confirm the configuration file setting on the Joint Training SuperPoint (step 3): correct network setting | Modify demo_superpoint code to change the structure of SuperPoint network |
| Friday | 22/07/2022 | - Modify demo_superpoint code | - Run demo_superpoint code using my own pretrained model on the training dataset: error | - Modify demo_superpoint code |
| Saturday | 23/07/2022 | - Modify demo_superpoint code | - Check the output point tracks coding part | - Modify demo_superpoint code |
| Sunday | 24/07/2022 | - Modify demo_superpoint code | - Check the point detection and point confidence heatmap coding part | - Modify demo_superpoint code |
| Monday | 25/07/2022 | - Modify demo_superpoint code | - Debug raw point confidences code part | - Modify demo_superpoint code |
| Tuesday | 26/07/2022 | - Modify demo_superpoint code | - Debug raw point confidences code part | - Modify demo_superpoint code |
| Wednesday | 27/07/2022 | - Modify demo_superpoint code | New demo_superpoint code in progress Result: without extra output point confidence heatmap, my own pretrained model can be used to run the SuperPoint on an image sequence using the demo_superpoint code Next: debug the code to show the extra output point confidence heatmap | Finish demo_superpoint code Compare between SuperPoint and ORB-SLAM run on KITTI and TUM dataset |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---|--|---|
| Thursday | 28/07/2022 | - Loss function plotting using TensorBoard | - Loss function plot in progress | - Loss function plotting |
| Friday | 29/07/2022 | - Loss function plotting | - Loss function plot in progress | - Modify demo_superpoint code |
| Saturday | 30/07/2022 | - Modify demo_superpoint code | - Debug the point confidence heatmap | - Modify demo_superpoint code |
| Sunday | 31/07/2022 | Loss function plottingModify demo_superpoint code | Loss function plot in progressDebug the full resolution point confidence heatmap | - Modify demo_superpoint code |
| Monday | 01/08/2022 | - Modify demo_superpoint code | Numpy heatmap of point confidences code finishedDemo_superpoint code finished | - Testing the parameter of demo_superpoint code |
| Tuesday | 02/08/2022 | Loss function plottingRun SuperPoint on TUM dataset using different pretrained models | Loss function plot in progressComparison between different pretrained models finished | - Testing the threshold of demo_superpoint code |
| Wednesday | 03/08/2022 | Loss function plotting using TensorBoard Testing the threshold of demo_superpoint code | Loss function plot finished Run the SuperPoint on TUM dataset with different threshold and other parameters | - Project Report |

| Day | Date | Description | Result | What To Do |
|-----------|------------|--|--|------------------|
| Thursday | 04/08/2022 | - Finalize demo_superpoint code | - demo_superpoint code finished | - Project Report |
| Friday | 05/08/2022 | Run SuperPoint on TUM dataset using different pretrained models and parameters Save each output to different folders for project report | - Collecting ouput data finished | - Project Report |
| Saturday | 06/08/2022 | - Researching how to write a dissertation report properly | - Project Report in progress | - Project Report |
| Sunday | 07/08/2022 | - Researching how to write a dissertation report | - Project Report in progress | - Project Report |
| Monday | 08/08/2022 | - Project Report : Introduction | - Project Report : Introduction in progress | - Project Report |
| Tuesday | 09/08/2022 | - Project Report : Related Work | - Project Report : Related Work in progress | - Project Report |
| Wednesday | 10/08/2022 | - Project Report : Related Work | - Project Report : Related Work in progress Target Project Report Draft : 28 August | - Project Report |

| Day | Date | Description | Result | What To Do |
|-----------|------------|---------------------------------|------------------------------|------------------|
| Thursday | 11/08/2022 | - Project Report : Related Work | - Project Report in progress | - Project Report |
| Friday | 12/08/2022 | - Project Report : Related Work | - Project Report in progress | - Project Report |
| Saturday | 13/08/2022 | - Project Report : Methodology | - Project Report in progress | - Project Report |
| Sunday | 14/08/2022 | - Project Report : Methodology | - Project Report in progress | - Project Report |
| Monday | 15/08/2022 | - Project Report : Methodology | - Project Report in progress | - Project Report |
| Tuesday | 16/08/2022 | - Project Report : Introduction | - Project Report in progress | - Project Report |
| Wednesday | 17/08/2022 | - Project Report : Introduction | - Project Report in progress | - Project Report |

| Day | Date | Description | Result | What To Do |
|-----------|------------|-------------------------------------|--|------------------|
| Thursday | 18/08/2022 | - Chapter 4 Data Description | - Chapter 1 Introduction : feedback | - Project Report |
| Friday | 19/08/2022 | - Chapter 4 Data Description | - Chapter 4 Data Description in progress | - Project Report |
| Saturday | 20/08/2022 | - Chapter 3 SuperPoint Architecture | - Chapter 3 SuperPoint in progress | - Project Report |
| Sunday | 21/08/2022 | - Chapter 3 SuperPoint Architecture | - Chapter 3 SuperPoint in progress | - Project Report |
| Monday | 22/08/2022 | - Chapter 3 SuperPoint Architecture | - Chapter 3 SuperPoint in progress | - Project Report |
| Tuesday | 23/08/2022 | - Chapter 2 Related Work | - Chapter 2 Related Work in progress | - Project Report |
| Wednesday | 24/08/2022 | - Chapter 2 Related Work | - Chapter 2 Related Work : draft | - Project Report |

| Day | Date | Description | Result | What To Do |
|-----------|------------|------------------------------|--|------------------|
| Thursday | 25/08/2022 | - Chapter 3 SuperPoint | - Chapter 3 SuperPoint in progress | - Project Report |
| Friday | 26/08/2022 | - Chapter 4 Data Description | - Chapter 4 Data Description in progress | - Project Report |
| Saturday | 27/08/2022 | - Chapter 5 Experiments | - Chapter 5 Experiments in progress | - Project Report |
| Sunday | 28/08/2022 | - Chapter 5 Experiments | - Chapter 5 Experiments in progress | - Project Report |
| Monday | 29/08/2022 | - Chapter 6 Results | - Chapter 6 Results in progress | - Project Report |
| Tuesday | 30/08/2022 | - Chapter 6 Results | - Chapter 6 Results in progress | - Project Report |
| Wednesday | 31/08/2022 | - Chapter 7 Conclusion | - Chapter 7 Conclusion in progress | - Project Report |

| Day | Date | Description | Result | What To Do |
|-----------|-------------------------------|-------------------------------------|---|------------------|
| Thursday | 01/09/2022 | - Chapter 1 Introduction | - Chapter 1 Introduction : draft | - Project Report |
| Friday | 02/09/2022 | - Chapter 2 Related Work | - Chapter 2 Related Work : draft | - Project Report |
| Saturday | 03/09/2022 | - Chapter 3 SuperPoint Architecture | - Chapter 3 SuperPoint Architecture : draft | - Project Report |
| Sunday | 04/09/2022 | - Chapter 4 Data Description | - Chapter 4 Data Description : draft | - Project Report |
| Monday | 05/09/2022 | - Chapter 5 Experiments | - Chapter 5 Experiments : draft | - Project Report |
| Tuesday | 06/09/2022 | - Chapter 6 Results | - Chapter 6 Results : draft | - Project Report |
| Wednesday | 07/09/2022 - 21/09/2022 | - Chapter 7 Conclusion | - Chapter 7 Conclusion : draft Project Report Draft Finished | - Project Report |

| Day | Date | Description | Result | What To Do |
|----------|------------|--|--|------------------|
| Thursday | 22/09/2022 | Project Report RevisionRevise the SuperPoint Code | Project Report Draft RevisionSuperPoint Code for Submission | - Project Report |
| Friday | 23/09/2022 | Project Report RevisionRevise the SuperPoint Code | Project Report Draft RevisionSuperPoint Code for Submission | - Project Report |
| Saturday | 24/09/2022 | Project Report ReviewRevise the SuperPoint Code | Project Report Draft RevisionSuperPoint Code for Submission | - Project Report |
| Sunday | 25/09/2022 | Project Report ReviewRevise the SuperPoint Code | Project Report FinishedSuperPoint Code for Submission | - Project Report |
| Monday | 26/09/2022 | Project Report SubmissionCode Submission | - COMP0132 Finished | - Graduation |