

EBU7240

Computer Vision

- Course Overview -

Semester 1, 2021

Changjae Oh

Course Overview

Unit 1: Early vision / Low-level vision

- Introduction / Camera / Restoration / Feature detection

Unit 2: Mid-level vision

- Fitting / Grouping / Calibration / Epipolar / Stereo matching

Unit 3: Mid-/High-level vision

- Tracking / Recognition / Detection

Unit 4: Deep learning for computer vision

- Introduction / Loss / Backpropagation / CNN / Deep learning with practice

Course Overview

Unit 1: Early vision / Low-level vision

- Introduction / Camera / Restoration / Feature detection
- **Lab1:** Setting up - image/video representation in Python
- **CT1:** Early vision / Low-level vision

Unit 2: Mid-level vision

- Fitting / Grouping / Calibration / Epipolar / Stereo matching
- **Lab2:** Restoration and features
- **CT2:** Mid-level vision

Unit 3: Mid-/High-level vision

- Tracking / Recognition / Detection
- **Lab3:** Fitting and grouping
- **Lab4:** Tracking and detection + In-lab assessment
- **CT3:** Mid-/High-level vision

Unit 4: Deep learning for computer vision

- Introduction / Loss / Backpropagation / CNN / Deep learning with practice
- **Coursework report submission (Deadline: 23:59, 21st December 2021, UK time)**
- **CT4:** Deep learning for computer vision

Course Details – Module Delivery

- **Blended Teaching – How?**
 - Lectures
 - = **50%** live lectures + **50%** recorded lectures

BUPT Week		3	4	5	6	7	8	9	10	11	12	13	14	15	16	Telecom_M_G1		
w/c		13-Sep	20-Sep	27-Sep	4-Oct	11-Oct	18-Oct	25-Oct	1-Nov	8-Nov	15-Nov	22-Nov	29-Nov	6-Dec	13-Dec			
Mon	1	Live	Rec	Rec		Rec	Rec	Rec	Rec	Rec	Rec	Rec	Rec	Rec		Mon (3-435)	1	19:20-20:05
	2	Live	Rec	Rec		Rec	Rec	Rec	Rec	Rec	Rec	Rec	Rec	Rec			2	20:10-20:55
Thur	3	Rec	Live	Tut		Live	Live	Tut	Live	Live	Tut	Live	Live	Tut		Thur (3-437)	3	19:20-20:05
	4	Rec	Live	OH		Live	Live	OH	Live	Live	OH	Live	Live	OH			4	20:10-20:55
Labs/ Class Tests				CT1			L1	CT2	L2		L3/CT3		L4	CT4		Telecom_M_G2		
Topics		Unit 1				Unit 2			Unit 3			Unit 4				Mon (3-435)	1	16:35-17:20
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Course Details – Module Delivery

- **Blended Teaching – How?**
 - Recorded Lectures
 - To deliver the content in detail
 - Live lectures
 - Review the past content + **Interactive sessions**

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w/c		13-Sep	20-Sep	27-Sep	4-Oct	11-Oct	18-Oct	25-Oct	1-Nov	8-Nov	15-Nov	22-Nov	29-Nov	6-Dec	13-Dec			
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Course Details – Recorded Lectures

- Recorded Lectures

- Recorded Lectures

- To deliver the content in detail
- Students should take the recorded lecture **before the next live session**

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w/c		13-Sep	20-Sep	27-Sep	4-Oct	11-Oct	18-Oct	25-Oct	1-Nov	8-Nov	15-Nov	22-Nov	29-Nov	6-Dec	13-Dec	Mon (3-435)	1	19:20-20:05
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Course Details – Live Lectures

- Live lectures
 - Brief review about past recorded lectures
 - Interactive sessions using Mentimeter
 - Going through exercises together + Q&A

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Labs

- **4 times:** 8th, 10th, 12th, 14th BUPT week
 - Tuesday afternoon, (13:00 – 14:35)
 - 科研楼 on main (Xitucheng) campus
 - Telecom_M_Y4_**G1 (Room 116)**, Telecom_M_Y4_**G2 (Room 120)**

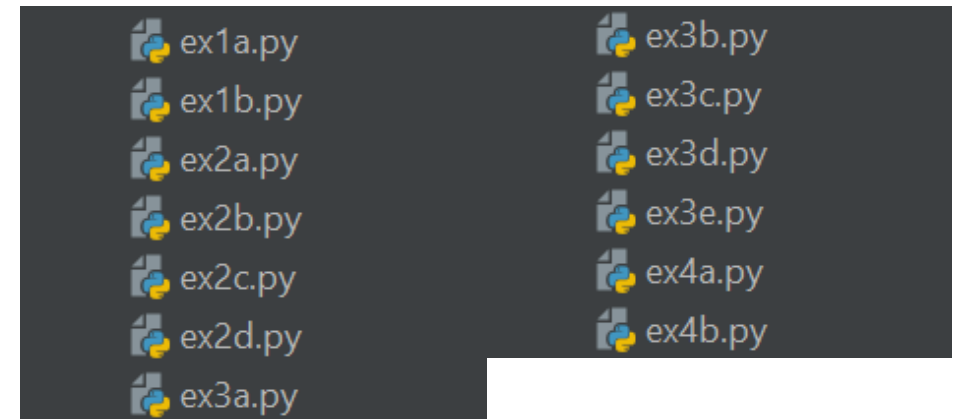
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Assessment

- **Exam (80%)**
 - One written exam
- **Coursework (20%)**
 - Individual coursework (15%)
 - Development of computer vision tasks
 - Python and OpenCV
 - In-class tests (5%)
 - Test to be done in each office hour (Four in-class tests)
 - Each test covers each unit's content
 - Easy questions using QMPlus
 - **Top 2 marks (out of 4 tests)** will be counted. (2.5% each)
 - Absence will be marked as **zero (NO excuse)** of your absence will be accepted)

Assessment – Individual Coursework (1/3)

- In-lab assessment (30% of individual coursework)
 - During the **Lab4** hours
 - Assessment of your coursework covered in Lab1-3
- Report (70% of individual coursework)
 - use the provided layout, with provided guideline
 - at the end of the semester (Deadline: 21st December 2021)
- Code
 - One .py code to each problem
 - Zero mark will be given if the result is not reproducible
 - Zero mark will be given if any unauthorized library is used



Assessment – Individual Coursework (2/3)

- In-lab assessment (30%)
 - will be evaluated by
 - 1) running the implemented codes,
 - 2) checking during the in-lab assessment: the understanding of the tasks with a short conversation with a TA
- Report (70%)
 - will be evaluated based on
 - 1) the quality of the analysis
 - 2) the discussion of the results obtained in the coursework tasks

Assessment – Individual Coursework (3/3)

- Dataset
 - A dataset provided from this module (image + video)
→ Quantitative assessment
 - A dataset collected by yourself (image + video)
→ Qualitative assessment

Assessment – Coursework Submission@ QMplus

- Submit 1) your report and 2) zip file to the QMplus.

Deadline:
23:59, 21th Dec 2021
UK time

- QMplus submission example:

- EBU7240_CHANGJAE_OH_1711XXXXX.pdf
- EBU7240_CHANGJAE_OH_1711XXXXX.zip

- The zip file will contain the following folders:

```
EBU7240_FIRSTNAME_FAMILYNAME_QMSTUDNETNUMBER
├── inputs
├── results
└── codes
```

- Name the zip file you submit as: <EBU7240_FIRSTNAME_FAMILYNAME_QMSTUDNETNUMBER>.zip
- Max size of the zip file: **50M**
- The outputs of your implementations should be generated in the **\results** directory
 - No need to submit the outputs of your code (we will reproduce them!), just make the **\results** directory

In-class Test

- Four in-class tests
 - To be done in each office hour
 - Less than **20 min**
 - Students should be in the classroom (Scores will be accepted **ONLY WHEN attendance is recorded**)
 - Easy online-test using QMPlus
 - Each test covers each unit's content
 - Questions for Telecom_M_G1 and Telecom_M_G2 will be **different**
 - For a fairness issues, **ONLY** the problems used in the live-session will be covered (with modification)
 - Top 2 marks will be counted. (2.5% each)
 - Absence will be marked as **zero**
 - Any excuse of your absence will **NOT** be accepted

Office Hours

- **When?**
 - During office hours (OH), but after the class test (<20 min)
- **Where?**
 - MS Teams
 - I will post the meeting link through QMPlus
 - Anyone can drop in with his/her own MS Teams account and have a video meeting

A few tips – Exam

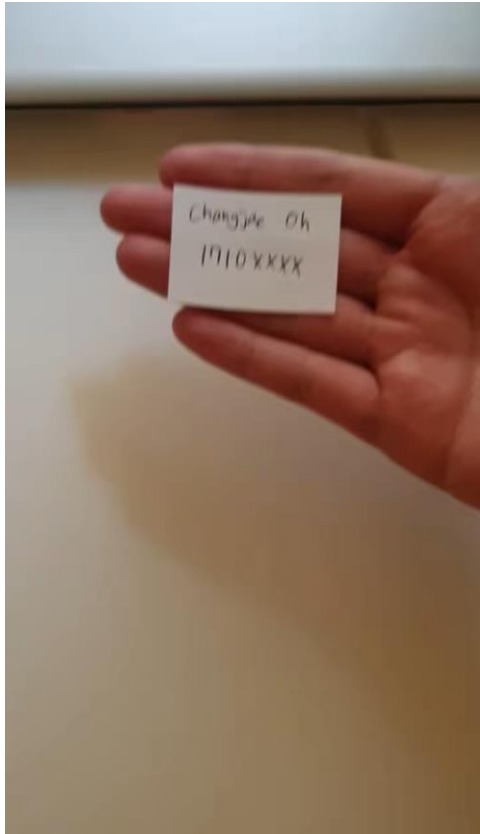
- **Define, define, define!**
 - ex) EBU6230- Image Video processing

i) By using erosion and dilation operators, give the mathematical representation of morphological opening and morphological closing for the structuring element S and image M .

$$\text{Opening: } M \bullet S = (M \ominus S) \oplus S$$

A few tips – Coursework

- There are several traps to prevent your plagiarism
 - Don't copy others
 - You'll need to create your own dataset
 - ex)



By the end of this module, you will

- understand fundamental tasks involved in computer vision tasks
- understand the principle of deep learning in computer vision
- become familiar with
 - the various important techniques in computer vision tasks
 - Python and OpenCV