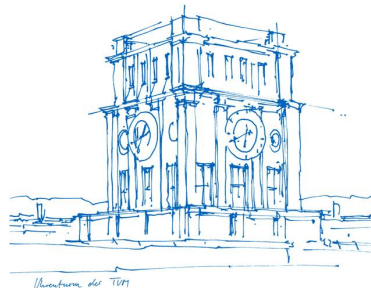


Computer Vision II: Multiple View Geometry (IN2228)

Exercise 00 Introduction

Viktoria Ehm

26 April 2022 16:00-18:00



Outline

- General Exercise Information
- Theoretical Exercises
- Practical Exercises

Exercise Information

- Exercise (120 minutes)
- Time: Wednesday from 16:00 to 18:00
- Room: 102, Hörsaal 2, "Interims I" (5620.01.102)



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Course Information

➤ Tentative Exercise Schedule

Please note that exercise sessions may be rescheduled depending on the course progress!

Wed 26.04.2023 Exercise 1: Introduction

Wed 03.05.2023 Exercise 2: Mathematical Background

Wed 10.05.2023 Exercise 3: Representing a Moving Scene

Wed 24.05.2023 Exercise 4: Perspective Projection

Wed 31.05.2023 Exercise 5: Lucas-Kanade Method

Wed 14.06.2023 Exercise 6: Reconstruction from two views

Wed 21.06.2023 Exercise 7: Reconstruction from multiple views

Wed 05.07.2023 Exercise 8: Direct Image Alignment

Wed 12.07.2023 Exercise 9: Direct Image Alignment

Questions regarding Exercise/Lecture Content


- Ask in the Moodle Forum not via Email (Course related emails will be ignored, personal questions can be asked via email)


Computer Vision II: Multiple View Geometry (IN2228)

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▼ General

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 Ankündigungen

 Lectures

This forum is to discuss the content of lectures.

 Exercises

This forum is to discuss the content of exercises.

Theoretical Exercises

- Will be provided one week before the corresponding exercise session on Moodle and the lecture website
- **No Grade Bonus** for theoretical exercises
- Very important for the exam preparation
- We highly recommend to do them
- Do them at home before the exercise session
- Solutions are discussed in the session

Theoretical Exercises



Multiple View Geometry: Exercise 1

Dr. Haoang Li, Daniil Sinitsyn, Sergei Solonets, Viktoria Ehm
Computer Vision Group, TU Munich
Wednesdays 16:00–18:15 at Hörsaal 2, "Interims I"
(5620.01.102), and on [RBG Live](#)

Exercise: May 03, 2023

Math Background

1. Show for each of the following sets (1) whether they are linearly independent, (2) whether they span \mathbb{R}^3 and (3) whether they form a basis of \mathbb{R}^3 :

(a) $B_1 = \left\{ \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \right\}$

(b) $B_2 = \left\{ \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} \right\}$

(c) $B_3 = \left\{ \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} \right\}$

2. Which of the following sets forms a group (with matrix-multiplication)? Prove or disprove!

(a) $G_1 := \{A \in \mathbb{R}^{n \times n} \mid \det(A) \neq 0 \wedge A^\top = A\}$

(b) $G_2 := \{A \in \mathbb{R}^{n \times n} \mid \det(A) = -1\}$

(c) $G_3 := \{A \in \mathbb{R}^{n \times n} \mid \det(A) > 0\}$

3. Prove or disprove: There exist vectors $\mathbf{v}_1, \dots, \mathbf{v}_5 \in \mathbb{R}^3 \setminus \{\mathbf{0}\}$, which are pairwise orthogonal, i.e.

$$\forall i, j = 1, \dots, 5: \quad i \neq j \implies \langle \mathbf{v}_i, \mathbf{v}_j \rangle = 0$$

Practical Exercises - Bonus

- Pass all 5 exercises to get the bonus
- 0.3 Bonus
- To pass an exercise you need to pass all tests of the corresponding exercise
- Only valid for the **first attempt**
- Only valid if you **pass** the exam
- Bonus Examples
 - 1.3 -> 1.0
 - 2.7 -> 2.3
 - 4.3 -> 4.3


Practical Exercises - Anti-Plagiarism

- We have an **Anti-Plagiarism system**
- Every suspicion **will be reported**
- Not in your interest to cheat
- Bonus is a motivation
- Do not share code on Moodle (not questions and not answers)
- Do not share code with others

Practical Exercise Content

- Exercise can contain more than one task
- Language: Python or C++
- Two weeks for every practical homework
- Test exercise one week
- Deadline is Wednesday at 11am (1h before the lecture)

Practical Exercises - Demo

RANK	TEAM	SCORE	A+B
3	 TA_TEST	1 / 177	177 / 194

Submission done! Watch for the verdict in the list below.

Submissions			
time	problem	lang	result
14:01	A+B	py3	PENDING
13:58	A+B	py3	CORRECT
13:57	A+B	py3	CORRECT

Clarifications
No clarifications.
Clarification Requests
No clarification request.
request clarification


Practical Exercises - Demo


A+B

Sum of two integers

Limits: 1 second / 125 MB



text

 samples

 Submit

Text: Given two integers a and b, return the sum of the two integers

Practical Exercises - Demo Samples

Extract		+	samples-A+B.zip		Q	≡	–	□	×
<	>	🏠	Location: 📁 /						
Name	Size	Type	Modified						
 1.ans	2 bytes	unknown	26 April 2023, 13:42						
 1.in	4 bytes	unknown	26 April 2023, 13:42						

1.ans: 4
1. in: 2 2

Input stream:2 2
Output stream: 4

Practical Exercises - Demo Solutions

➤ C++

```
#include <iostream>

int main() {
    int a, b;
    std::cin >>a >> b;
    std::cout << (a + b) << std::endl;
    return 0;}
```

➤ Python

```
print(sum(map(int, input().split())))
```

Practical Exercises - Demo Samples

Submit problem Sum of two integers

Source files

No file selected

Browse

Language


Select a language

Cancel

 Submit

Practical Exercises - Demo

DOMjudge [Home](#) [Problemset](#) [Scoreboard](#) [Jury](#) [Submit](#) [Logout](#) 6d 21:58:10

RANK	TEAM	SCORE	A+B
3	 TA_TEST	1 177	177 100%

Submission done! Watch for the verdict in the list below.

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time	problem	lang	result
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Clarifications	
No clarifications.	

Clarification Requests	
No clarification request.	

request clarification

If you pass one submission run, you pass this exercise

Practical Exercises - Next Steps

- We have provided you with an username and a password by email today
- If you don't receive it today/tomorrow, please contact us via Email
- You can log in at <https://domjudge.cvg.cit.tum.de/>