Report - DD2423 - 2021-10-04

Respondents: 1
Answer Count: 1
Answer Frequency: 100.00%

Please note that there is only one respondent to this form: the person that performs the course analysis.

Course analysis carried out by (name, e-mail):

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DESCRIPTION OF THE COURSE EVALUATION PROCESS

Describe the course evaluation process. Describe how all students have been given the possibility to give their opinions on the course. Describe how aspects regarding gender, and disabled students are investigated.

The course is primarily evaluated through a questionnaire at the end of the course. The questionnaire is intentionally placed right after the results from the exam are published, giving the students an opportunity to comment on the exam correction. However, since this is almost two months after the final lecture, there is a risk though that students have forgotten some feedback they originally wanted to provide. Another possibility for computer science and machine learning students to provide feedback is through the program integration courses DD2300 and DD2301. The lecturer is a mentor in DD2300 for about 35 students in the autonomous systems and data science tracks, out of which many attend the course. Aspects related to gender are evaluated through the questionnaire, which includes average responses reported by gender. Students with disabilities who require individualized exam procedures are typically asked about the course in connection to the exam.

DESCRIPTION OF MEETINGS WITH STUDENTS

Describe which meetings that has been arranged with students during the course and after its completion. (The outcomes of these meetings should be reported under 7, below.)

Students meet the lecturer and teaching assistants during the 16 seminars (13 lectures and 3 exercise sessions), 9 lab help sessions and 3 individualized lab presentations. Due to the high number of students, the only planned individual meetings are lab presentations. However, students are also encouraged to ask questions related to the course either in Canvas, in direct connection to the lectures and after exams are corrected and returned. Many of these questions are later brought up during lectures.

COURSE DESIGN

Briefly describe the course design (learning activities, examinations) and any changes that have been implemented since the last course offering.

The course is an introductory course in image analysis and computer vision. It covers mature areas such as image filtering, enhancement and reconstruction, feature detection and extraction, shape representation, image segmentation, object recognition, as well as stereo and motion analysis. It contains 16 seminars, out of which three are dedicated to exercises, repetition and open questions. Even if the course is heavy on theory, the focus is to make students learn how to do image analysis in practice, something that is done in three labs, one on image filtering, one on edge detection and line extraction, and the last one on image segmentation. Labs are examined by interviewing students individually, with directed questions assessing their understanding of the underlying concepts behind the labs, more than the results of the labs per se. The theoretical part of the material is examined through a final exam. Even if the lab course is worth more in terms of credit points, the exam has a higher influence on the final grade, given that grades are computed as an average of the lab and exam grade, but rounded towards the exam grade. The reason for that is the fact that theoretical aspects from the labs also end up on the exam and the exam is the last activity of the course. If a student misunderstands an important concept during the labs, the lab presentation can provide feedback in time for the exam. For students to get an idea of how much in-depth they are expected to study the material, the course also contains a weekly voluntary quiz. Since the course is introductory it spans the whole field of computer vision and the amount of available literature is vast. A second reason is to focus on important concepts that are often misunderstood. Quiz questions are often phrased such that incorrect answers easily lead to cognitive dissonance when an explanation is given at the end. Finally, the quiz gives the lecturer feedback on what should be reiterated during lectures.

A relatively small, but valuable, change compared to earlier course rounds introduced this year, was to more actively use Canvas to provide direct feedback and help, in particular for questions related to the labs. TAs were staffed to moderate discussions related to different aspects of the course and provide quick feedback to students in need of help. These students would otherwise wait until a lab help session or ask the lecturer in class. A positive side-effect of this change was that students often helped each other faster than a TA could have done. Another change was that the re-exam was held online due to the COVID pandemic that started just weeks before the re-exam was to be held. With questions posted online in Canvas students worked from home while being connected through Zoom, but without the necessity of having the camera turned on. Canvas was also used to check IDs, while the chat in Zoom could be used for questions. Despite the short preparation time, the exam went much smoother than anticipated. A few days prior to the exam, a trial run was held during which students could get acquainted with the procedure.

THE STUDENTS' WORKLOAD

Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If these is a significant deviation from the expected, what can be the reason?

The workload varies a great deal depending on what program the students come from and if they are exchange students or not. Many exchange students are very ambitious and sometimes spend more time than necessary, but a fair number of students with strong programming backgrounds are able to complete the labs with ease. The median of the reported workload is about 14 hours a week, which is close to what can be expected, but it's problematic that it varies so much depending on background, from 3 hours to as much as 23 hours a week.

THE STUDENTS' RESULTS

How well have the students succeeded on the course? If there are significant differences compared to previous course offerings, what can be the reason?

Most students successfully completed the course, but there are a number of students that, depending on background, find either the laboratory exercises or the more mathematically oriented exercises on the exam difficult. The course assumes an understanding of basic linear algebra and multivariate analysis, something that many students have used since they once studied it. Out of 224 (218) registered students, 202 (187) passed the lab course, 200 (190) passed the exam, while 200 (184) passed the course as a whole, based on numbers recorded in Ladok, which might vary from those in Canvas that include doctoral students and students attending more than one course round. The numbers in parentheses are from the previous course round. It should be noted since the course is an elective course for most students, the number of students passing the course might vary considerably from year to year, depending on the number of other alternative courses given in the same period. This course round had an unusually high number of students. To ensure that as many students as possible pass the course, exams were held three times, once for exchange students who would leave the country after the end of the year, one regular exam and one re-exam.

STUDENTS´ANSWERS TO OPEN QUESTIONS
What does students say in response to the open questions?

Given the large and diverse group of students, students have very different opinions on the course, even if most students enjoy the course as a whole. Some students enjoy the labs the most, while others prefer the lectures. Some find the labs easy, while others find the programming parts difficult. The same is true for the more mathematically oriented exercises and exam questions. This is also reflected by how much time students spend on the course, which might vary considerably.

SUMMARY OF STUDENTS' OPINIONS
Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.

There are some themes that were shared by multiple students that responded to the questionnaire. When it comes to the content itself and the lectures, students tended to be quite positive, which was true also for the quizzes. However, some students brought up the weak connection between lectures, labs and exercises as a problem, especially since these activities do not overlap in time. What is brought out in lectures might appear in exercises and labs one or two weeks after. They also requested more exercise sessions to prepare for the exam. Another more critical concern that was raised was differences in the assessment of labs, depending on which assistant the student was assigned to. More standardized questions from assistants were requested.

OVERALL IMPRESSION
Summarize the teachers' overall impressions of the course offering in relation to students' results and their evaluation of the course, as well as in relation to the changes implemented since last course offering.

It is true that lectures, labs and exercises might seem disconnected. Part of the reason is due to scheduling and the effort to keep the load evenly spread across the course. Thus there are more lectures early on in the course, exercises at the end and labs during the weeks between. However, more can be done to introduce the labs during lectures right before they occur, possibly by refreshing some of the topics mentioned one or two weeks earlier. There is also some truth when it comes to differences in grading. Given that the course has grown rapidly during the years and is now more than twice as large as it was a couple of years ago, the course has relied on master students being recruited as assistants as a complement to the existing doctoral students. Even if the grading seems to be similar for the higher grades, the doctoral students seem more likely to also apply the lower grades on the scale. In preparation for the labs, the grading procedures were discussed between assistants for a total of four hours. A possible explanation for the observed differences could be that the more acquainted you are with the material, the more you tend to expect from others. In cases of doubt, you are also less likely to recommend a higher grade than might be motivated. What should be noted though is that, due to the way the final grade is computed and the fact that students and assistants are randomly paired, the effect of a single lab grade is very small. Furthermore, if a single lab still has a negative effect on the final grade, the student is allowed to present the lab once more, an opportunity that is mentioned on the course web page and during lectures. Regardless of this, more efforts need to be made to ensure that assistants give similar grades and that grading is viewed as fair.

ANALYSIS
Is it possible to identify stronger and weaker areas in the learning environment based on the information you have gathered during the evaluation and analysis process? What can the reason for these be? Are there significant difference in experience between:
- students identifying as female and male?
- international and national students?
- students with or without disabilities?

The scores for the different points in the questionnaire range from 3.9 to 6.3, with a median score of 5.6, where the maximum is 7.0. The two most critical points are "20. I had opportunities to influence the course activities (3.9)" and "15. I could practice and receive feedback without being graded" (4.7). All other points were scored 5.0 or higher, where "1. I worked with interesting issues" (6.3) got the highest. Since the course is elective for most students this is understandable, since a student would not select the course, unless there was an interest in the topic as such. The two critical points are difficult to immediately find a solution for, given the large number of students in the course and the lack of experienced TAs that can provide support. The introduction of voluntary quizzes for feedback and the wider use of Canvas for assistance has led to an improvement on point 15, given that the score was about 3.5 in earlier course rounds. More could possibly be done in that direction, without requiring a considerable increase in load for the TAs. To improve on point 20, one could possibly introduce alternative paths through the course, with alternative labs with a focus either on theory or practice. This is reasonable given that the role of an engineer with expertise in computer vision might vary considerably, where some work more on geometrical aspects while others work on algorithms.

You rarely get a good opportunity to talk about diversity and inclusion in a course like this. This course round was an exception though. A student had anonymously complained against the usage of a particular image in the course and asked for it to be removed. The image "Lena" is the most widely used image in the history of computer vision. In the early 70s it was one of the first images ever to be scanned and thus became a standard for benchmarking of image processing algorithms. It later turned out, however, that the image, that shows a face of a woman, originates from a larger image taken from a pornographic magazine. In an effort to show examples of algorithms as they appeared in their original publications, the image had been used in the course since the earliest versions of the course about 20 years ago. However, since there were no good pedagogical reasons to keep the image in the course, other than as a historical document, the image was removed from the four slides on which it appeared. A motivation was given on the course webpage and discussed twice during lectures, the next following lecture and the final one when students were asked to fill in the course evaluation. Students who mentioned the removal of "Lena" from the course material did so in positive terms. Also worth noting is that in the questionnaire, the point "6. The atmosphere on the course was open and inclusive" got a score of 6.0, which is higher than in earlier course rounds.

PRIORITIZED COURSE DEVELOPMENT
What aspects of the course should be developed primaily? How can these aspects be developed in short and long term?

More efforts should be made to provide more direct feedback to the students, as well as provide alternative paths through the course, in particular, due to the fact that students in the course come from so many different programs (about 15) and thus have different expectations. Computer vision is used to solve different concrete problems, but these problems vary considerably depending on whether your core interest is in media, medical technology, computer science or mathematics. It is difficult to find one size that fits them all. In the long run, at least if the course keeps having about 200 students, is to split up the course, where one course focuses on image processing for media and medical technology, while the other is concentrated on computer vision for real-time systems in e.g. robotics and autonomous driving.