

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 avenue for feedback from students in the computer science and machine learning programs, while the course is running, 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. The course, which is compulsory only for a limited number of students in media technology and robotics, is attended by a diverse group of students from about 15 master programs, many of which have little programming experience.

The course has been updated with more examples of deep learning being used in computer vision, in order to better align with courses in machine learning. A short introduction to typical neural networks in computer vision was given in the first lecture, which is followed by examples in various lectures about feature matching, segmentation, object recognition and motion analysis. Given that the most critical aspect of the course, that was identified after last year's course round, was the limited feedback students could get during the course, a set of voluntary quizzes were introduced after each lecture. The quizzes serve two purposes. First, it gives students an idea of how much into depth they need to go into each individual topic. 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. It should be pointed out though the most important feedback students will get during the course is through the individual lab presentations. Teaching assistants are instructed to not just assess the students but also to use the opportunity to resolve misunderstandings.

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. On median reported workload is 12-14 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 30 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 218 (178) registered students, 187 (144) passed the lab course, 190 (146) passed the exam, while 184 (140) 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. Numbers in parentheses are from the previous course round. It should be noted since the course is elective 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 for a while. 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.

A reoccurring theme is that students on one hand spend most of the time on the labs, but they still enjoy the labs and believe the labs to be the most important part of the course. Another theme is that the course includes too much information, which makes it hard to digest. There is an opportunity to be more selective and spend more time on a fewer number of topics. Given how much time the students spend on the labs, it seems that some students do not find enough time to complete the recommended exercises in preparation for the exam.

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.

Given that the evaluation points in many different directions, often due to the background of students, whatever change you introduce to the course might lead to negative consequences in another part of the course. You are also constrained by the number of teaching assistants available for the course. Keeping the exercise sessions in smaller groups would probably be good to keep the sessions more intimate and interactive, but then these sessions should preferably be in parallel with many different teaching assistants in order not to become too unbalanced in the number of students, something that has occurred in earlier course rounds. The diagram in the evaluation indicates that students find the course material interesting and meaningful, they understand what is expected and how the course is organised, but there are few opportunities for individual students to affect the course activities. It would be possible to introduce individual projects to cope with this, but that would come at the expense of the labs, which already today work quite well. An alternative is to make it more transparent what is required for different grades on the exam in particular. The most important change this course round for the introduction of quizzes for formative assessment. All students that commented on these quizzes seemed to have appreciated the addition and recommended their future colleagues not to forget them.

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 most critical point in the diagram is 20. I had opportunities to influence the course activities (4.1), a point that had hardly changed since previous course rounds. Given how the course is structured, where activities are more or less the same for all students, this should not be seen as a surprise. Variability in activities for different students means that you need to have more alternative activities in total. With about 200 students, teaching assistants need to be used for most of these activities, which is not feasible given what the assistants are doing already today and the fact that master students need to be recruited to fill the needs of the labs. One solution would be to create a new optional lab, possibly for higher grades. To some extent, this is something that already exists, at least for those students who like to improve the lab grades after the exam. An alternative that could be tried would be to at least have variations in the exam, with deeper questions required for higher grades.

All other points in the diagram got scores between 4.9 and 6.0, with a median at 5.5. The most critical point among these was 15. I could practice and receive feedback without being graded with a score of 4.9 compared to only 3.5 the year before, which must be due to the introduction of quizzes since that was the only major change. It would be possible to improve this further though, with more direct interaction with teaching assistants, while working on the labs. The highest scoring point was 1. I worked with interesting issues (6.0), which has consistently been the strongest point. For an elective course though, this is a point that needs to be high, in order to at all motivate the existence of the course.

The most positive group were exchange students, while the least positive students were Swedish master students. It is reasonable to believe that many of the international students are better prepared both in terms of mathematical skills and the ability to work independently. They might also have an intrinsic interest in the course, which lead them to elect this particular course. Female students tend to be more positive than men. It is hard to tell exactly why this is the case, but it might be due to the fact that female students are more common among international students, while the lack of diversity is more apparent among students from Sweden. It is harder to draw any conclusions from the group of students with disabilities, partly because they are so few. However, from interactions with these students there is nothing that suggests that their concerns would be much different.

PRIORITIZED COURSE DEVELOPMENT

What aspects of the course should be developed primarily? How can these aspects be developed in short and long term?

Most important is to provide students with more personalized feedback on coursework, in order to satisfy the individual needs that might be quite different depending on background. Canvas and KTH Social can possibly be used for such interaction, but there might be other technical solutions that do not require prior scheduling. There should also be possibilities to more directly affect the course activities, if not directly based on personal interests, but as a means to vary the ambition level depending on expected grades.

A long-term solution is to split up the course into two different courses tailored towards different groups of students, given that the group of students is so diverse. The ambition is for students to get hands-on experience in working with images, but it is very hard to recruit a significant number of experienced assistants to support that ambition for a course with around 200 students that runs over a single period.