Report - DD2423 - 2022-09-09

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.)

Due to the COVID pandemic, all meetings were held online using Zoom. Students meet the lecturer and teaching assistants during 16 seminars (13 lectures and 3 exercise sessions), 3 individualized lab presentations and weekly lab help sessions. The only planned individual meetings are those related to the labs. However, students are encouraged to ask questions related to the course either in Canvas, in direct connection to the lectures or 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.

Due to the pandemic, the course had to be changed into a fully online format, where only the exam was held on campus. Students that could not attend the exam, possibly for health reasons or because they were exchange students unable to visit KTH, were instead given the opportunity to attend the re-exam that was also held online. Lectures were given in Zoom and recorded with videos published on Canvas. This allowed students to revisit the lectures while preparing for the labs and the exam. Lab presentations and help sessions were also held online. However, while presentation sessions were densely scheduled during the last days of each lab week, help sessions were more sparsely spread over the whole period giving students and TAs more flexibility.

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 reported course load was everything from 3 to 23 hours a week, which is a very large spread. This is possibly due to differences in levels of ambition and backgrounds of students. Students come from many different master's programs, many of which include less mathematics and programming than others. The median workload of 15 hours a week is closer to what one might expect.

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 mathematically oriented exercises on the exam difficult. Out of 145 (224) registered students, 125 (202) passed the lab course, 129 (200) passed the exam, while 122 (200) passed the course as a whole, based on numbers recorded in Ladok, which might vary from those in Canvas that include doctoral students and re-registered students that failed to complete the course during an earlier 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. Due to the pandemic, this course round was attended by only a small number of exchange students, a group of students that has been fairly large over the years. While the number of students from the computer science, machine learning and robotics masters stayed the same, there was a considerable reduction in the number of students from more peripheral programs. It is possible that students overall tended to focus more on the core courses of their respective programs and less on their elective courses.

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 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 too easy, while others find the programming parts difficult. The same is true for the more mathematically oriented exercises and exam questions. It is worth noting that those who spend a lot of time on the course are also quite positive. There are comments related to the course load, but these seem not to be correlated with how much time people spend on the course.

SUMMARY OF STUDENTS' OPINIONS

Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.

While students were in general quite positive in their comments, especially when it comes to the labs, they still had a number of recommendations for future course rounds. A number of students found the lectures unnecessarily math-heavy and dense and wanted more time on each topic with fewer topics in total. Python was also recommended as an alternative programming language by some students, who questioned why Matlab was at all used. The exam was often considered to be quite disconnected from the labs. Some students questioned whether a lab is needed at all, instead recommending more labs or a project.

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.

Computer vision is indeed a broad topic and includes a number of mathematical concepts that can be difficult to grasp. For example, it is hard to imagine a computer vision engineer who does not know what a projection is. Stereo geometry might not be as important, but if you aim for a higher grade, you are typically expected to know it. The question is how the understanding of these more mathematical concepts should be assessed. If they are not assessed, students will eventually learn to ignore them. In that case, it would be better to gradually let the course become a pure project course, in which students try to understand only those concepts that are needed for the individual projects. The course has so far used a final exam to assess both these mathematical concepts, as well as algorithms that are regarded as fundamental in computer vision. The exam could potentially be replaced by take-home exercises, but the question is how to then avoid students collaborating on these exercises so that the understanding of each individual student can be assessed. It is true that the exam can be considered quite disconnected from the labs since they are intended to assess different kinds of skills, but more can be done to align them better.

Running the course fully online turned out to be easier than expected, much due to the availability of technical solutions for remote teaching that existed already before the pandemic. The online format definitely has its pros and cons. It forces students and teachers to get the discussions going online, which means that help and inspiration are shared with groups beyond those that students normally interact with. It also allows for more flexibility when it comes to organising lab presentations and help sessions. Spontaneous meetings were held online without being scheduled, allowing students to more quickly receive help. However, some students clearly found the isolation to be problematic, resulting in less motivation in general. Lectures also tended to be more formal, not least because they were also recorded, with much less interaction in class. It is also difficult for a teacher to read the body language of students to get a feeling for how well students were able to grasp concepts that were presented, which could prompt the teacher to go more in-depth or explain the concept from another angle.

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?

Compared to earlier years, more points in the questionnaire were given a lower score, even if the spread, from 3.8 to 6.0 with a median of 5.5, was more or less the same. The two points "15. I could practice and receive feedback without being graded" (5.0) and "20. I had opportunities to influence the course activities" (3.8) have been a challenge for the course in recent years, even if the scores have improved somewhat since they were first measured. Due to the lack of experienced TAs, the size of the course and the diversity of students coming from around 15 different programs, it is hard for an individual student to affect the course activities. Point "5. I felt togetherness with others on the course" (4.3) score was significantly lower than usual, which can be explained by the pandemic and the online format of the course. It is worth noting that a handful of students gave the lowest possible score, which greatly affected the mean, while the rest gave scores more similar to earlier years. Another point, "14. I received regular feedback that helped me to see my progress" (4.6), scored lower than usual, but without comments in the questionnaire, it is hard to explain why. One possible explanation could be due to the fact that all interaction was online, which made interaction seem more formal. The purpose of lab presentations, for example, is to grade students, but also to provide feedback. It could be that this feedback is partially lost due to the format.

In general female and international students rate the course higher than students from KTH. These two categories might well be interrelated since the relative number of female students is significantly higher among international students. Furthermore, students for which the course is compulsory are students from KTH, students that might not have the same intrinsic interest in the course, compared to those for which the course is elective. The largest difference in responses was for point "2. I explored parts of the subject on my own", where the international students were considerably more positive. The reason could be that these students are more motivated in general. After all, they went abroad for their master's education and often have to pay for it. No students with disabilities responded to the questionnaire.

PRIORITIZED COURSE DEVELOPMENT

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

Given that students come from so many different programs and thus have different expectations from the course, the course has over the years become too streamlined. Students don't see that they can affect the course activities, which in turn affects their motivation. The long-term solution should definitely be to divide up the course into two courses, one course on image processing and analysis and another one on computer vision for real-time systems. So far this has not been possible, due to the lack of teaching resources, even if there are enough students to motivate such a split. More short-term solutions could be to introduce alternative lab exercises or projects, possibly only for high grades.