MODULE EVALUATION REPORT

Module	CS3244 - MACHINE LEARNING
Academic Year/Sem	2018/2019 - Sem 1
Department	COMPUTER SCIENCE
Faculty	SCHOOL OF COMPUTING

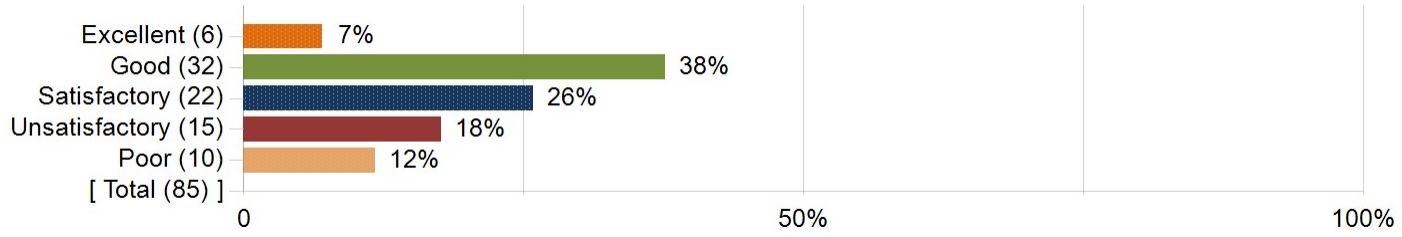
Note: Class Size = Invited; Response Size = Responded; Response Rate = Response Ratio

Raters	Student
Responded	85
Invited	160
Response Ratio	53%

1. Overall opinion of the module

Frequency Analysis

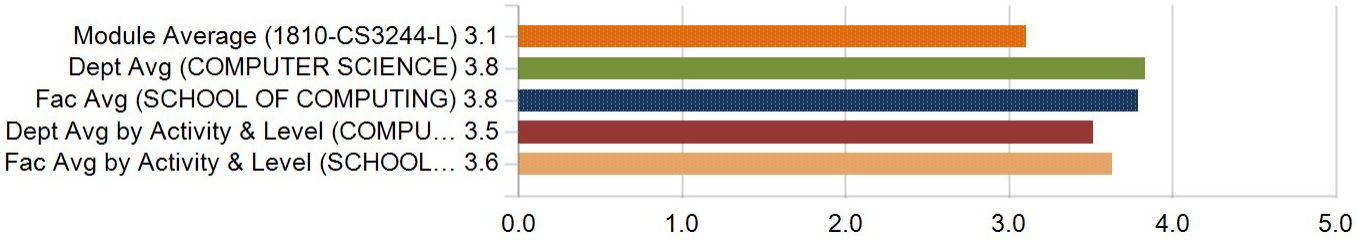
1. What is your overall opinion of the module?



Statistics	Value
Response Count	85
Mean	3.1
Standard Deviation	1.1

Normative Analysis

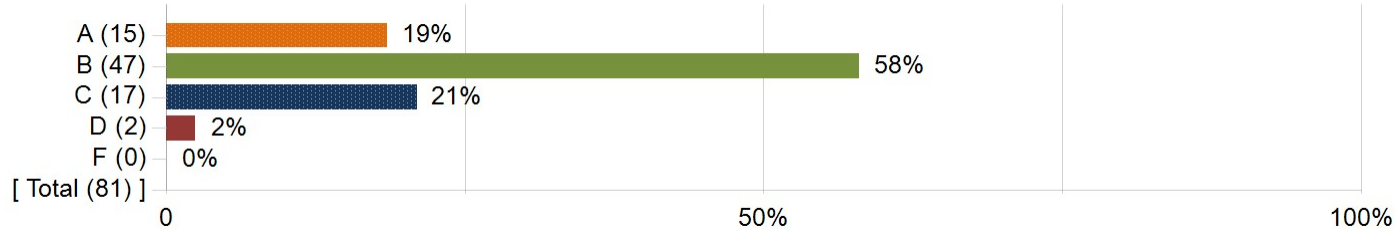
Question	Module Average (1810-CS3244-L)		Dept Avg (COMPUTER SCIENCE)		Fac Avg (SCHOOL OF COMPUTING)		Dept Avg by Activity & Level (COMPUTER SCIENCE-LECTURE (Level 3000))		Fac Avg by Activity & Level (SCHOOL OF COMPUTING-LECTURE (Level 3000))	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
What is your overall opinion of the module?	3.1	1.1	3.8	1.0	3.8	1.0	3.5	1.1	3.6	1.0



2. Expected Grade

Frequency Analysis

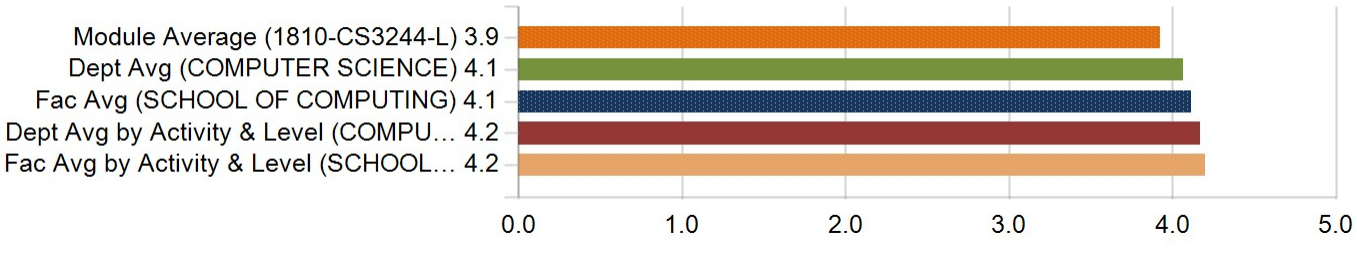
1. The grade that I am most likely to get in the module is:



Statistics	Value
Response Count	81
Mean	3.9
Standard Deviation	0.7

Normative Analysis

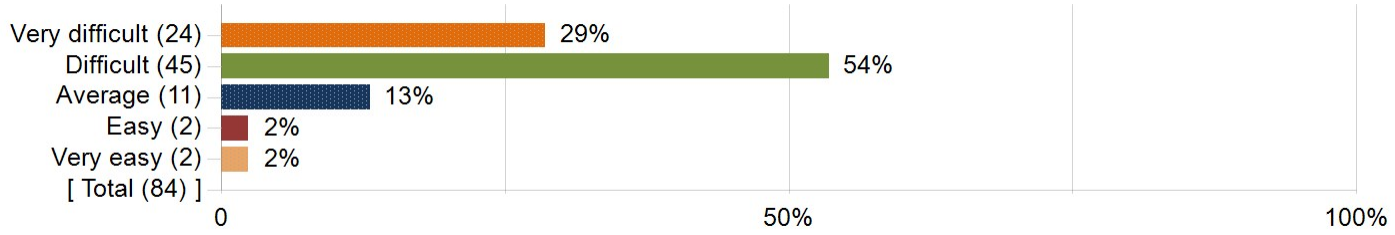
Question	Module Average (1810-CS3244-L)		Dept Avg (COMPUTER SCIENCE)		Fac Avg (SCHOOL OF COMPUTING)		Dept Avg by Activity & Level (COMPUTER SCIENCE-LECTURE (Level 3000))		Fac Avg by Activity & Level (SCHOOL OF COMPUTING-LECTURE (Level 3000))	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
The grade that I am most likely to get in the module is:	3.9	0.7	4.1	0.8	4.1	0.8	4.2	0.7	4.2	0.6



3. Difficulty Level of the module

Frequency Analysis

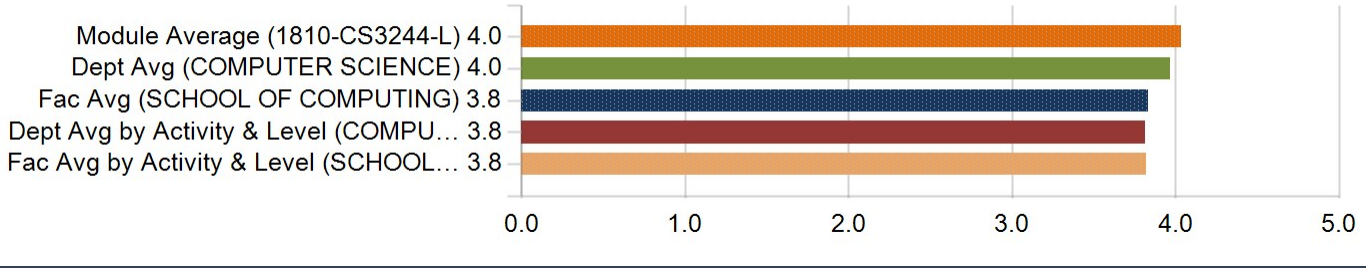
1. I rate this module as:



Statistics	Value
Response Count	84
Mean	4.0
Standard Deviation	0.9

Normative Analysis

Question	Module Average (1810-CS3244-L)		Dept Avg (COMPUTER SCIENCE)		Fac Avg (SCHOOL OF COMPUTING)		Dept Avg by Activity & Level (COMPUTER SCIENCE-LECTURE (Level 3000))		Fac Avg by Activity & Level (SCHOOL OF COMPUTING-LECTURE (Level 3000))	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
I rate this module as:	4.0	0.9	4.0	0.8	3.8	0.8	3.8	0.8	3.8	0.7



MODULE LEARNING OUTCOMES

1. Understand the basic concepts of machine learning.

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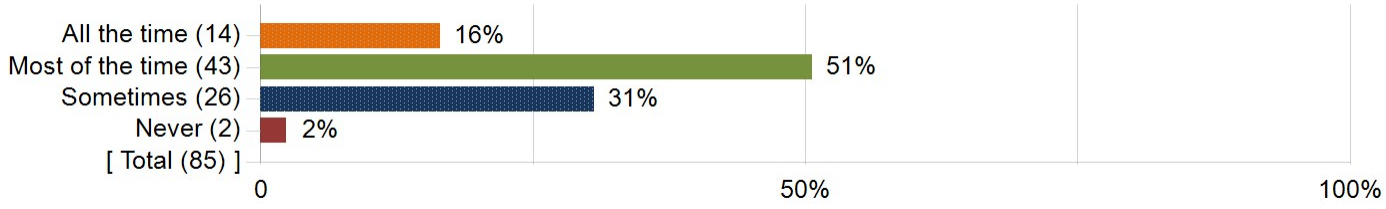
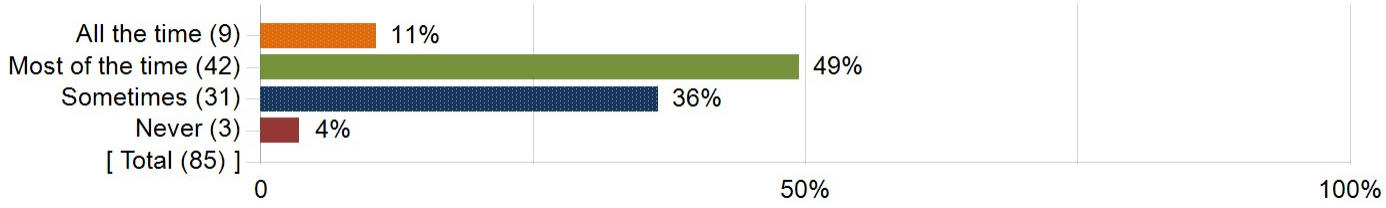


Statistics	Value
Response Count	85
Mean	2.8
Standard Deviation	0.7

2. Apply an appropriate machine learning algorithm for a given problem.

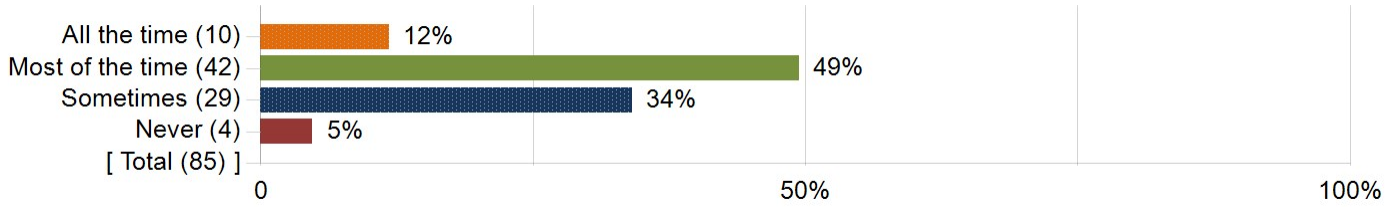
1. Apply an appropriate machine learning algorithm for a given problem.



Statistics	Value
Response Count	85
Mean	2.7
Standard Deviation	0.7

3. Evaluate the performance of a machine learning solution.

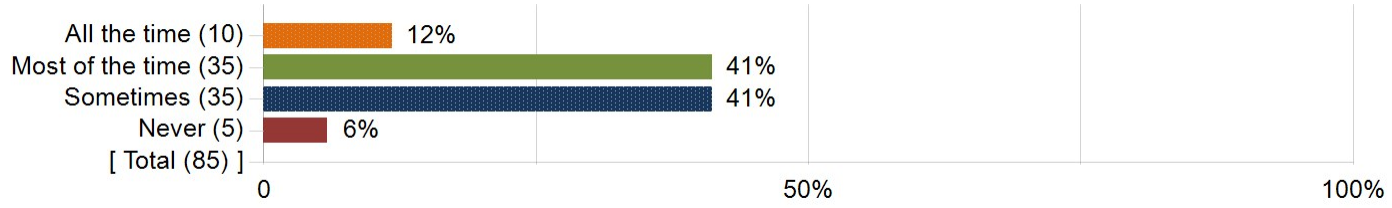
1. Evaluate the performance of a machine learning solution.



Statistics	Value
Response Count	85
Mean	2.7
Standard Deviation	0.7

4. Use a machine learning tool to carry out machine learning experiments.

1. Use a machine learning tool to carry out machine learning experiments.



Statistics	Value
Response Count	85
Mean	2.6
Standard Deviation	0.8

WHAT I LIKE / DISLIKE ABOUT THE MODULE

What I liked about the module:

Comments
NIL
It teaches student of no related experience a broad range of knowledge in machine learning, and it empowers student to explore more.
Interesting, cultivates interest in the field of AI and ML.
exposure to ml concepts
Prof covered different aspects of the module instead of just focusing on the algorithms.
Variety of machine learning concepts covered via preclass, inclass and postclass exercises.
In class coding project
Webcast lectures, good mix of application (notebooks, project) and theory, good breadth of machine learning concepts, use of notebooks help students to be on track with learning and can be used for studying reference, good medium to use to explain concepts, help students visualise and allow students to experiment
I really appreciate the time and effort that the teaching staff put into teaching module - all the videos, notebooks and in-class consultations.
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This module explores a wide variety of the machine learning concepts which are interesting and eye-opening.
The subject, you learn a lot about interesting things. I like having a lot of practice through notebooks
na
what we learn is very applicable to real world
I liked that the topics taught were very relevant and updated. I feel more confident in my skills as a data scientist after this module.
Interesting topic
Flipped classroom Practical application
Good mix of algorithms and learning theory Notebooks gives good overview of implementation of certain codes
Nil
The use of Google Colab.
–nil-
Covers a lot of ground and gives a good high level view of Machine Learning.
nil
Great coverage
It was a good module, I liked it's flipped classroom style and how helpful the TAs were! I think the content is relevant and I'm proud to have completed a project and learn different methods.
Interesting and comprehensive.
NIL
interesting
Nothing
Nothing
flipped classroom

What I did not like about the module:

Comments
NIL

Comments
The work is a bit trivial. The notebook is good, but learning is minimal due to the setting of the questions.
Lack of practice material i.e. tutorial questions that resemble midterm or final questions more
messy
The lack of tutorials made it hard to gain a deep understanding of the lecture material. I don't think there's anything wrong with the flipped classroom, but a lack of tutorials to enforce the learning made it hard to understand the material better. Moreover, the lecture theatre is not a conducive space for discussion of material - it is very noisy, the tables are small and cramped. The lecture material is ambitious - attempting to teach a wide breadth of material. However, there is a serious lack of depth in teaching. The notebooks were usually a little more than just translating mathematical equations into python code. Chunks of mathematical proofs were briefly discussed in the lecture and never touched upon again. The project portion of the module was unsatisfactory, to say the least. The initial project proposal required submission right after recess week, where we only had learnt basic techniques of ML. (PLA, Gradient Descent) This was most students' first foray into machine learning, and it would be unreasonable to expect them to be able to come up with a solid proposal that had reasonable timeline estimates, as well as correct predictions for ML techniques that could be used. For example, you were penalized if you did not know that your project required the use of techniques like GANs, Reinforcement learning, and that these would take a very long time (which was of course, subjective). Furthermore, actually doing the project and figuring out how it worked would essentially render the course material to be rather pointless, since you would already know the material from doing the project.
Pre and post class videos were very time consuming as I had to rewind repeatedly to understand the concepts. 4 minute videos could take me 30 minutes. The explanations given in the video were unclear and some questions in the notebook given after midterms were not covered in the notebook. Lack of examples given for some of the concepts e.g. adaboosting in the lecture slides. There were always small errors in the notebook, full solutions were not given for some questions. Solutions were usually released 2 weeks after submission.
I don't think this module did machine learning any justice. On the first day of this module, I was immediately disappointed by Prof Shannon introduction to machine learning. He attempted to hype up a field that is already filled with unreasonable amount of hype, and the overall atmosphere feels like a "Crypto-currency for the Future" conference. The focus of this module is also inconsistent. It seems like the content are watered-down to suit the taste of the majority (who come in for the HYPE), but at times, random dense mathematics are included without much motivation. This inconsistency can also be seen from the major assessment of this module. The midterms consist of questions that are nowhere rigor, and the project criteria (i.e. making a video and poster) makes this module feels like a communication module rather than a machine learning module. I think this is ridiculous. Machine learning is fundamentally a mathematical topic. I came in expecting to receive some rigor treatment to statistical learning, not to some introduction on how to use Python. I also felt that the final question for midterms is rather ridiculous. Giving 6 to 8 marks for an MCQ question is insane. It is usual for people to make calculation error for such question, and having them drop one grade because of such carelessness is plain unfair. Such questions, I believe, should be open-ended instead, so that partial marks can be given if careless mistakes are made. Should it be an MCQ question, the weightage should be lighter. Overall, I do not enjoy this module, and I hope the professors could bring back the old-style machine learning module that focus on actual mathematics and techniques instead of pure applications.
Mathematical proofs which does not seem very applicable in reality.
flipped lecture lack of mathematical rigor too many concepts packed in 13 weeks - everything was rushed
Flipped class is extremely inefficient for learning please change it as soon as possible.
Heavy project workload, multiple submissions (proposal, interim report, final report, poster, video, peer review, notebooks) Could do away with peer reviews, the peer reviews do little to enhance learning as students hardly pay much attention to the work of other groups when there are many other submisisons Another issue with regard to the peer review is that the peer reviews directly affect the grade of the reviewed group, this is not wise because students have a vested interest, and may manipulate the marks Mid-term MRQ questions should have been equally weighted, students are overly penalised if they answer a heavily weighted

Comments
question incorrectly
To be very honest, this flipped-class format really does not work out well in this module. Especially a CS module. I understand that the rationale behind it but in application, it does not work well. 3 sets of videos every week was too overwhelming for me, considering the workload of other modules. It's good that the comment section below the videos lets you ask questions that may arise from watching the video but the compendiums that reply them take too long to come out. By then, the questions I may have would be long forgotten, overshadowed by all the other pressing work due at hand. This makes it really really difficult to learn from feedback in this module. This applies to the notebook remarks and answers as well. It's understandable that the teaching staff have a lot to do as well, especially marking everyone's notebook. Since this is the case, the usual tutorial face-to-face format works well. Not only because of the reasons above but also that not everyone is quick to digest and code out the algorithms in class, on the spot. There's this constant push during in-class sessions to finish a section, and even if you couldn't the prof would just move on while your mind is still comprehending the previous section. I truly do not mind having the traditional recitations, tutorials, lab sessions and lecture. If that is really not possible, it would much better to incorporate the slides into the notebooks (the slides and notebooks are not in tandem most of the time, talking about and asking about different things).
The lack of manpower resulted in a lot of delays. Classes could have benefited from more tutors so that there is better coverage of students' questions. Might have been better to have smaller tutorial groups if manpower allows for it.
The module did not have physical lectures and the lectures were all held online. This made it very difficult for people who do not have machine learning knowledge beforehand to grasp the concepts fully. Furthermore, the content was delivered so quickly, every week a new topic. This module should not be meant for people outside of computing.
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One of the most poorly taught modules I have ever taken in NUS. Flipped classroom lecture videos are really hard to understand. I understand less than half of what the lecturer is teaching in every video, and I know many friends who face the same problem so I know I am not the only one.
NIL.
I did not like the form of the class at all. I do not like to study on videos, it is not convenient at all when you are looking for information ect... We did not have normal class, we just came to do the notebooks but it was a little bit useless, you could do it at home. Way too much notebooks to submit, a lot of work but it is only 5% of the grade. Too much work between the notebooks and the huge project.
na
just sitting and coding during lectures..not even help available..lecture hall too big for tutors to give enough attention to everyone
No proper answers/walkthroughs were given for the notebooks, so we don't know how to correctly do the questions that we got wrong.
however, the pace of the module is rather fast, and we will need to read up on the content before the lectures are taught so that we are able to implement the project in time, and the lecture slides have very few content thus it can be very hard to understand.
I felt that the some Pre-lectures/Pre-notebook is not linked well enough to the In-class work. I would like to have a way to be more prepared for the in-class lectures. Perhaps the lecture notes and collab notebook could be posted earlier so that the students can be more prepared for class.
Project could have been better scheduled, I understand that this is the first time for the STEPS participation, which pushes up the schedule by around 1 week. Would be better if teams or information about it is pushed earlier, so it is easier to meet up with and be able to sort working issues and finding a good schedule the team can work together on the project for, since half of the team will be unknown. I personally think that in terms of in class content and notebooks it makes more sense to go through the more difficult theory first, and have the application ones more for the in class and post class. Good knowledge of the theory will make it much easier when implementing and understanding how the algorithm performs on real applications.
Extremely poorly planned. It was a running joke in my circles that this module was planned by machine learning given how bizarre everything was. It seemed extremely lazy to plan a completely open-ended project assessment. The Kaggle projects tended to be deep and difficult, but there was not hardly enough breadth to justify a 6-people group. It was impossible to delegate the work, and many of my friends from different groups reflected the same kind of problems. One or two technically more proficient people would just end up doing everything. Videos and posters are full of fluff. Unlike business or artsy modules, technical ones like machine learning do not lend themselves well to such things, and many of us are convinced it was a pathetic attempt to populate STePS. To make it worse, a big part of it revolved around peer-reviews, which are once again, iffy, since the content knowledge we learn from the lectures are not enough for us to tackle these projects, let alone assess others. It was extremely lazy of the facilitator’s part to try to outsource much of their work to the students enrolled.

Comments
The entire course reeked of making-it-up-as-we-went-along, with the production quality and punctuality plunging hard after the first couple of weeks. The video resolution was 480p and the audio quality/volume levels were really awful. Misread lines are left in the video, with the lecturer just restarting from the misspoken line. I hardly need to elaborate on how bad that is for the flow and ease of comprehension of the video lectures. Given how much math there was, I'm not sure why they wanted to do a flipped classroom. Some tutorials with more practical math-solving would have helped a lot. The notebooks are so frequently late, causing the workload to snowball, and towards the end of the semester most students started winging the notebooks because there was simply no time to have watched the video content in detail when they were so often delayed. The reason given was that the enrolled population size was too big, but if the one LT can house us all for flipped classrooms, I'm not sure why a normal lecture cannot be given.
The module is ambivalent on whether it wants to be mathematically rigourous or generally approachable to the large cohort. If it was a mathematically rigourous module, like Stanford's CS229, I would have appreciated the mathematics. Many times I was introduced a mathematical concept or idea which is not immediately intuitive for me.
The module switches from high-level explanation to rigorous mathematics without much notice far too often. The project felt more like something from an arts module rather than something you would expect from machine learning. The midterms marks allocation was ridiculous; allocating so much marks to a single mcq question where a simple calculation error can throw you off feels like it depends more so on luck.
Guidelines and deadlines were very rushed, since not all the material was available early
Lack of familiarity with python was a barrier. Flipped classroom - not very good for learning. Impacts learning because I had to rewatch the videos a few times to understand fully what's going on. Mathematical notations all over the place. Can certainly be made neater and less confusing; for instance, be consistent with style of indexing, superscripting and subscripting (superscript to mean j-th sample, subscript to mean i-th component of sample, etc.) Sometimes the mathematics speaks for the algorithm? While I understand the mathematical aspects is not the main focus but I still feel that mathematics is important for understanding certain things. Project: difficult to portray creativity given that for most of us it is the first time we are learning about machine learning and those who are not familiar with python still have to struggle with the coding, data transfer, etc. Also it is difficult to comment on other methods given that we do not have much expertise on the subject. Style of lecture does not work very well since most of the groups are talking and I can hardly listen to the lecturer. Also if lecture videos are late the burden shouldnt be on the students to submit multiple notebooks in close proximity; some course materials should be taken out to help course get back on track. Too much material in close proximity impacts learning?
Flippped classroom, sparse lecture notes did not learn much from collab notebooks
The lack of tutorial classes by replacing them with Mass Tutorials during the lecture slot. Smaller class tutorials are much more effective for students to learn and keep up with the lecture content. The flipped lecture videos are very confusing, especially when comparing the same concepts and algorithms to the notebook. The explanation used and notation is vastly different. The explanation for several concepts in the lectures are also not properly explained, there are many gaps in the explanation and results which are not explained properly. Especially when talking about the posterior and prior, the notation used should not be the equal sign. This will confuse many people, when comparing the ratio and actual probabilities. You should use the \propto notation in LaTeX instead.
–project - too many notebooks
I understand the course is undergoing a lot of changes, and as such, a large amount of time has to be spent creating new material and planning how assessments will be done. That being said, the students are quite substantially affected by the late release of content, assignments and guidelines. I suppose this would improve in future iterations, but it would be great if more planning and material creation is done before the course even starts. Some of the project requirements are needless and time consuming, especially the peer review and interim report. The interim report does not overlap the final report significantly, and it was counter productive to have spent time working on it instead of our

Comments
code/final report. Peer reviews also took up time needlessly as well. Having a peer review for the proposal makes sense as everyone got an idea of other projects and how others viewed their project. Beyond that, the peer review was ineffective as many reviewers did not take the time to understand the project they are reviewing, making inaccurate and detrimental suggestions. Furthermore, groups realised that the peer review score contributed to the final score, and began marking down other groups with a lack of justification.
nil
Not enough coverage about the really important things like more state of the art models
Too much content in too little time. The workload is very heavy.
Flipped Classroom. Too many content in a week with too little practice. Hard to internalise concepts without practicing the math
A little ambitious (too many topics) and thus a little too shallow on some areas and a little too deep on others. Deadlines are rushed for everyone (students, staff). Project-wise most students struggle much with their own set project, perhaps a little more guidance might make this better. Still, good effort in making a change.
Concepts are too abstract and too little time were given to understand and practice
poor administration and poor teaching. imagine you have to look for MIT's lecture just to understand, because the lecturers cant teach.
The collaboratory has alot of bugs. Experimenting teaching style on students is not a good thing especially when our grades are on the line. Furthermore, since we are using our computer to code in class, please ensure that there are plugs in the LT as well. Sometimes even i come in with a full battery, due to my battery life being poor, i would need a power plug. You may say get a new computer, but due to my financial status i do not have the means as well. The lecture slides are not released on time and expect us to be flexible and stick to the delayed lectures while assuming we only take this module and no other module's deadline to follow as well. The delayed lecture not only affected our schedule but also affected my learning rate for this module as well. Blended learning like CS3230 with achipelego is still recommended. Why is the module trying to attract more students to enter? If the module is just trying to teach us how to do coding in machine learning, we can easily google and get the code. But the main point of this course is to understand the mathematics behind the codes. The vectors, gradient descent and the partial derivatives. But it is just a touch and go, surface explanation which is hard to relate to what we are doing us well. In general, this module has been a failure the moment there wasn't any tutorial to discuss the math behind the codes.
No tutorial Notes and slides not informative Useless in-class
Lateness of materials: it feels like I'm living on the edge. Can we have more examples to explain the concepts?