PGT Exam Performance Feedback
Semester 1

Comments:

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Q1: generally good performance, with 5 out of the 11 students attempting this question getting full marks.

Q2: 16 attempts, with a couple of common omissions:
- mention of effect of data traffic on ARM vs Thumb performance
- the need for a system model to provide a timing basis for profiling
- discussion of trade-offs in the last part once performance targets have been met - e.g. can use Thumb to get more routines on chip.

Q3: 14 attempts, 5 achieved full marks. Generally good answers with good discrimination of the best answers. As it happens, questions had been asked about exactly this area during revision, and answered via Moodle. This seemed to help most candidates as the answers were very much on target.

Q4: 5 attempts, generally good answers.

Q5: 5 attempts, reasonable answers. It is hard to get very good marks (>16) on this material as the answers are somewhat discursive.

Overall the COMP60041 exam marks were very good again this year, showing that the on-line delivery is working well: the exam questions are similar to those used when the course deliver was face-to-face, and the marks are generally higher.
Generic Comments for students and external examiners.

Students attempted a range of exam question with a slight preference for Q1, as expected. This year we had focused a generic assignment on the topic relating to Q1 (visualization critic). Most questions were answered reasonably well. This year also all past exam papers were printed and handed to the students at the beginning of the course.

Comments:
- Students should be informed repeatedly to read and reread the rubric – a few answered more than three questions and some did not answer all parts of the questions. This seriously reduces the final overall total of awarded marks.
- One student wrote in pencil for most of the examination – students should be reminded to carry more than one pen.
- General concern was an obvious lack of revision in a few candidates when it came to key points. Attempts to generalise and not clearly mention the main points requested reduced the scoring. This was noticeable on Q2 and Q4.
- Q5 (Compositing) was answered very well by those who attempted the question. There were some issues of clarity when creating diagrams, remember when showing the flow of time.
- Q3 (Reference Model) is one of the most important questions in the science of visualization and the answers should have been far more concise. Also candidates should remember to reread the questions after they have answered.
- Quality of English was a concern and candidates should be reminded if their English is poor not to try and write very complex prose. Recommend if English is poor and/or time is limited that carefully chosen ‘bullet point’ notes are used.
- A reminder that answers should be at the Masters level and include insight and research analysis components that are appropriate. This should be at the next level above an undergraduate answer.

There was one error on the script – Q4(a) stated “Scatter plot” which should have been “Scatter plot Matrix”. Only one person did not answer it as a “Matrix” as this was implicit in the other parts of the question; but was not penalised for this as a correct answer.
A model solution would be

\[
\text{fib}(0,0), \\
\text{fib}(1,1), \\
\text{fib}(N,F) : \text{N} \geq 2, \text{N1 is N-1, fib(N1,F1), N2 is N - 2, fib(N2,F2), F is F1 + F2}.
\]

Nearly everybody missed \( N \geq 2 \).

Several solutions used a wrong order of atoms in the body, e.g.

\[
\text{fib}(N,F) : \text{fib}(N1,F1) ...
\]

This would only result in an infinite cycle with no answer.

Finally, there were several answers that looked like a functional language, not Prolog. For example,

\[
\text{fib}(N,F) : \text{fib}(N-1) + \text{fib}(N-2)
\]

In addition to answers that are simply incorrect there were answers with the correct result but no use of the unification algorithm from the lectures.

No correct solutions

A few errors, especially in apply the CNF rule for equivalence.

In some answers query \( b(1) \) returned a substitution for \( X \), while \( X \) does not occur in the query at all.

General mistakes, but not frequent:
- failing to answer a part of a question, probably due to not reading questions carefully enough.

Q3:
- generally answered well, imprecise formulations and explanation common reason for losing marks
- generally answered very well, common mistakes: wrong direction of implication in definitions, bracketing not clear

Q4:
- bookwork, answers poor, common mistake: wrong statements, not explaining use in resolution theorem proving
- either answered very well and very poorly, common mistake in those cases: not knowing/applying the definitions of orderings
- generally answered well common mistake: not indicating both selected and maximal literals in clauses, selecting more than one literal in clauses, incorrect unification
Question 1

a) answers generally good common mistake: to stop expanding an open branch when applications of the theory rule are still possible

b) answers generally good, but some students had difficulties *explaining* their answers, both whether a formula was satisfiable or valid (mostly because they hadn't understood the meaning of these properties) and whether a statement was true or false (mostly because they hadn't understood the statement)

Question 2

a) i) answers generally correct; occasional mistake: not to label nodes with concept names
ii) common mistake: to overlook that individuals without R successors also belong to the interpretation of  all R.B

b) bookwork, answers generally ok to very good

c) i) posed no problem
ii) answers generally very good; occasional mark deductions for missing justifications and skipped steps
iii) answers generally very good; occasional mark deductions for insufficient explanation or no counter example.

Question 3

Most parts were answered well, especially the entity-relationship question (some people didn’t know DL syntax or how to use inverse roles, but most were fine), the LCS, the MSC, and the temporal one. The default question was answered by only few students, and it contains a confusion: none of the defaults is applicable to the TBox, and thus it is correct to answer "none of these assertions is consistent with the default knowledge base" and this answer gives full marks. One or two students spotted the confusion and wrote "ah, in the defaults, you meant to write b instead of a, and then the answer would be..." which is a laudable answer, but not required to get full marks.
Q1
A popular question. The two main areas where marks were lost were with the use of anticipation to create a 'thinking character' and the separation of the rendering and modeling domain in RenderMan.

Most knew that anticipation was used to show the audience what action was coming next. However the question wanted to know how the character is animated to show it is thinking. A description of how the eyes and then then head are moved before the main body action to show the character is thinking about something - an object that has captured its attention for example.

The question about RenderMan modeling and rendering domains was concerned with a scene description language. Many assumed it was a matter of separating a team of people in to modelers/animators before passing on to the rendering team. The correct answer was to comment on how rendering technology generally advances quicker than modeling techniques and any new modeling techniques usually allow an object to be represented using existing low level primitives. Hence new shader developments, faster renderers etc can be used with no (or minimal) changes to the modeling software used to generate an RenderMan RIB file, for example.

Q2
Another popular question which was generally well answered. There were a few woolly description of Euler Angles with very few describing the independent rotation around the three principal axes. Most knew the formula for rotating a point by a quaternion but failed to described the terms of the formula correctly, namely q-1 being the inverse of q and the point P being converted to a pure quaternion [0,P]. The final part asking why it is sometimes desirable to interpolate from q1 to -q2 rather than q2 was often answered imprecisely. The answers often referred to a shorted path from q1 to -q2 but it should be stated this is a shorter path in quaternion space and this results in less 'twisting' or rotation of the object. The shorter path could be determined using the quaternion dot product to measure the angle between q1 and q2.

Q3
The most popular question. Again, generally well answered. The descriptions of why hierarchical modeling is used often missed the points that objects only need to be positioned relative to their parent, making construction easier and that moving a parent object moves all of its child objects, reducing the workload on the animator.

The tree traversal algorithm was perhaps a difficult question but most knew the basic properties (depth first, stack needed for backtracking of matrices). A few details about which matrices are used and the fact they are multiplied together were often missing.

The IK algorithm answers often missed the fact that the Jacobian needs to be calculated every timestep and that the joint angle velocities should be multiplied by the timestep. The Jacobian relates joint angle velocities to end-effector velocities.

Q4
Nobody attempted this question!

Q5
Only a few attempted this question and it seemed that time may have run out for some. The additional information needed by a rigid body simulator over a particle system was concerned with distribution of mass in an object and angular components. The update cycle could have been described using the diagram at the start of the dynamics lecture notes with some mention of the accuracy of the integration scheme used (Euler, for example). To give some control back to the animator, a simulator could plot keyframes for an object at each frame and then use the motion warping technique (described in the motion capture lecture) to assist the animator in editing these dense motion graphs.
Question 1, part (f)

Many students missed the fact that the update-intensive nature of the workload is a likely cause for the disagreement. Type 0 appliances target OLAP, not OLTP, queries. OLAP queries tend to run over read-only data warehouses.

Question 1, parts (g) and (h)

Marks were lost because of a failure to base the answer on the abstract operations on distributed hash tables (i.e., lookup, insert and delete). Too many students failed to focus and ended up giving vague answers that didn’t command many marks.

Question 1, part (i)

Some students mixed the issue with that of choosing a join order, which is a completely different matter. Most, however, understood the question well. Too many among these failed to remember the notation for describing a distributed evaluation program, and some also ignored the fact that the cardinalities were given in order and therefore a unique program could be determined.

Question 2, part (b)

There was a widespread failure to recall that by asymmetry here what is meant is that different concrete join algorithms can be used in responding to tuple arrivals in different operands. Various other guesses as to what asymmetry meant were made, but only the above counted.

Question 2, part (c)

Too many students simply did not remember the sequence in which the match, insertion and deletion are performed. Some also forgot to state the result of the match phase. Yet others confused the timestamp with the value and assumed that the timestamp is part of the match, which is wrong.

Question 2, part (h)

Some students mistook an aggregation tree for the semantic routing trees used in TinyDB.

Question 1: taken by 68 students, and the average mark is 61.5%;
Question 2: taken by 67 students, and the average mark is 68.9%;
Question 3: taken by 63 students, and the average mark is 64.6%;
Question 4: taken by 31 students, and the average mark is 51.3%;
Question 5: taken by 7 students, and the average mark is 13.5%.

Overall speaking, the first 4 questions are set at the right level, and the 5th one is a bit too hard, unfortunately.
Q1: Question 1 was taken by almost every student, and in general performance was good. However, a critical point in the text passage, missed by most students, was that the perceptron performance cannot be predicted directly from the learning rate.

Q2: A common mistake on 2(c) was to think that the difference between filters and wrappers was to do with the search strategy - forward vs backward selection. In fact the difference is that a filter strategy is based on statistics, independent of any model, and a wrapper is model-specific.

Q3: Very few students selected Q3, perhaps because they were unclear about what generative and discriminative classifiers are. In some cases students confused a generative (i.e. model-based) classifier with probabilistic models in general. A probabilistic generative classifier is where one fits a probabilistic model (e.g. a Gaussian, mixture model or a HMM) to each class of data and then uses Bayes' rule to predict the probability of being in a particular class for some new data. A Gaussian mixture model is not a classifier, it is a probabilistic model used for unsupervised learning. The labels of the data are not known when fitting a mixture model - they have to be inferred e.g. as in the E-step of the EM-algorithm. In classification the labels of the training data are used to fit the model.

Q4: This question was answered very well by most students who selected it. However, a lot of students did not get the last part right. The answer was that prior knowledge can be used to develop a pseudo-count prior for estimating the transition probabilities, using the old transition probabilities as the prior when estimating the new transition probabilities. Some student were confused and mentioned the EM-algorithm which is not relevant for Markov chains, only for HMMs.
All students except one attempted questions in three sections. Their marks are roughly distributed in three intervals: i.e., six above 70%, two in the interval between 50% and 60% and three below 40%. The averaging mark of this module is 62.5% with a standard deviation 22.8%. The highest mark is 87% while the lowest one is 29%. For short questions in Sect. A, most students have a good understanding of basic concepts and book knowledge underlying Java and general object - oriented programming in general. A common problem is that a number of students do not understand the difference between statement and expression in Java so they failed to present their answer to question A.6 properly. In addition, several students do not fully understand the inheritance of classes so that they did not give the correct answer to question A.9. For essential questions in Sect. B, nearly all performed well on questions B1, B3, and B5 but a quite number of students performed inadequately on question B2 and B4. For B2 and B4, it is evident that some students do not know how to design Java classes from a simple real problem and the implementation of a simple class. From the performance, it appears that students perform well in using existing classes but poorly in designing and implementing a class from scratch.

For comprehensive questions in Sect. C, all students chose C1. Most of students generally managed to answer questions well where the book knowledge can be applied relatively straightforward, but performed poorly for questions that require some critical analysis and comprehensive knowledge in problem solving.

In summary, the overall result looks quite reasonable and accurately reflects what students actually achieved from this course unit. In particular, the distribution of examination marks is consistent with that of coursework assessment.

Q1. The answers are good overall. The only mistake made by some is saying user requirements are requirements that are written in natural languages for users.

Q2. Generally good answers again. The main mistake is not saying what the results of the software engineer’s work are for the example.

Q3 Most students opted for this question. Part (a) turned to be difficult, as many students struggled to provide reasonable examples to illustrate redundancy in the given relation. Furthermore, the anomalies related to these repetitions were not focused - some students were discussing the primary key rather than illustrating the problems. Most marks were gained in part (b) - there were no major issues, apart from getting the ‘contains’ relation right (missing ‘quantity’ or FK to Order). Still, the average mark for this question was in high 60%.

Q4 This question was selected by almost all students. Unfortunately, there were a number of problems with part (a) - which was a bookwork question. Many students failed to describe what a database transaction was. Most marks were again gained on the practical part of the question, i.e. part (b). The main issue here was getting the 'group by' operator to work and defining an SQL view (a bookwork-like question). Overall, the average was under 60%.

Q5 This question was not a popular one, taken by only 3 students, but who all did it reasonably well (average of 62%). In part (a), the main problem was with the justification of the selected approach, while there were also examples of wrong design decisions. In part (b), again surprisingly, the main issues were in defining what the referential integrity was - most of marks were lost there. While defining a class and the first OQL query were mostly ok, there were problems with the second and third queries, mainly because the students did not use required OQL constructs ('count' and 'for all' respectively).