

Lab 1 Report

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- a) There are limited rounds of proposals which causes unstable pairs which could be broken in the subsequent rounds and not all people are guaranteed a spot in just 3 rounds. This is the fatal flaw
- b) We should make the running or proposal rounds unlimited until everyone has a marriage which will be stable
- c) This is as even though some students might have the same gpa they are definitely going to be living at different distance away from the professor which provides us a way to uniquely set them apart. This means that in the preference no two people will occupy the same spot thus giving us total ordering
- d) The unlimited proposal rounds means that no spot is reserved for ever and the offer can be redacted at anytime a better candidate comes forth which basically eliminates the cheating aspect that lower academic students could have used.
- e) Each student and professor will have a preference list. The student will propose first with proposing to highest preference professor first and if the professor is free the student is taken. The professors preference list is highest gpa and in case of a tie the student who lives closer wins. When in turns when a student proposes to a professor who has already added a student we check which student the professor prefers. Whoever is more preferable is picked and the other student goes back to the pool waiting to propose next.
- f) First we can tell that the result produced will be the best as each student will have the chance to propose to every professor and all consideration are taken into place and whoever the professors like more is kept for the job. This means that every professor is satisfied with the candidate they have which means the result are satisfied as the candidates satisfaction was already taken into account while proposing. This means that the result is correct.. But this also means that in the next round of proposals either none will be selected if there are more students than jobs or there will be no free students left. This means that the algorithm will stop
- g) The big O complexity of the gale sapley algorithm is n^2 as the max time each person can attempt to propose professors is n and there are n students.
- h) The big) complexity of the brute force has to be order of $n!$ this is as there are n items the first element can take, $n-1$ for next one and so on. When all is taken into account $n!$ unstable pairs will be made and then we would need to check for the stability of it.