Specialist English: Assignment 10 (solutions)

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Here's my solutions; your solutions needn't be identical.

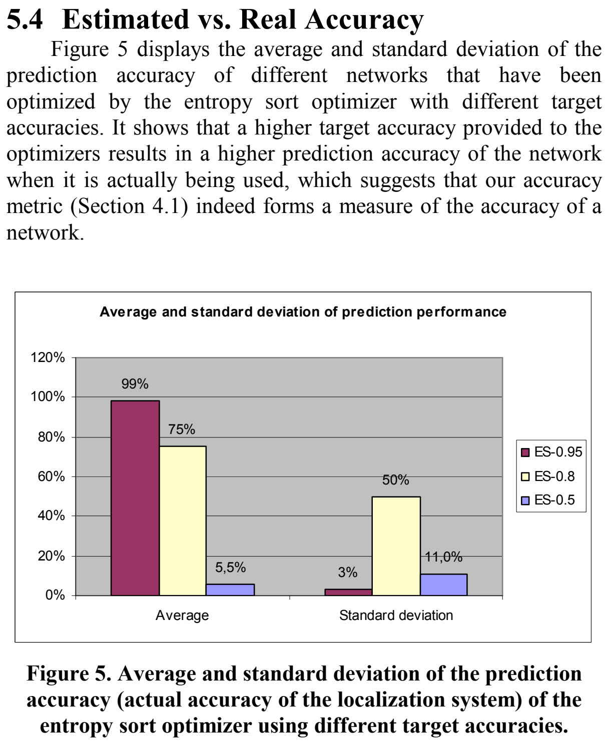
Problem 1 *Looking at Section 4 (entitled Experiment) in the paper Wang et al., Regularity and Conformity: Location Prediction Using Heterogeneous Mobility Data, KDD, 2015 (which we looked at in Assignment 7), identify one example of where the authors describe (a) a decision they make, (b) the experimental setup, (c) the baselines, (d) an experimental observation, and (e) some deduction they make from an observation.*

There was a lot to choose from (and many items could answer several parts of this question). Here's some examples:

- *A decision*: The authors decide to use "Acc@topP" and average percentile rank (APR) to measure prediction accuracy, which are described in Section 4.1.2.
- *Experimental setup*: The authors use three real-world datasets: a check-in dataset, a bus dataset, and a taxi dataset, which are specified in Section 4.1.1.
- *Baselines*: The four baselines are MF, PMM, W^3, and CEPR, which are described in Section 4.1.3.
- *An experimental observation*: When describing Fig. 5(b), the authors observe "the Acc@top10 of the C_{static} model is 0.06 higher than the R model ...".
- *A deduction*: The above experimental observation leads to the deduction "... demonstrating that more check-ins are driven by conformity than regularity in our dataset."

Problem 2 *Write a paragraph critiquing the following section by Jevring et al. (2008). This paper is available via the third author's webpage* `https://www.hesselman.net/`.

Figure 5 by Jevring et al. (2008) plots the "prediction performance" of "entropy sort" with varying "target accuracies". The main text states that the figure contains the "average and standard deviation", but this is not necessary as it is apparent from the figure. The main text also says "prediction accuracy" whereas the figure says "prediction performance", which is inconsistent. It is unusual to separately plot the average and standard deviation of a single measurement: if we want to display the data in columns, this data would be better presented in a box plot (showing the average, and plus and minus one standard deviation). Alternatively, with so few data points, we could use a table to present this data. Better yet, the authors could extend the experiments to obtain more data points. The title "Average and standard deviation of prediction performance" is not only clunky, but can easily be replaced by the succinct "Prediction accuracy". The caption repeats the title of the plot, which is unnecessary. Moreover, the authors use the term "different" to mean "various", both in the main text and in the caption. Thus, the caption would be better rewritten "Actual accuracy of the localization system as the target accuracy varies."



5.4 Estimated vs. Real Accuracy

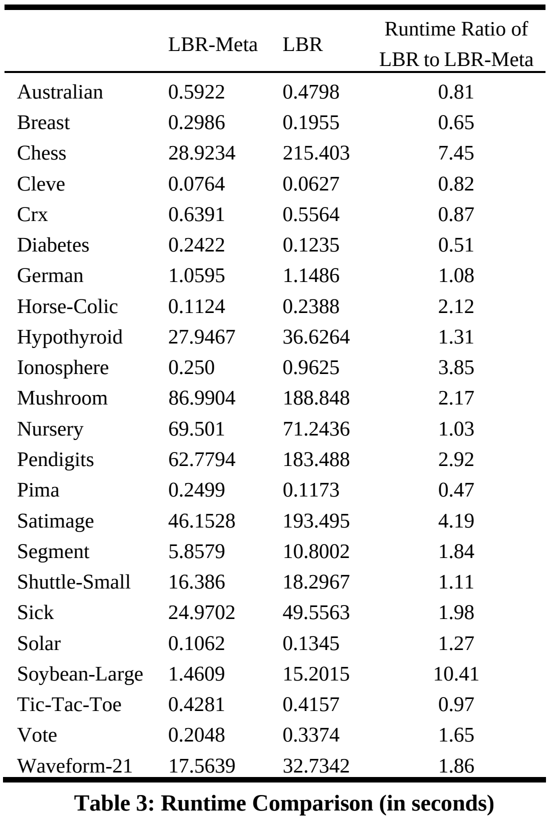
Figure 5 displays the average and standard deviation of the prediction accuracy of different networks that have been optimized by the entropy sort optimizer with different target accuracies. It shows that a higher target accuracy provided to the optimizers results in a higher prediction accuracy of the network when it is actually being used, which suggests that our accuracy metric (Section 4.1) indeed forms a measure of the accuracy of a network.

Figure 5. Average and standard deviation of the prediction accuracy (actual accuracy of the localization system) of the entropy sort optimizer using different target accuracies.

— Jevring et al., *Dynamic Optimization of Bluetooth Networks for Indoor Localization*, CSTST, 2008.

Problem 3 *Identify how we can improve the presentation the following table.*

The most important way to improve the presentation in the following table is to use appropriate rounding. It is not meaningful to measure run times to four decimal places (i.e., thousandths of a second).



	LBR-Meta	LBR	Runtime Ratio of LBR to LBR-Meta
Australian	0.5922	0.4798	0.81
Breast	0.2986	0.1955	0.65
Chess	28.9234	215.403	7.45
Cleve	0.0764	0.0627	0.82
Crx	0.6391	0.5564	0.87
Diabetes	0.2422	0.1235	0.51
German	1.0595	1.1486	1.08
Horse-Colic	0.1124	0.2388	2.12
Hypothyroid	27.9467	36.6264	1.31
Ionosphere	0.250	0.9625	3.85
Mushroom	86.9904	188.848	2.17
Nursery	69.501	71.2436	1.03
Pendigits	62.7794	183.488	2.92
Pima	0.2499	0.1173	0.47
Satimage	46.1528	193.495	4.19
Segment	5.8579	10.8002	1.84
Shuttle-Small	16.386	18.2967	1.11
Sick	24.9702	49.5563	1.98
Solar	0.1062	0.1345	1.27
Soybean-Large	1.4609	15.2015	10.41
Tic-Tac-Toe	0.4281	0.4157	0.97
Vote	0.2048	0.3374	1.65
Waveform-21	17.5639	32.7342	1.86

Table 3: Runtime Comparison (in seconds)

— Xie, *LBR-Meta: An Efficient Algorithm for Lazy Bayesian Rules*, AusDM, 2008.

Problem 4 *Identify something suspicious about the following table.*

The unit of measurement for the entry "7211199226.13" is seconds. This equates to around 228 years, implying the experiments began before computers were invented.

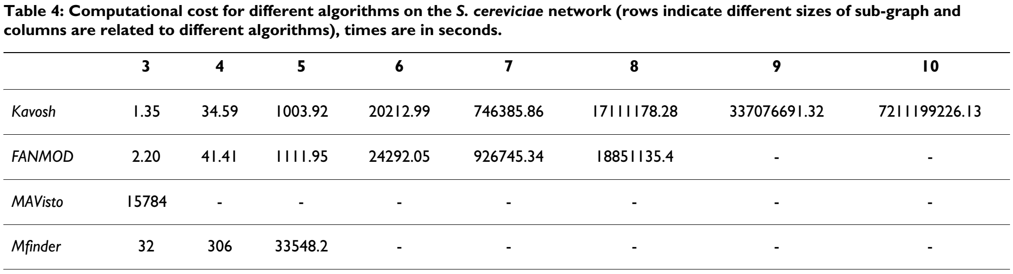


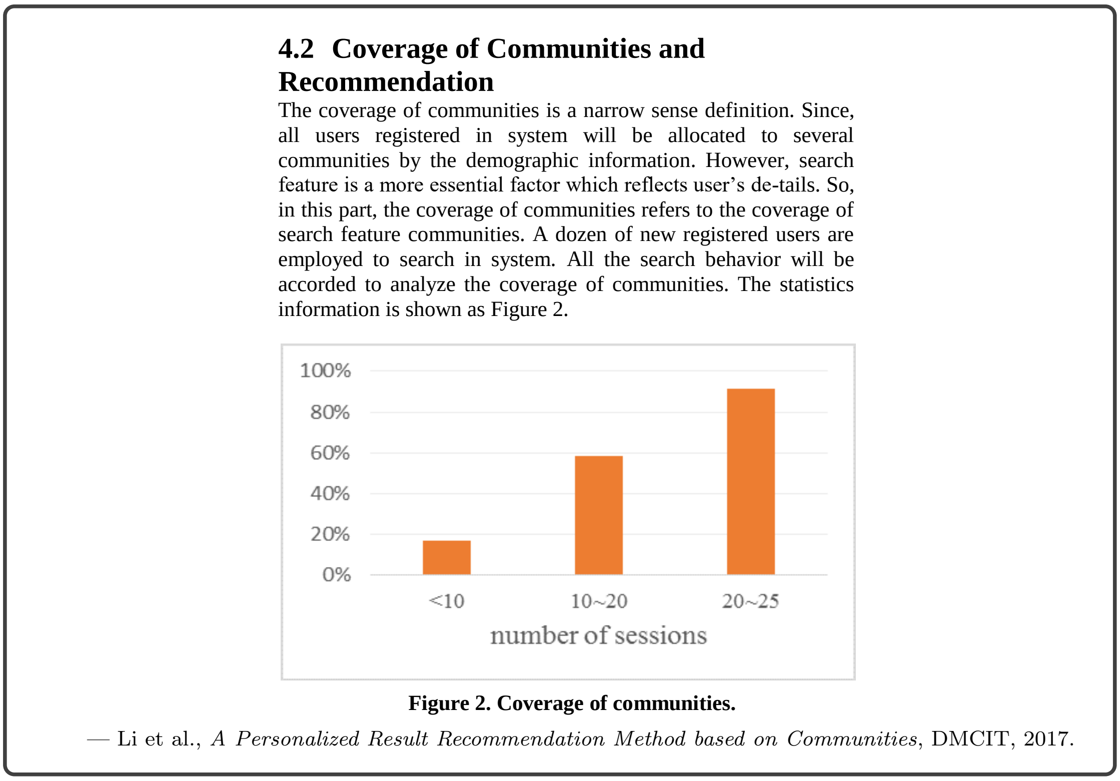
Table 4: Computational cost for different algorithms on the *S. cereviciae* network (rows indicate different sizes of sub-graph and columns are related to different algorithms), times are in seconds.

	3	4	5	6	7	8	9	10
Kavosh	1.35	34.59	1003.92	20212.99	746385.86	17111178.28	337076691.32	7211199226.13
FANMOD	2.20	41.41	1111.95	24292.05	926745.34	18851135.4	-	-
MAVisto	15784	-	-	-	-	-	-	-
Mfinder	32	306	33548.2	-	-	-	-	-

— Kashani et al., *Kavosh: a new algorithm for finding network motifs*, BMC Bioinformatics, 2009.

Problem ~~4~~ 5 *How many data points does Figure 2 in Li et al. (2017) below contain? Based on this, suggest a better way to present this data.*

Figure 2 by Li et al. (2017) contains 3 data points. A table would suffice to present this data, and moreover a table has the benefit of giving the numbers precisely.



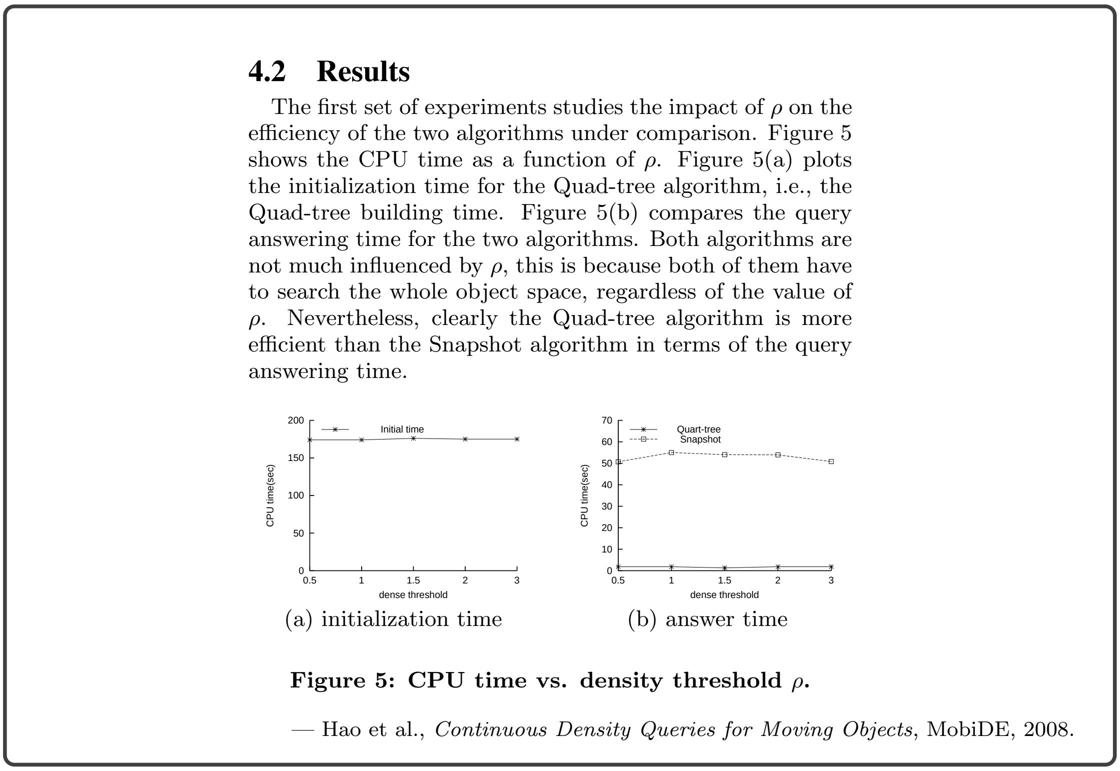
4.2 Coverage of Communities and Recommendation

The coverage of communities is a narrow sense definition. Since, all users registered in system will be allocated to several communities by the demographic information. However, search feature is a more essential factor which reflects user's de-tails. So, in this part, the coverage of communities refers to the coverage of search feature communities. A dozen of new registered users are employed to search in system. All the search behavior will be accorded to analyze the coverage of communities. The statistics information is shown as Figure 2.

Figure 2. Coverage of communities.

— Li et al., *A Personalized Result Recommendation Method based on Communities*, DMCIT, 2017.

Problem ~~5~~ 6 *Identify four (or more) ways to improve the following snippet from Hao et al. (2008).*



4.2 Results

The first set of experiments studies the impact of ρ on the efficiency of the two algorithms under comparison. Figure 5 shows the CPU time as a function of ρ. Figure 5(a) plots the initialization time for the Quad-tree algorithm, i.e., the Quad-tree building time. Figure 5(b) compares the query answering time for the two algorithms. Both algorithms are not much influenced by ρ, this is because both of them have to search the whole object space, regardless of the value of ρ. Nevertheless, clearly the Quad-tree algorithm is more efficient than the Snapshot algorithm in terms of the query answering time.

(a) initialization time

(b) answer time

Figure 5: CPU time vs. density threshold ρ.

— Hao et al., *Continuous Density Queries for Moving Objects*, MobiDE, 2008.

There's a lot of ways to improve this snippet. These are what I consider most important:

- The font in the figure is too small compared to the main text; it's hard to read.
- Figure 5(a) only applies to Quad-tree, which should be indicated in the figure, perhaps in the caption for Figure 5(a).
- Given that the experiments only take a few minutes, why not increase the number of data points? More data points imply more reliable experiments.
- The authors inconsistently write both "dense threshold" and "density threshold". In fact, "dense threshold" means "a threshold which is dense", which is likely an incorrect meaning.
- The authors inconsistently both "initial time" and "initialization time". In this case, "initial time" probably has the wrong meaning.
- The spacing in "CPU time(sec)" is wrong; correct is "CPU time (sec)".
- "Quad-tree" is misspelled "Quart-tree" in Figure 5(b).
- In the main text, writing "the density threshold ρ" instead of just "ρ" serves as a reminder as to what ρ denotes.