PeerGrader simulator

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***Abstract*—In this homework we try to evaluate the accuracy evaluation process after a given number of homeworks.**

I. Assumptions

- Quality of students - X_s, uniformly distributed between 0 and 1
- Quality of homework - Q_{hs}, h of student s
- Evaluation - E^k_{hs}, k for homework h of student s
- Grade - (estimated quality) of homework h of student s

$$\hat{Q_{hs}} = \frac{1}{K}\sum_{k=1}^{K} E^k_{hs}$$

- Grades and evaluations $\epsilon[0,1]$

II. Input Parameters

- S - number of students
- H - number of homeworks delivered
- K - number of evaluators
- Variance for Q_{hs}
- Variance for E^k_{hs}

III. Output parameters

- Average Relative Grading Error (homework-by-homework)

$$\varepsilon 1 = \frac{1}{HS}\sum_{h}\sum_{s}\frac{|\hat{Q_{hs}} - Q_{hs}|}{Q_{hs}}$$

- Average Relative Grading Error (final grade)

$$\varepsilon 2 = \frac{1}{S}\sum_{s}\frac{\sum_h |\hat{Q_{hs}} - Q_{hs}|}{\sum_h Q_{hs}}$$

IV. Development of Simulation

- We enter input parameters. In my particular case, I kept all the parameters steady and just changed the number of evaluators.
- Calculation of quality of each student which is uniformly distributed between 0 and 1 and it is one dimensional matrix.
- Calculation of quality of particular homework of particular student, distributed between 0 and 1 and it is two dimensional matrix.
- Calculation of evaluation of particular evaluator for particular homework of particular student, distributed between 0 and 1 and it is three dimensional matrix.
- Calculation of estimated quality of particular homework for particular student by taking average of evaluations.
- Calculation of Average Relative Grading Error (homework-by-homework).
- Calculation of Average Relative Grading Error (final grade).

V. Results

As I mentioned already, I kept input parameters steady, for instance, given number of students and delivered homeworks considered 20 throughout simulation and the number of evaluators entered as (4,5,6,7,8,9,10) for understanding how it can affect simulation accuracy. Below figures show the results.

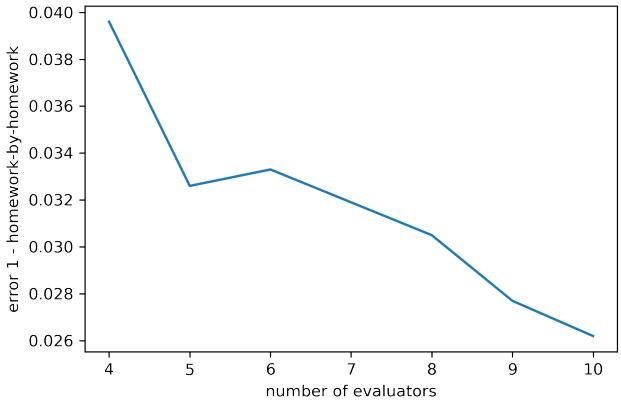

Fig. 1: The change in the Average Relative Grading Error (homework-by-homework), so-called error1, with respect to number of evaluators.

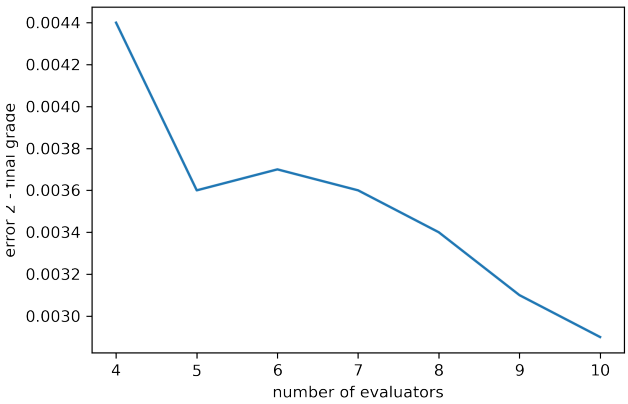

Fig. 2: The change in the Average Relative Grading Error (final grade), so-called error2, with respect to number of evaluators.

VI. Conclusion

From the results we understand that increasing the number of evaluators in general decreases both error rate, so increase accuracy of the simulation.