Computer aided simulations and performance evaluation

Lab 2 - Peer Grading System Simulator

Gabriele Cuni 277957

2.1 Assumptions

The evaluation interval is an internal state and it is between zero and one.

$X_s \sim Uniform(0,1)$ $\forall s \in S$	The quality of the student s is called X_s and it is uniformly distributed between zero and one. This value is the real student quality and it is the ground truth.
$V_{s,h} \sim Truncnorm(X_s, \sigma_1, 0, 1)$ $\forall s \in S; \forall h \in H$	The homework h of the student s has a real value $V_{s,h}$ that is a random variable. $V_{s,h}$ has a truncated normal distribution between zero and one, mean equal to X_s and standard deviation equal to σ_1
$M_{s,h,e} \sim Truncnorm(V_{s,h}, \sigma_2, 0, 1)$ $\forall s \in S; s \neq e$ $\forall h \in H$	$M_{s,h,e}$ is the mark given by a student s to a homework h of value $V_{s,h}$. M is a random variable truncated normally distributed between zero and one, mean equal to $V_{s,h}$ and standard deviation equal to σ_2
$\hat{v}_{s,h} = \frac{1}{E} \cdot \sum_{e \in E} m_{s,h,e}$ $\forall s \in S; s \neq e$ $\forall h \in H$ $m_{s,h,e}$ are realizations of $M_{s,h,e}$	$\hat{v}_{s,h}$ is the estimator of the value of the homework h of the student s. Given that any student doesn't evaluate itself.

2.2 Input parameters

- S: number of students
- E: number of evaluation each homework will receive
- H: number of homework each student will make every simulation runs
- σ_1: the quality variance that affects any homework submitted by any student.
- σ_2: the evaluation variance that affects any evaluation given by any student.

2.3 Output parameter

$$average\ relative\ error\ = \frac{1}{S} \cdot \sum_{s \in S} \cdot \frac{1}{H} \sum_{h \in H} \left| \frac{\hat{v}_{s,h} - X_s}{X_s} \right|$$