

Estimation Quiz

Goal

You are asked to estimate a number of quantities, x_1, \dots, x_k . For instance, a quantity could be *the shortest distance to the moon from the Earth in kilometers*. For every quantity, x_i , you guess an interval $[l_i, u_i]$ that should contain x_i . Upon guessing, you only learn whether the interval contains x_i or not. Your guesses will give you a score S and the objective of the game is to minimise S .

Scoring

The score S is computed as follows.

- For every correct interval, i.e., where $l_i \leq x_i \leq u_i$, the rounded down fraction $\left\lfloor \frac{u_i}{l_i} \right\rfloor$ is computed.
- The rounded fractions are summed and 10 is added to the score.
- Then, for every quantity where a correct interval has not been guessed, the score is multiplied by 2. For example, if there are 3 quantities that you have not guessed a correct interval for, the score S is multiplied by 8.

Thus, it is good to have tight intervals (making $\left\lfloor \frac{u_i}{l_i} \right\rfloor$ as small as possible). However, it is also important to guess correctly, since multiplying S by 2 is costly. Mathematically, we can express the score as

$$S = \left(10 + \sum_{i: x_i \in [l_i, u_i]} \left\lfloor \frac{u_i}{l_i} \right\rfloor \right) \cdot 2^{|\{i | x_i \notin [l_i, u_i]\}|}$$

Guessing

For every quantity, submit an interval of positive integers as a lower and upper bound $l_i < u_i$. There is a maximum number of guesses, so guess carefully. For every quantity, it is the latest guess that counts towards the score, regardless of whether a previous guess was better.