Day 2: Interval Cover Lab – Non-Coding Solutions

Part B: Who Gets Watered First?

Question 1. Did your algorithm treat every garden the same? Or, should we be treating every garden the same, even though there are more or fewer resources?

Sample answer:
The algorithm only looks at intervals and their endpoints, not at who owns each garden or what they need. It treats all garden plots as equal pieces of land on the line, as long as they are inside some chosen interval. In that sense, it ignores differences like crop type, income, or past access to water. Whether we *should* treat every garden the same is a value choice: equal treatment may sound fair, but it can also ignore that some farmers have fewer resources or more fragile crops and might need more support than others.

Question 2. Who is benefiting from your current system? In other words, what can people do to be beneficial under your rules?

Sample answer:
People whose land sits inside the long, "efficient" intervals that the greedy algorithm picks first get water earlier and more reliably. Farmers who can afford pipes with large watering ranges benefit, because those pipes are more likely to be chosen to cover big gaps. People whose gardens are isolated, or only covered by short or weak pipes, may be watered last or not at all. To benefit under these rules, a person would want to place their garden near other gardens and invest in strong pipes that cover wide ranges, which favors those who already have money and power.

Question 3. What factors have you been ignoring? Think about who pays for the water. How much energy has been used in this system? Are there better solutions?

Sample answer:
Our algorithm ignores who pays for the water, how much each farmer can afford, and how the costs are shared. It also ignores energy use, long pipe maintenance, and environmental impact, even though long-distance pumping may use more electricity or harm the land. We do not model crop needs, historical access to water, or which groups have been under-served in the past. A better solution might balance several goals at once: cover the whole garden, limit total energy use, and make sure no group is always last. For example, we could design an algorithm that spreads wait time more evenly, adds extra weight for already-privileged plots, or gives priority to plots with higher need, instead of only minimizing the number of open pipes.