

As a team of two people, we spent approximately 24 person-hours.

Model Description

Setup

- **Tests** - This was an array of binary variables representing whether or not we decide to test each symptom
- **XOR Matrix**: We created a 3d array of dimension `numDisease` by `numDisease` by `numTest`. Effectively, for each pair of diseases, we had a vector representing which tests could differentiate between those two diseases. This is precomputed.

Constraints and Objective

- **All Differentiable** - For each unique pair of diseases, we had to check that the dot product of which tests are activated with the XOR vector in the XOR Matrix was ≥ 1 . This guarantees that there is at least one active test that differentiates every pair of diseases.
- **Minimized Cost** - We took the dot product of the active tests vector and the cost vector to obtain the cost for a given assignment of tests. Our model aimed to minimize this.

Relaxation to LP

We relaxed the binary variable for tests into a continuous variable from 0 to 1. This model produces a lower bound on the cost of testing, and we were able to use it at every node in our search tree to get a cost lower bound given a set of forced assignments.

Branch and Bound Searching

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