**Train Tracks**

Train Tracks is a puzzle game involving a map grid and two villages. The aim of the game is to place tracks on the map grid in a path from village A to village B. The numbers along the map grid indicate how many sections of rail may be placed in each row and column, and the track cannot cross itself to reach the destination.

**The Solving Algorithm**

The way that the solving algorithm works is by splitting the grid up into its columns: we are given the number of rails that a single column must contain, and so firstly, we can make an algorithm that finds all possible rail combinations for a single column:

Column\_combo GIF

So now for each column, we have all of the possible combinations of rails. We can then go from left to right, matching up all of the rail combinations that are *consistent*. Two adjacent rail combinations are *consistent* if all of the rails match up, so there are no rails that lead to nowhere, and no rails that clash/don’t match up:

Column\_consistent\_GIF.

We then have a group of different board combinations, however most of them will not be valid solutions, as they will match the numbers for the columns but not for the rows. By checking whether the row numbers match up, we can remove most of the invalid solutions. For each remaining solution, we can check whether the solution uses every single rail to get from the start to the finish, or whether there are any isolated parts of the track that just go around in a loop:

Invalid\_with\_loop GIF

This should get rid of all of the invalid solutions, and just leave the single valid solution left.