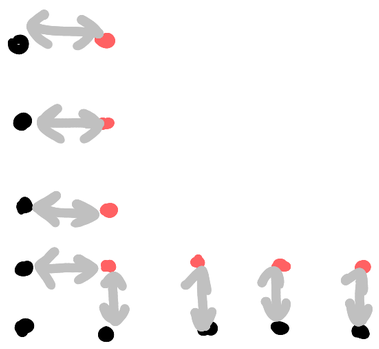
Iterative Closest Point (ICP):

- The ICP algorithm matches two point clouds and returns the transformation needed to match both point clouds as closely as possible.
- This is done by three steps:
  1) Find the translation required to overlap the centroids of both the point clouds on top of each other.
  2) Match both the point clouds to find the corresponding pairs of points. (Remove any outliers)
  3) Minimize the squared error between the two point clouds
  4) Rotate the sensor point cloud so it matches the reference point cloud
  5) Repeat steps 3 and 4 for n iterations. (n is a trade-off between accuracy and performance)

Reason for iteration:

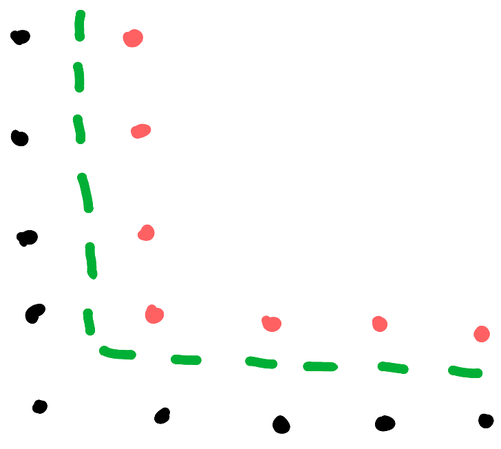
1) The correspondance pairs aren't ideal. So, the estimated optimal transformation gets us closer to the optimal solution but, we need to perform this multiple times to get closer to the ideal transfation.

i=0



↔ are the corresponding pairs

Estimated transformation:



- The estimated transformation does not get us to the optimal solution. This is due to the nature of least squares and incorrect corresponding pairs.
- If we get the solution closer to bottom points, the solution gets farther from left points and vice-versa
- So, we iterate the solution until we get the desired result.