Supplemental Material

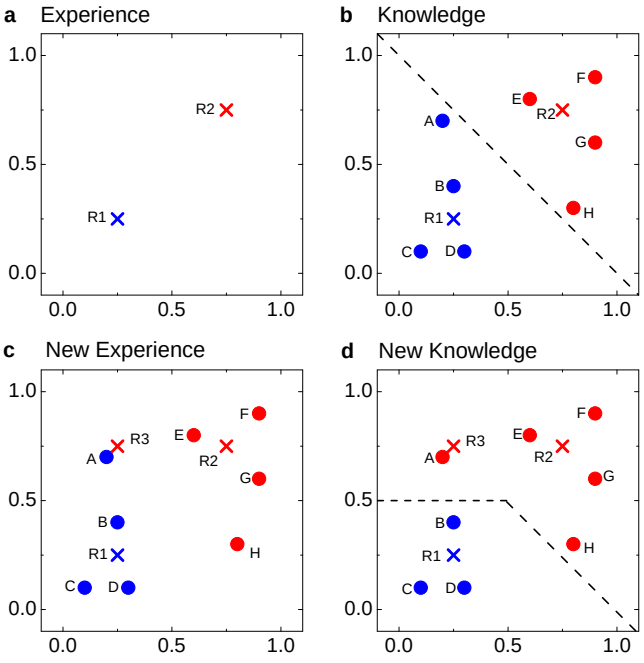

FIG. 1: Experimental result of supervised nearest-neighbour machine learning algorithm (a) The blue (R1) and red (R2) crosses are two training vectors, representing two different groups (blue and red), respectively. (b) Eight testing vectors are labelled from A to H. For each vector, its distance to $R1$ and $R2$ is experimentally evaluated: $D_{A-R1} = 0.54, D_{A-R2} = 0.58, D_{B-R1} = 0.24, D_{B-R2} = 0.62, D_{C-R1} = 0.20, D_{C-R2} = 0.90, D_{D-R1} = 0.21, D_{D-R2} = 0.83, D_{E-R1} = 0.75, D_{E-R2} = 0.54, D_{F-R1} = 1.05, D_{F-R2} = 0.62, D_{G-R1} = 0.86, D_{G-R2} = 0.60, D_{H-R1} = 0.67, D_{H-R2} = 0.61$. The test vectors are classified into the group with closest distance. Therefore, A, B, C, D belong to the blue group, and E, F, G, H belong to red group. The dash line in the figure represents the theoretical boundary between the two groups. (c) A new training vector $R3$ is provided, and the system needs to improve its classification taking into account this new vector. (d) The distance between each vector A to H to the training vectors $R1$, $R2$, and $R3$ is experimentally evaluated: $D_{A-R1} = 0.54, D_{A-R2} = 0.58, D_{A-R3} = 0.45, D_{B-R1} = 0.24, D_{B-R2} = 0.62, D_{B-R3} = 0.37, D_{C-R1} = 0.20, D_{C-R2} = 0.90, D_{C-R3} = 0.67, D_{D-R1} = 0.21, D_{D-R2} = 0.83, D_{D-R3} = 0.67, D_{E-R1} = 0.75, D_{E-R2} = 0.54, D_{E-R3} = 0.55, D_{F-R1} = 1.05, D_{F-R2} = 0.62, D_{F-R3} = 0.86, D_{G-R1} = 0.86, D_{G-R2} = 0.60, D_{G-R3} = 0.83, D_{H-R1} = 0.67, D_{H-R2} = 0.61, D_{H-R3} = 0.81$. As a result the label of vector A has to be changed from red to blue, as it is closer to $R3$ than $R1$, while other testing vectors remain unchanged. The boundary in this new configuration is accordingly shifted, represented as two linked dash lines.