Using different values of degree of exploration ‘c’, we can see from figure X that as the time step increases, the percentage of correct pulls will follow a logarithmic curve. This is because the rate of increase of upper bound confidence value representing the amount of exploration the algorithm does, diminishes over time since the number of times the charging station has been tried, increases over time. In addition, it can be seen that the rate of convergence for low values of c (less than 1) is faster than high values of c (greater than 1).

The confidence value of less than 1 will give a best performance only if the first charging station chosen was the optimum station because once a charging station is chosen, it will tend to exploit it most however if an incorrect station is first selected, then the performance will be extremely poor. Therefore on average a confidence value of 1 will give the best performance as its balance between exploration and exploitation in most cases will result in a fast conversion on the optimal charging station (figure X).

Different degrees of exploration rates gives a trade-off between exploration and exploitation. A plot of the variation of the mean total reward vs charging rates (figure X) shows that the mean total reward increases from 0, peaking at around X and then decreases dramatically from 1 onwards. This is because the is an estimation of the variance so with c less than 1, we decrease the variance of charging rates for each charging station by a factor of c and c greater than 1, the variance of charging rates is increased by a factor of c. This can be seen in figure X where higher degrees of exploration takes a longer to converge on the optimum charging station. However when running the UCB algorithm, we noticed that on many occasion, c less than 0.5 often gave 0% correct action for all or most time steps (figure X). This is because of the small variance determined by c so if an incorrect charging station was selected first, it would tend to stay with it as the exploitation of the algorithm is high whereas if a correct place was chosen then the result would converge very quickly on the optimum charging station (figure X)

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Graphical user interface, application, table, Excel

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Chart, histogram

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