Abstract

For the past 2 and half years, Covid -19 has been menacing to human society and has claimed numerous lives. Its impacts are not just limited to physical health but also the economy of society. Scientists, researchers, and governments have invested a lot of time and money to explore the determinant factors of transmission of Covid-19 to find strategies, and protocols to contain it. Geometric modelling of epidemic spread can help to mimic Covid-19 spread and analyse mitigation protocols to restrict it. In this paper, modelling of epidemic spread is done in a supermarket using 2 models, first an agent-based model for the customer to simulate realistic behaviour, and second, a virus transmission model to mimic covid -19 spread in the supermarket. The store layout, customer, and virus model simulation are all done using python libraries pyglet and networkx. A recommender system was created based on Machine learning. The recommender system would predict each customer's path for the nth day based on his/her historic data. To make it realistic, each customer has a stationary time in each aisle they visit based on exponential distribution, simulating a customer spending some time to think whether to buy a particular item or not. To make sure customer entry into the supermarket is not disorganised. Gamma distribution was used. Once the initial setup was done, all mitigation protocols were implemented. To avoid any transmission of covid-19 through air particles, masks were introduced to block covid 19 droplets both in infected users' mouths as well as susceptible users' mouths. There is still a chance of transmission if 2 users are very close to each other, and thus social distancing was implemented. It is evident that the population following these protocols is important, hence both of these strategies were implemented as mandatory and non-mandatory. In the longer run, human beings need natural immunity against covid, and thus various vaccinations were made. In this simulation, users were provided either with 1st of dose or both doses. These protocols do help reduce transmission for each user but do not disinfect the surfaces around which gives the possibility of transmission from surfaces to hand and then later to mouth. Thus proper sanitization is as important as any other strategy. Alcohol and non-alcohol-based hand sanitizers were used by customers to sanitise their hands to protect themselves from covid-19. The results from these simulations are analysed and presented to help understand the effectiveness of each protocol against virus spread.