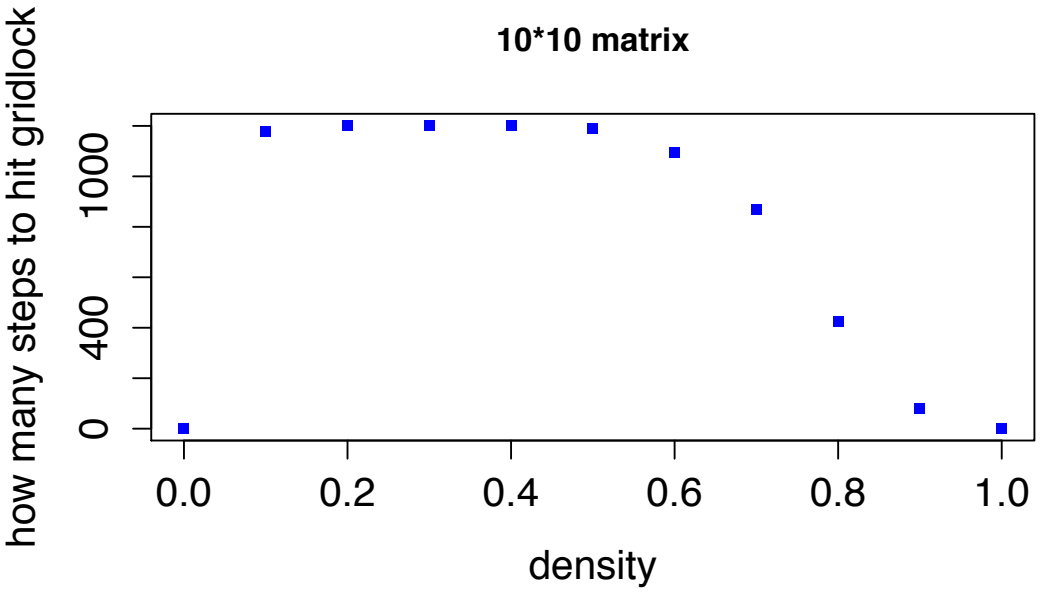
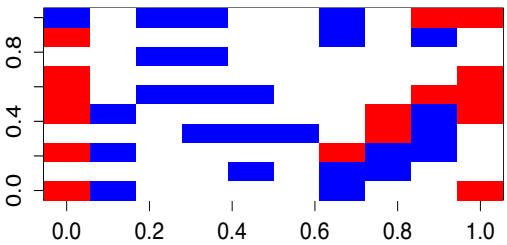
For the BML traffic simulation, I choose two different dimensions of lattices that are 10x10, and 20x20.



In the 10x10 grid above, the traffic was free flowing with the density from 0.1 to 0.4, after that the traffic condition was beginning to get worse and the number of steps to gridlock begin to decrease. There is a dramatic change around p=0.8 where the simulation hits the gridlock is less than 430. The following table shows that how many steps to get gridlock corresponding to the different density.

Density	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Step to Gridlock	0	1176.18	1200.00	1200.00	1200.00	1188.14	1093.05	866.90	425.67	78.32	

From the table, it is clearly to show that the traffic condition is good between the densities 0.1 to 0.4, and a mixture of free flow traffic and traffic jam between densities 0.5 to 0.7. After the density bigger or equal to 0.8, traffic became jammed very fast.



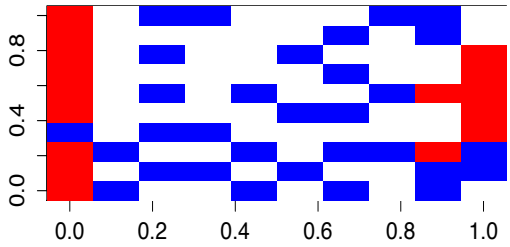
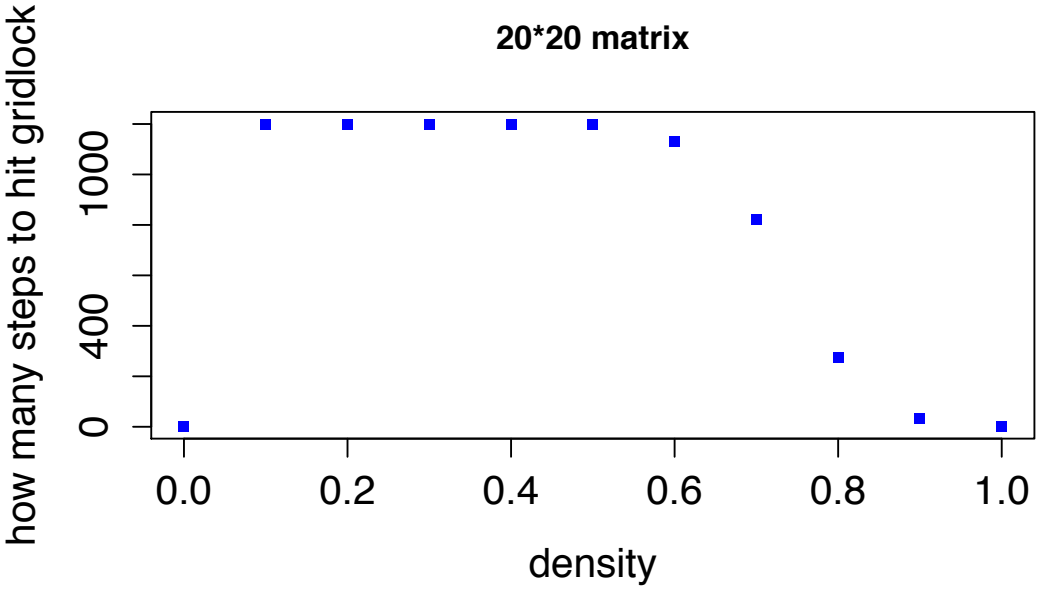


Figure 1 **Figure 2**

For the 10x10 lattice, I made the density p=0.4 to run the simulation, in the initial stage(Figure 1), the traffic is just a littlie bit jammed , however at the finial stage(Figure 2), the traffic get much worse after running the same simulation more than 20 times.



In the 20x20 grid above, the traffic was free flowing with the density from 0.1 to 0.5, after that the traffic condition was beginning to get worse and the number of steps to gridlock begin to decrease. There is a dramatic change around p=0.8 where the simulation hits the gridlock is less than 260. The following table lists the different densities and its corresponding steps to gridlock, the information is showed on figure above.

Density	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Step to Gridlock	0	1200	1200	1200	1200	1200	1164.99	859.53	257.53	13.98	0

From the table above, it is clearly to show that traffic is free flow during the density from 0.1 to 0.5, and a mixture traffic condition among the densities with 0.6 and 0.7, once the density bigger than 0.7, the traffic condition became jammed very quickly.

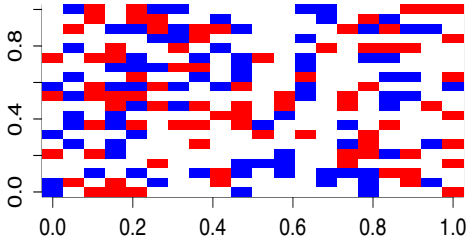


Figure 3

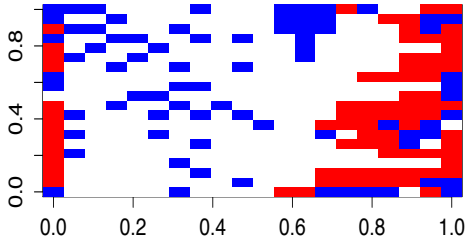


Figure 4

For the 20x20 lattice, still to run the simulation with density p=0.4, in the initial stage shows on the Figure 3, the traffic was almost gridlock, however at the final stage which shows on the Figure 4, the traffic condition was much better than the initial stage with same density p=0.4 after running the simulation several times.

Conclusion:

As the result, the traffic congestion approach to gridlock as the density increasing. It shows on the table above. However, as the dimension of the lattice increase from 10x10 to 20x20, the traffic flow approaches gridlock actually is decreasing. It is equivalent to say that as the dimension of lattice increase, it's less likely to hit complete gridlock.