Statistics 133: BML Simulation

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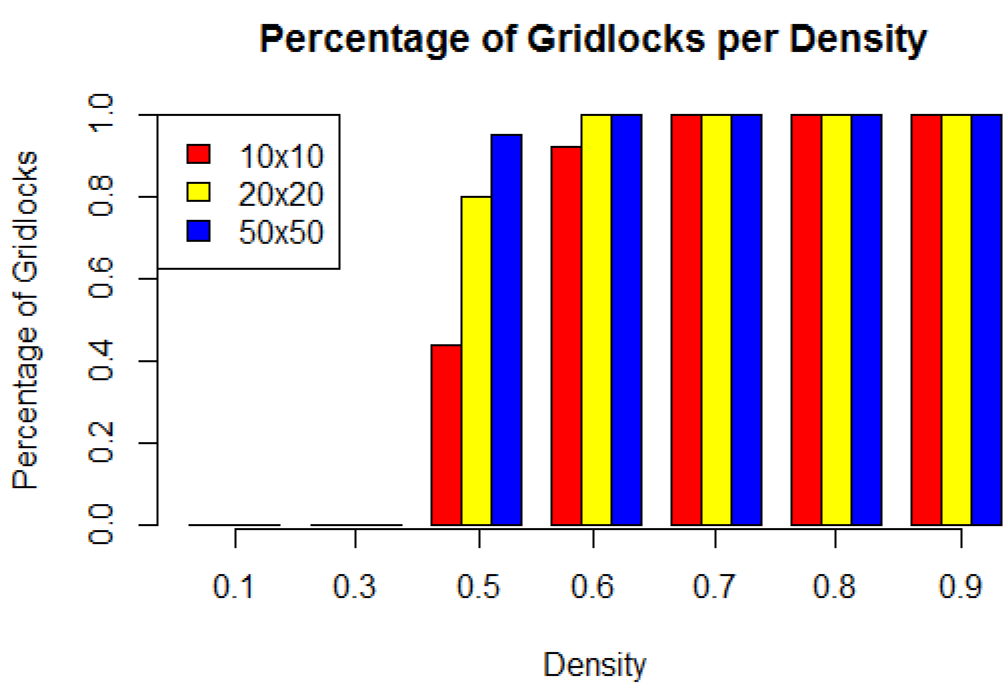
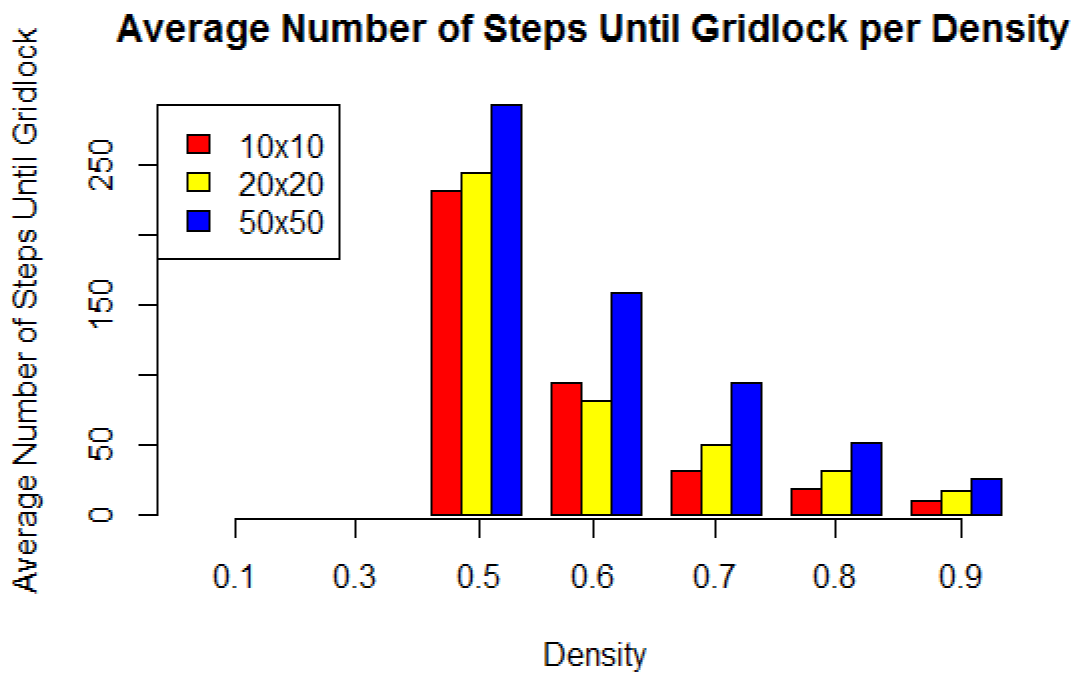
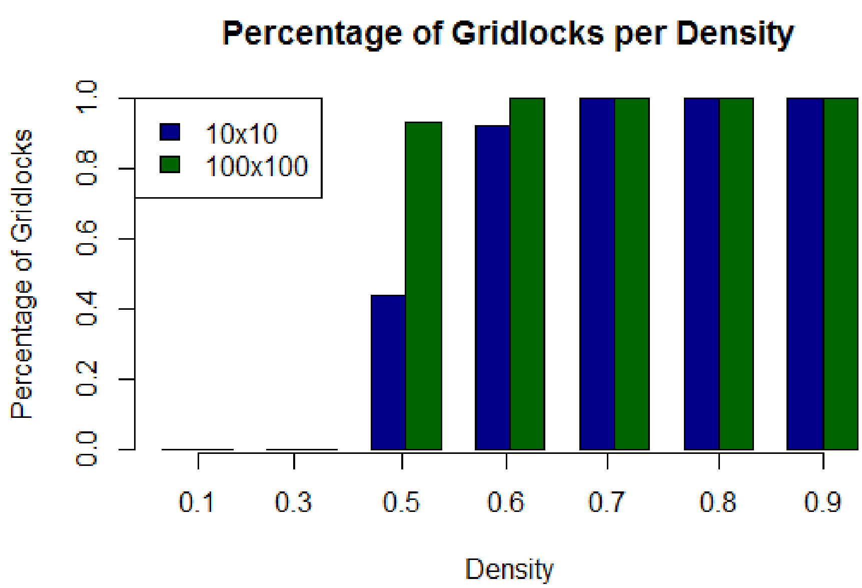
I tested the traffic densities of 0.1, 0.3, 0.5, 0.6, 0.7, 0.8, and 0.9. I found free flowing traffic every time for the densities of 0.1 and 0.3 for the grid sizes of 10x10, 20x20, and 50x50. There was a mixture of free flowing traffic and gridlocks for all three grid sizes at a density of 0.5. The percentage of gridlocks for each different grid size at a density of 0.5 is 0.437, 0.802, and 0.950 respectively. I ran my time-steps for one thousand iterations and I defined free-flowing traffic if there are no gridlocks in one thousand time-steps. I ran each grid for one thousand replications.



The average number of time-steps until gridlock decreases dramatically as the density increases, regardless of the size of the grid. There is trend where the larger the grid is a larger average number of time-steps until gridlock hits. The traffic model shows that the higher the density, the quicker a system will hit gridlock.

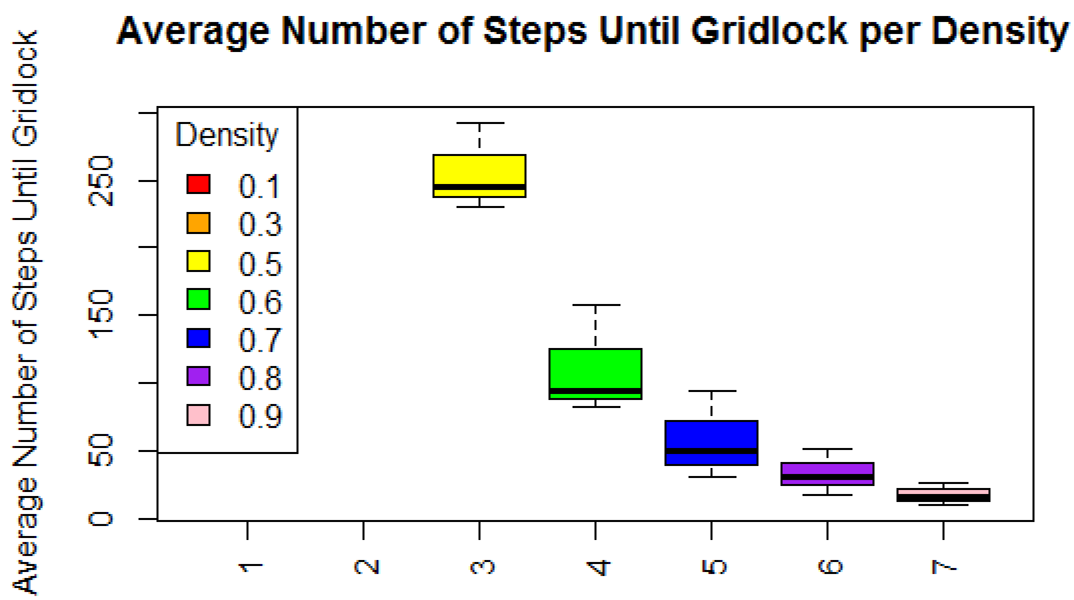


The transitions depend heavily on the size of the grid. The smaller grid sizes are more likely to be completely free flowing compared to the larger grid sizes. A 10x10 grid has a higher chance of being free-flowing compared to a 100x100 grid:

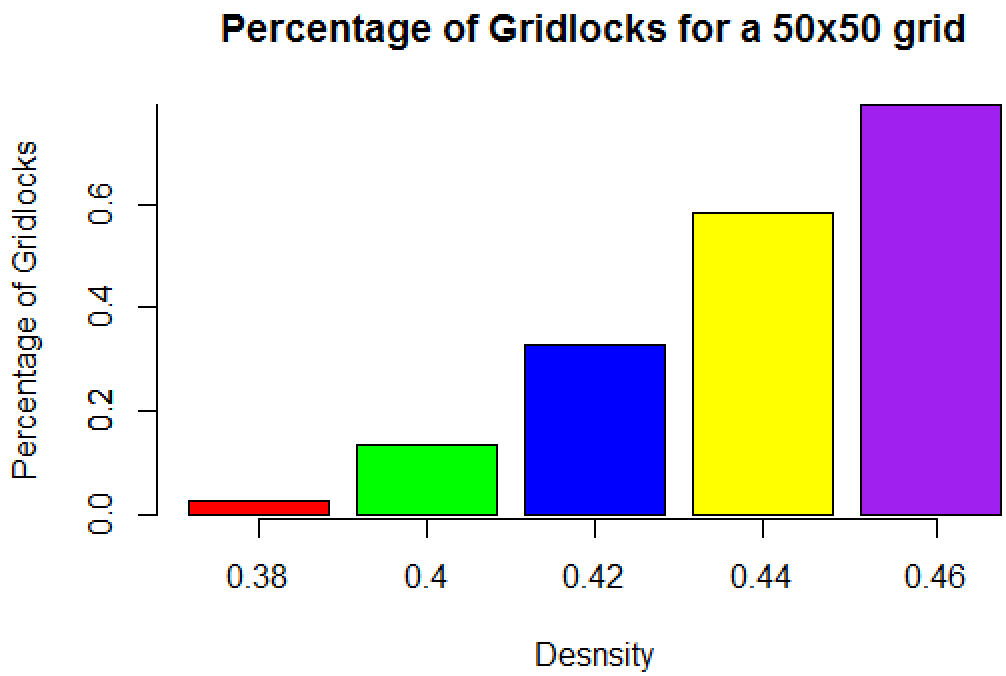


The shape of the grid also influences the percentage of gridlocks. A 10x20 graph differs from a 10x10 and a 20x20 grid in their own rights. The 10x20 grid had a significantly less gridlocks than both the 10x10 and the 20x20 grids.

The average number of time-steps until gridlock decreases as the density increases. The graph shows the combined results from a 10x10, 20x20, and 50x50 grid. The trend shows that as the density increases past the point where free flowing traffic occurs, it takes less time-steps until gridlock for any grid size.



I further analyzed the percentage of gridlocks for a 50x50 grid for densities between 0.38 and 0.46. These densities are where the traffic model leads to gridlock in varying degrees. Between a spread of 0.08 in density, the percentages of gridlocks grows from nearly two percent to eighty percent.



For a 50x50 grid a density between 0.38 and 0.46 will give you the greatest degree of variation in percentage of gridlocks in one thousand replications. There is a mixture of gridlocks and free-flowing traffic for these densities they grow inversely of each other as the density increases.