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Stat 133
bml.comments

I ran 100 simulations per the following matrices under densities ranging from 0.1 to 0.85 in intervals of 0.05:
10x10 (Purple)
20x20 (Blue)
30x30 (Green)
40x40 (Yellow)
50x50 (Red)

Initially, I wanted to have 1000 simulations but that took way too long to run for my laptop. Regardless, 100 simulations seems to be enough.

Before I analyze the results I need to define how I defined gridlock, looping, and unclear matrixes.
Gridlock occurs when no car can move.
Looping occurs when two periods of car movements are exactly the same.
Unclear occurs when looping and gridlock do not occur within 1000 iterations (or movements).

Consequently per each grid and density,
looping+gridlock+unclear=100

Looping versus Density
Analyzing the total looping versus density graph, it seems that only the 10x10 and 20x20 matrices ever loop.
The 10x10 matrix loops roughly 90% of the time at density=10% and seemingly has a linear relationship until density=40%. After density=40%, total looping=0%
The 20x20 matrix loops roughly 25% of the time at density=0.1 and has a curvilinear relationship until density=25% where total looping is 0%
The other 3 matrices never loop regardless of density.
As a result, I can predict that as the grid increases in size, there will be a 0% chance that looping will occur.
10x10>20x20>30x30=40x40=50x50
Purple>Blue>Green=Yellow=Red
Total "Unclears" versus density
The number of "unclear" results increases for both the 10x10 and 2x20 grids from density=10% to density=45%.
The number of "unclear" results stays constant at 100% for both the other grids from density=10% to density=45%. These grids with these densities may eventually lead to a gridlock state or even a looping state.
Moreover, after the 45% density mark, all unclear results decrease and they all eventually reach 0% at densities 70%-85%

50x50>40x40>30x30>20x20>10x10
Red>Yellow>Green>Blue>Purple

Gridlocks versus densities

Gridlocks for all grids from density=0% to density=40% is 0%. Beyond the 40% limit, total gridlocks increases curvilinearly. The bigger matrixes have slower ascends while the smaller matrixes have higher ascends. But at densities=80% to densities=85%, gridlock is most certain at probability being 98%+.

10x10>20x20>30x30>40x40>50x50
Purple>Blue>Green>Yellow>Red