CS3200: Computer Networks

Lab9 - TCP Congestion Control

CS14B050 - Rachit Garg

Introduction

TCP congestion control mechanism was implemented in this assignment. The congestion window size was dynamically updated every time a successful or an unsuccessful transmission occurred. We followed the exponential and the linear phase for increasing window size as discussed in class.

The output of some programs and observations were as follows.

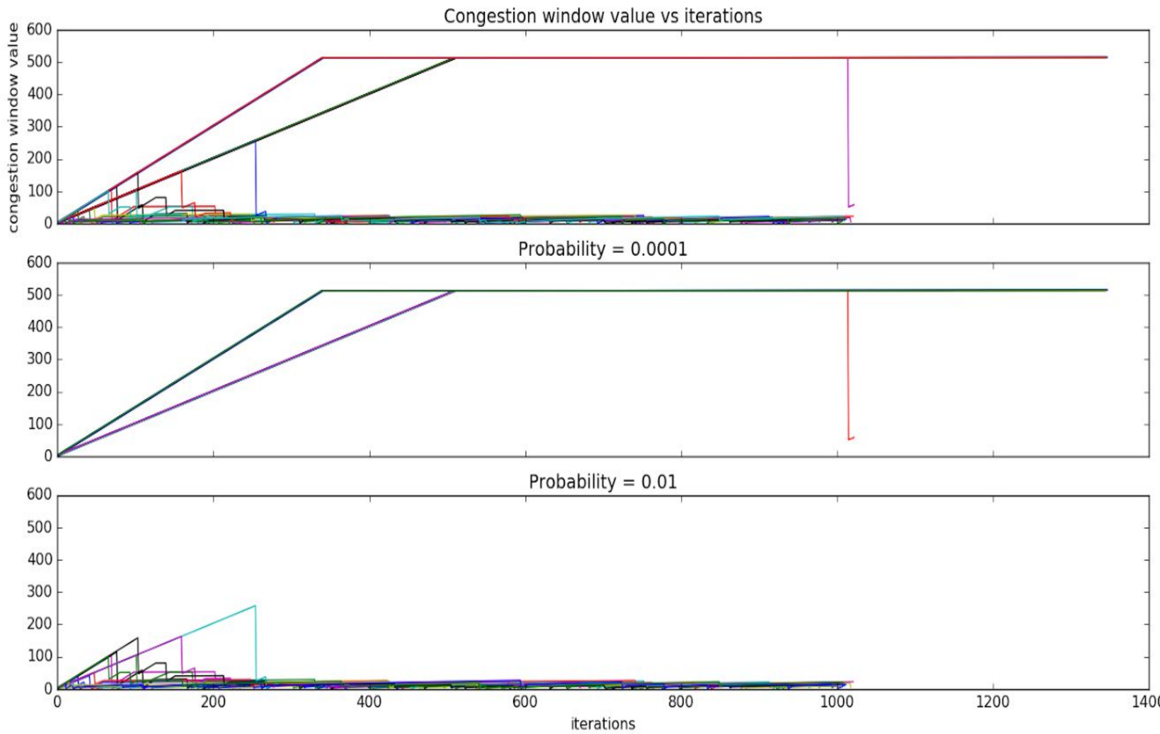
Experiment

A shell script was written in python and the output received was used to plot a graph between congestion window size and iterations. This was done for the cases mentioned in the report the plots were as follows.

Observations

The graph with all the parameters plot was as follows.

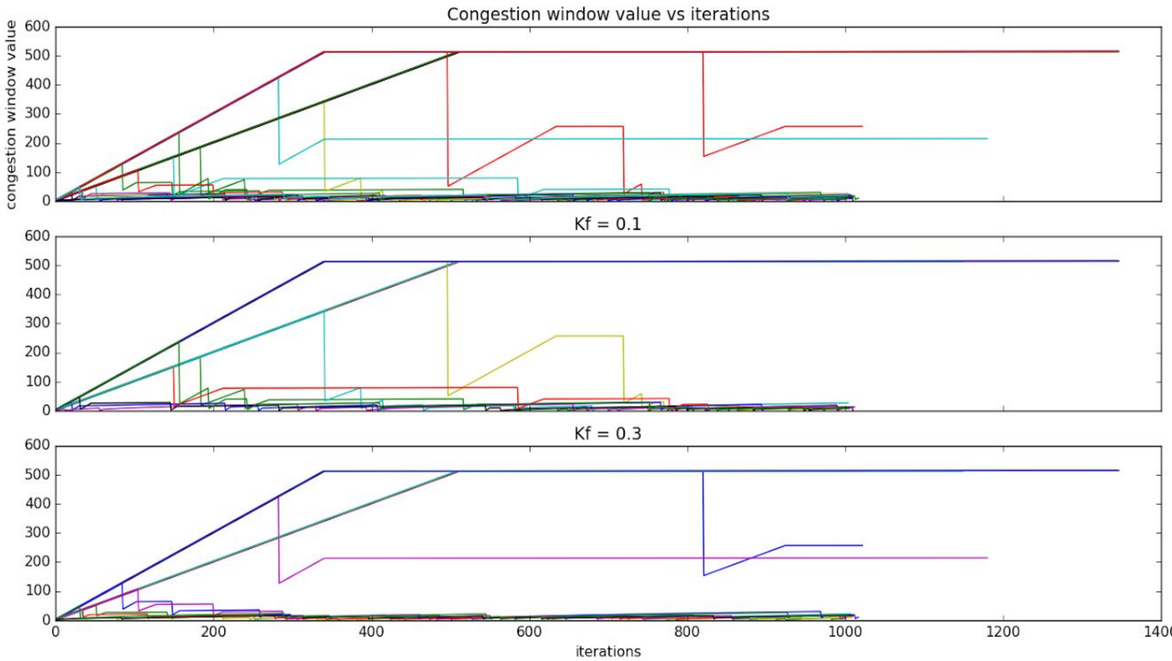
Variation of Probability



In this plot all the parameters were varied. To observe the change we plotted two more graphs between probability being 0.0001 and and probability being 0.01.

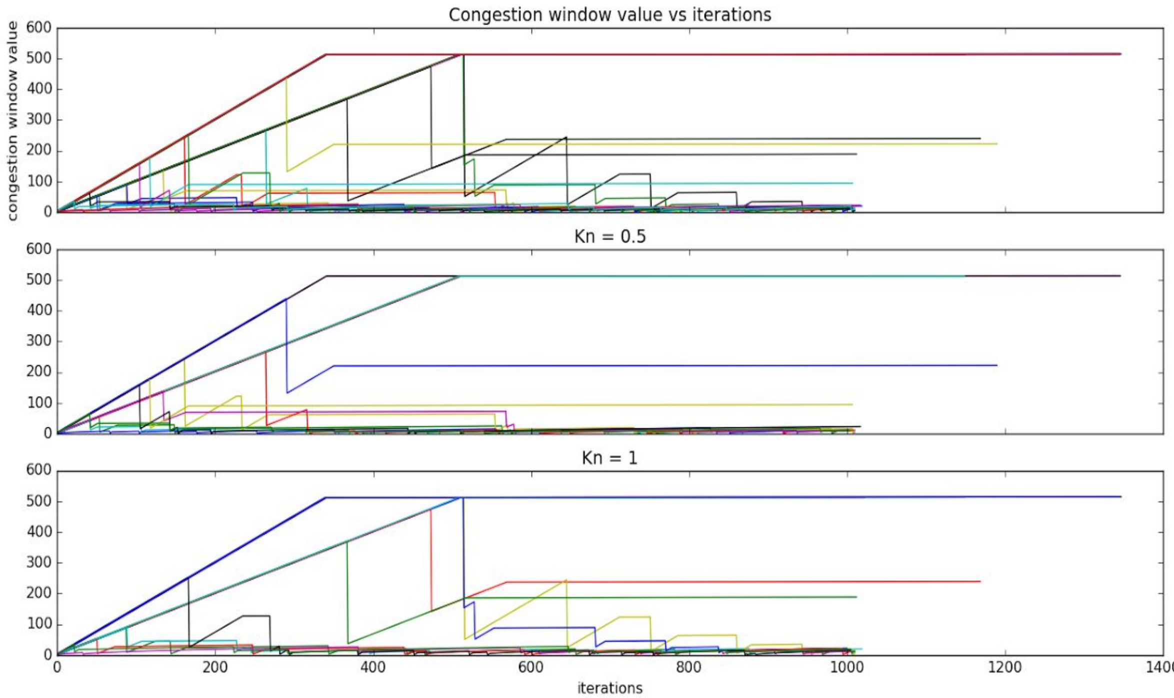
We observe that when probability of failure is 0.01 it has a considerably high probability of failure, we notice that most of the iterations are not able to undergo the exponential phase for long and end up falling more often than not. While when probability of failure is 100 times smaller, the initial exponential phase goes on longer for most of them.

Variation of Kf



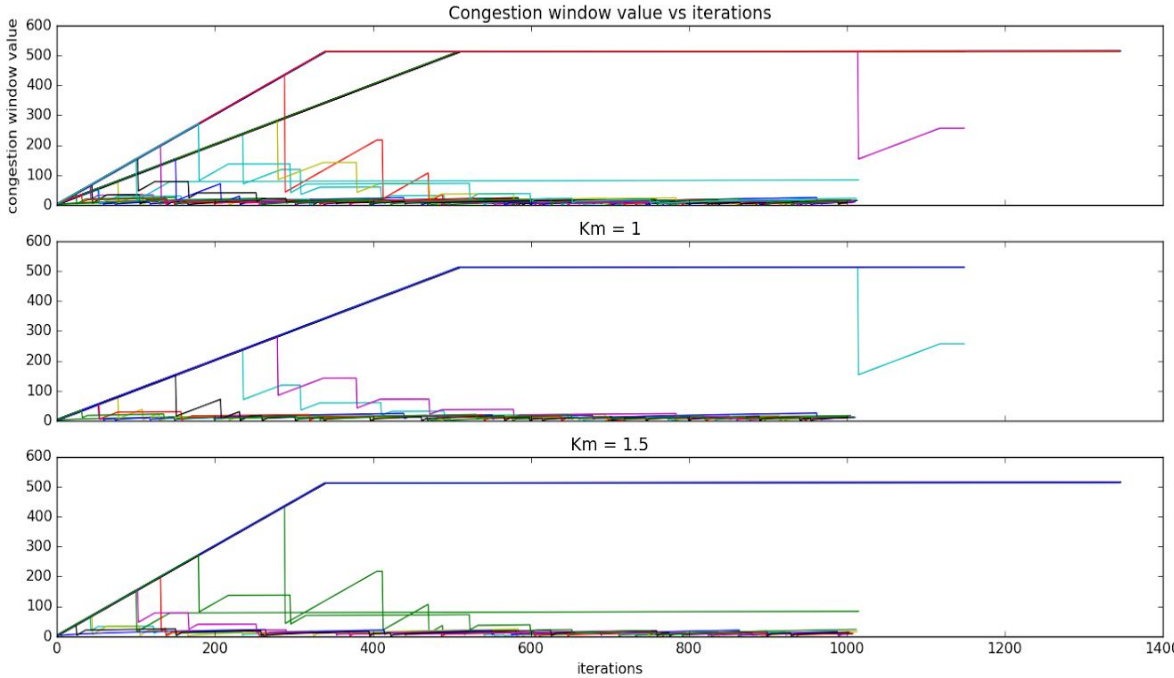
The value of Kf is smaller in the second graph, here we observe that in case there is a failure and the congestion window size falls to much smaller value while in the last graph we observe that it is falling by a much lesser margin and hence the value stays larger for a larger period of time as compared to the second graph.

Variation of Kn



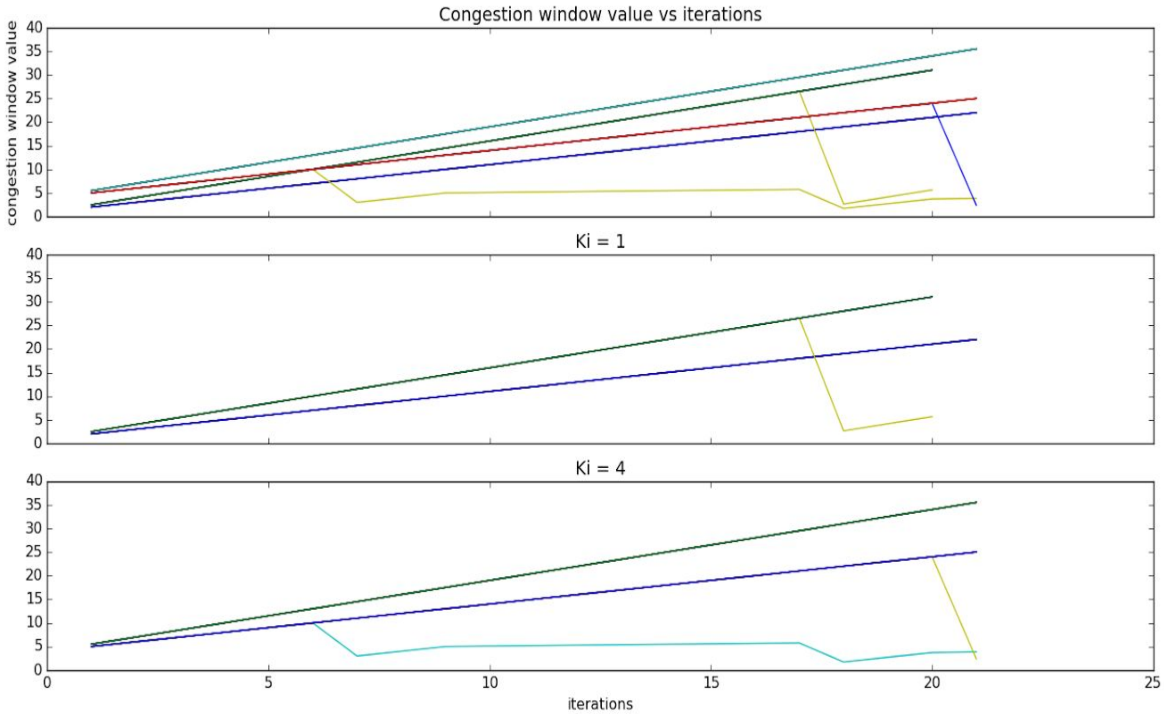
In variation of kn, actually the linear growth is what is changed, but since in our graphs, the linear growth measured is almost constant, the factor of the growth being so small, we can't measure the amount that is changed from the plots, although seeing the explicit values do confirm with the theoretical outcome.

Variation of km



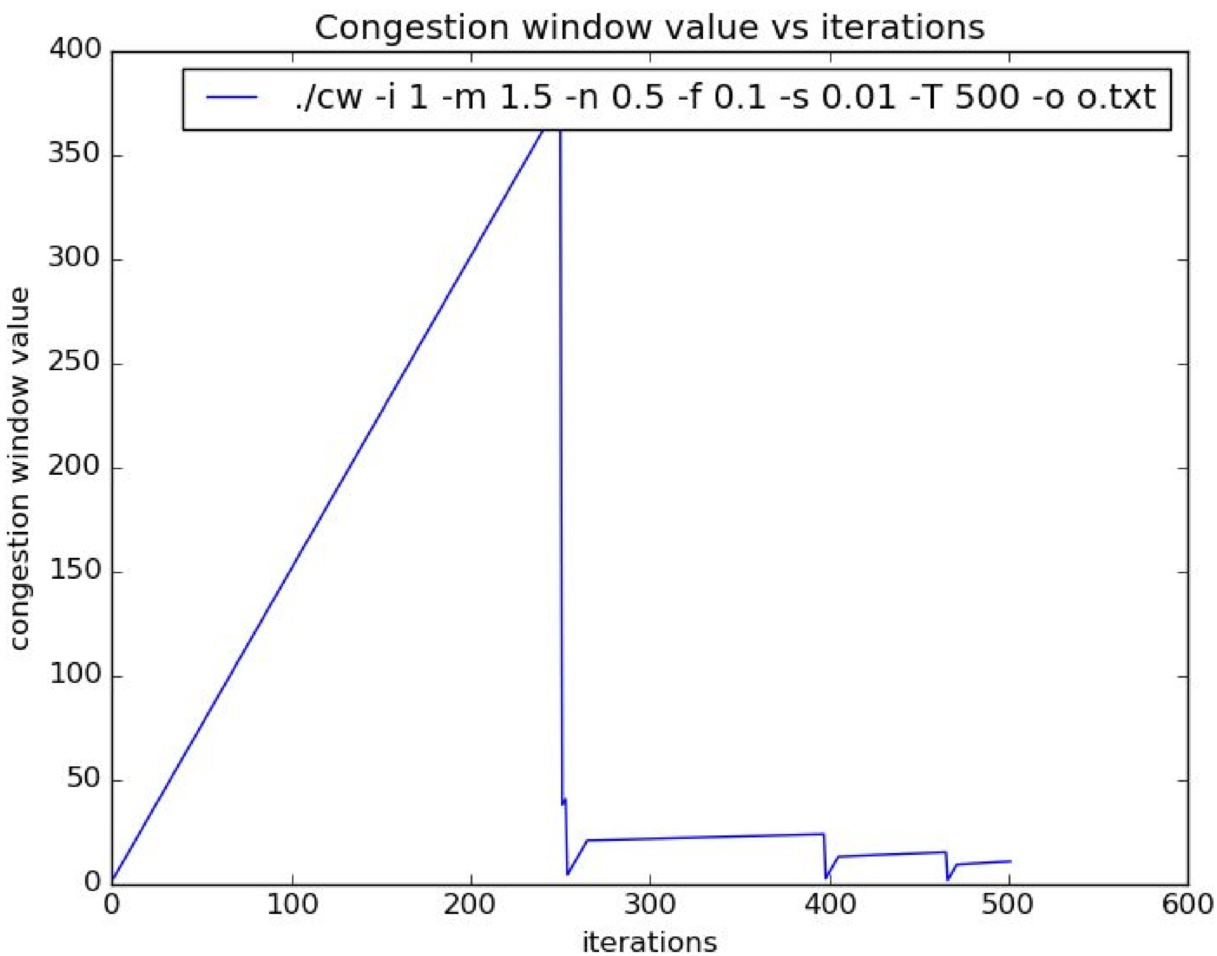
Here we observe the fact that the graphs with a higher Km value tend to increase more faster, we observe that in the bottom graph in abt 375 iterations the window size reaches the max value of 512, and all the exponential phases have this increased slope. While in the middle graph the value is reached in about 500 iterations and the slope is much smaller, this confirms our theoretical observations of Km effecting the exponential phase.

Variation of Ki



Here we clearly observe the variation that Ki causes, Ki sets the initial window start to be set, how this variation affects the network on a whole is unclear but the plots observe what is to be expected.

Here we also showcase the 32 plots of the various possible combinations



Congestion window value vs iterations
./cw -i 1 -m 1.5 -n 0.5 -f 0.1 -s 0.01 -T 500 -o o.txt
congestion window value
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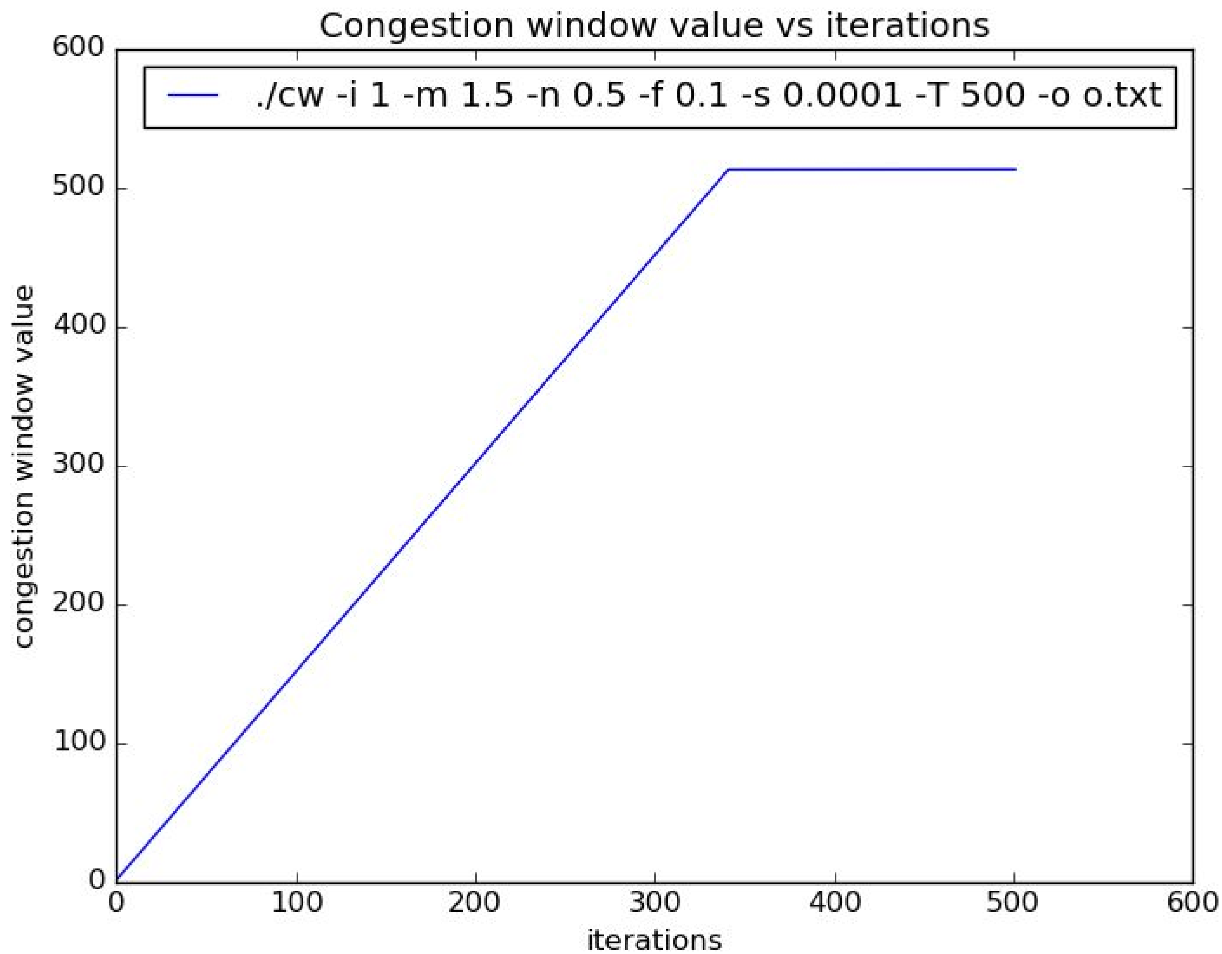
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congestion window value
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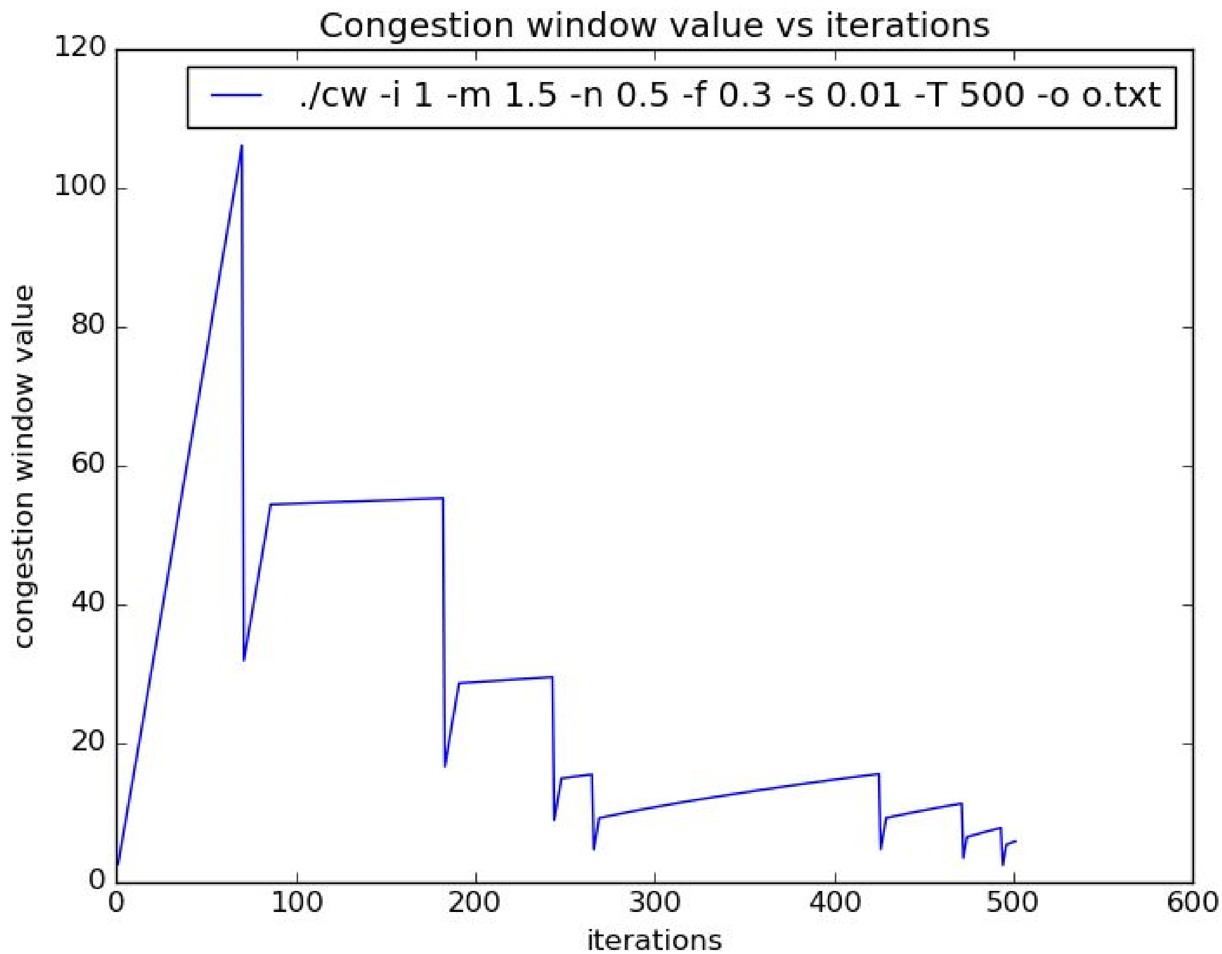
Congestion window value vs iterations
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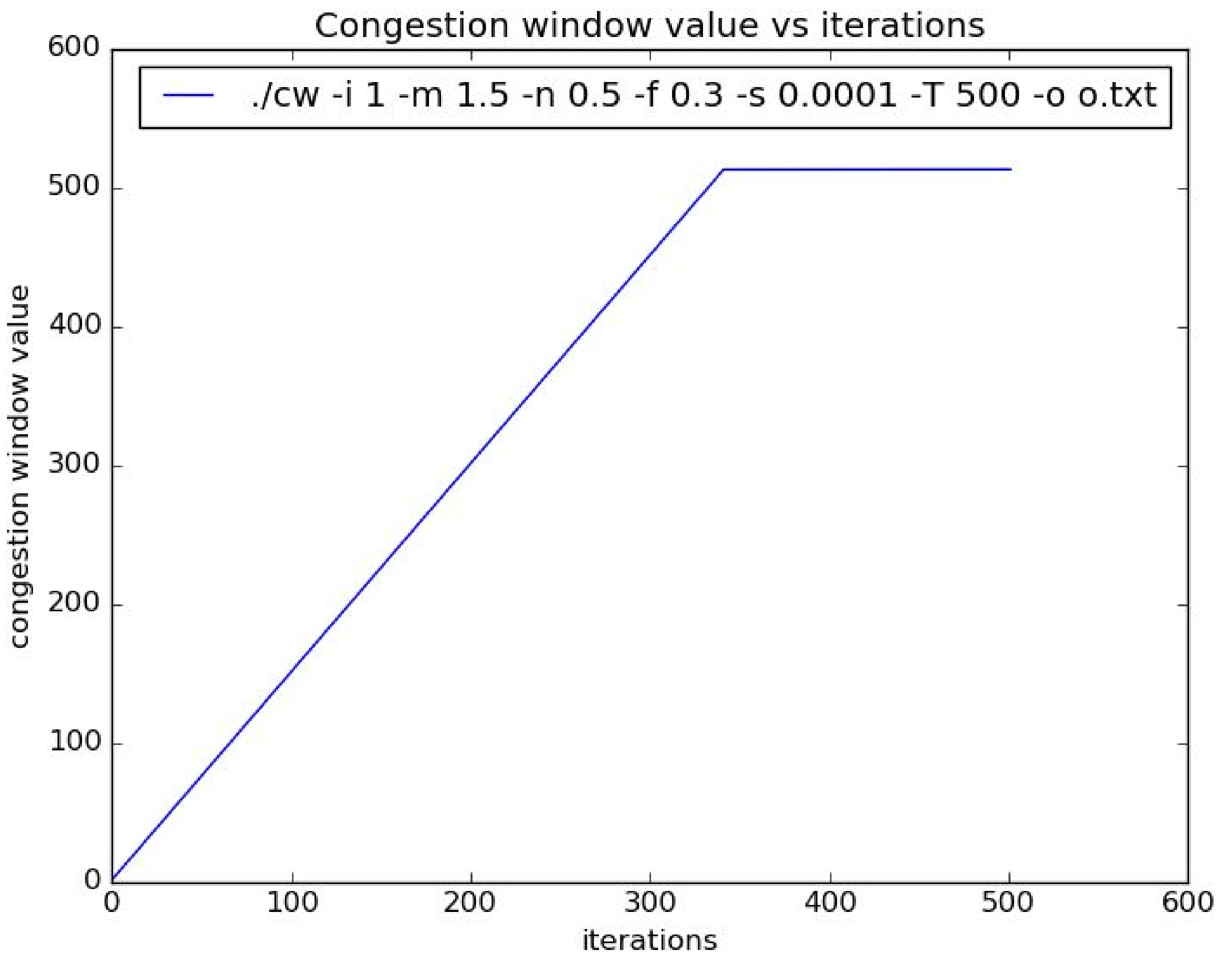
Congestion window value vs iterations
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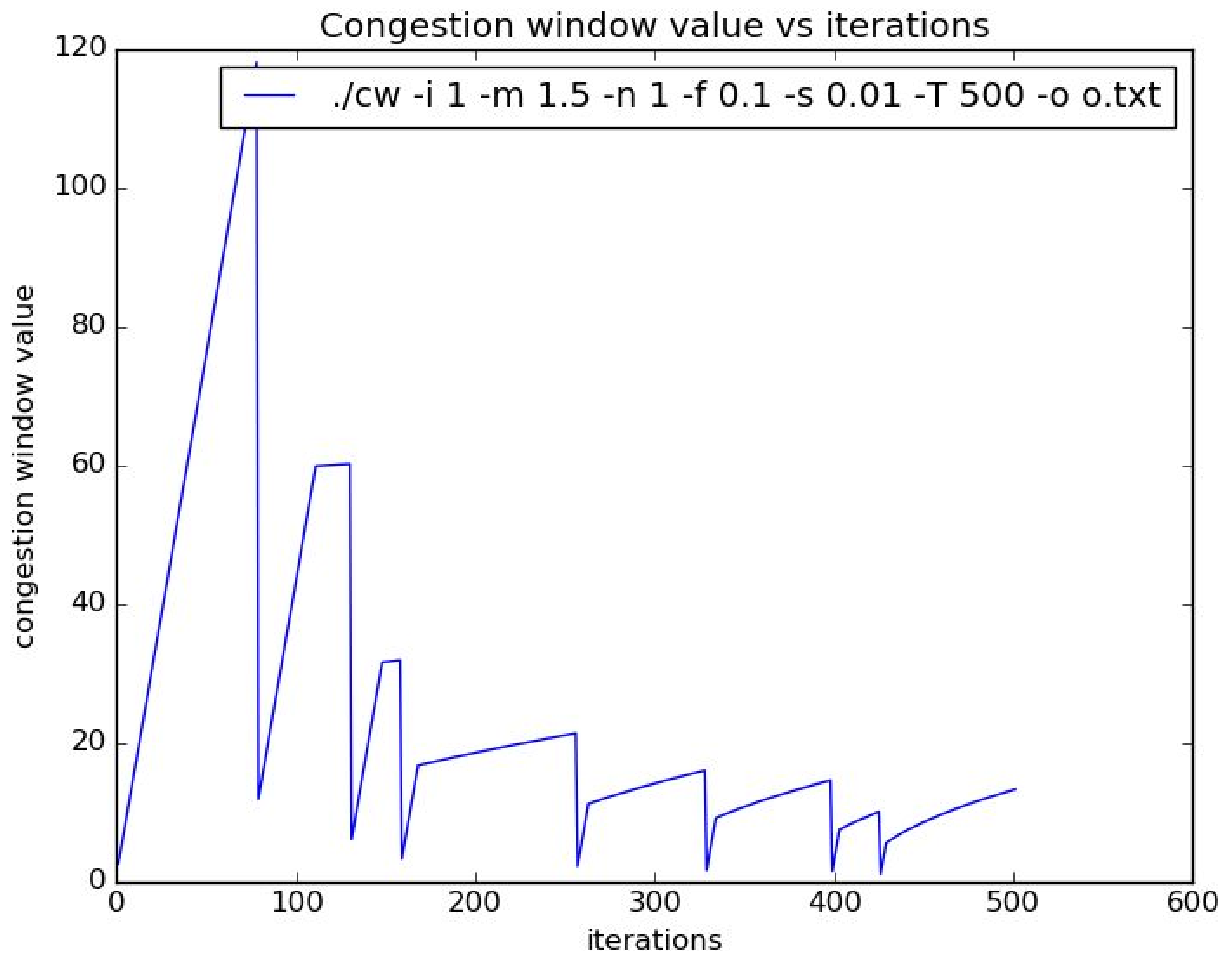
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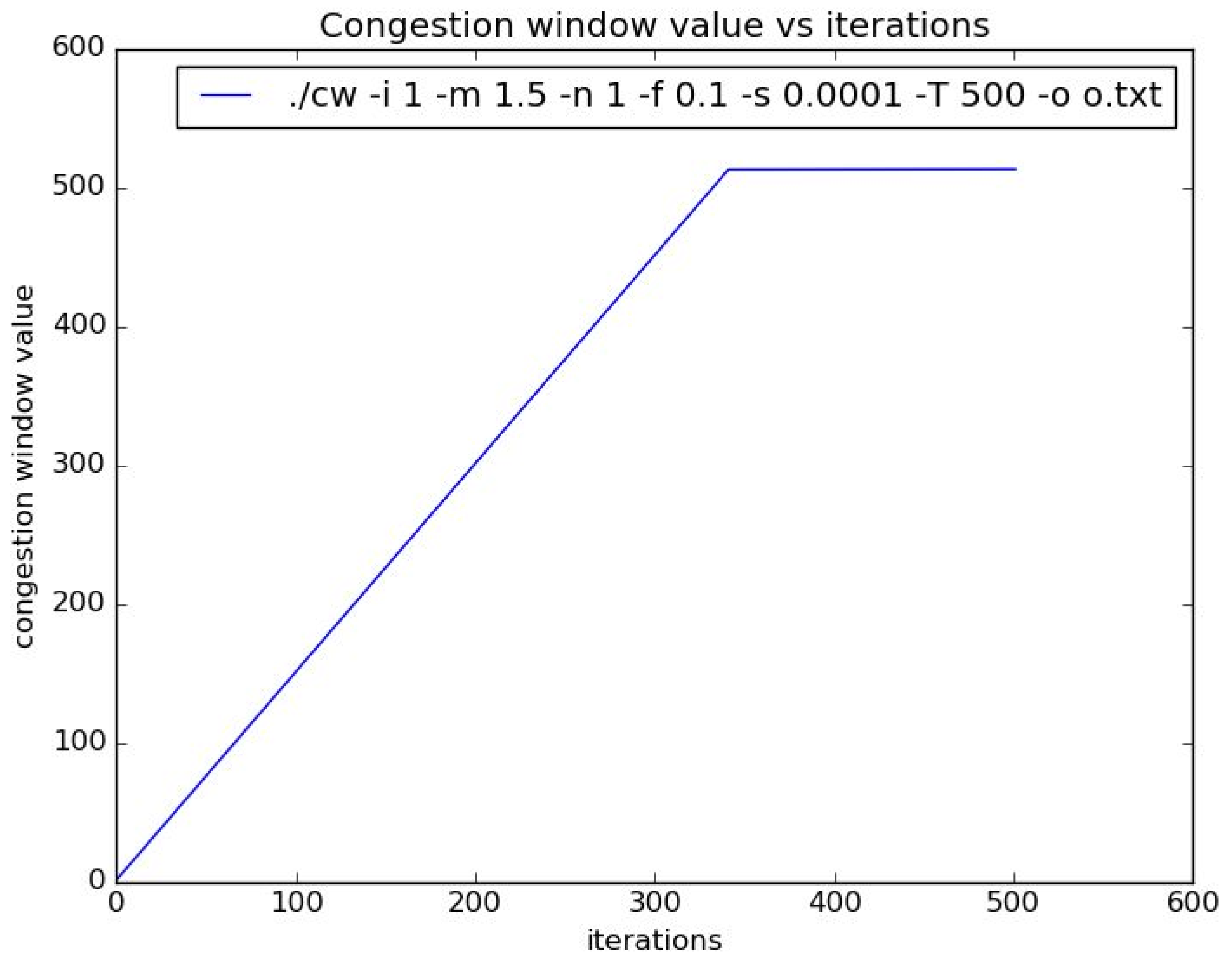
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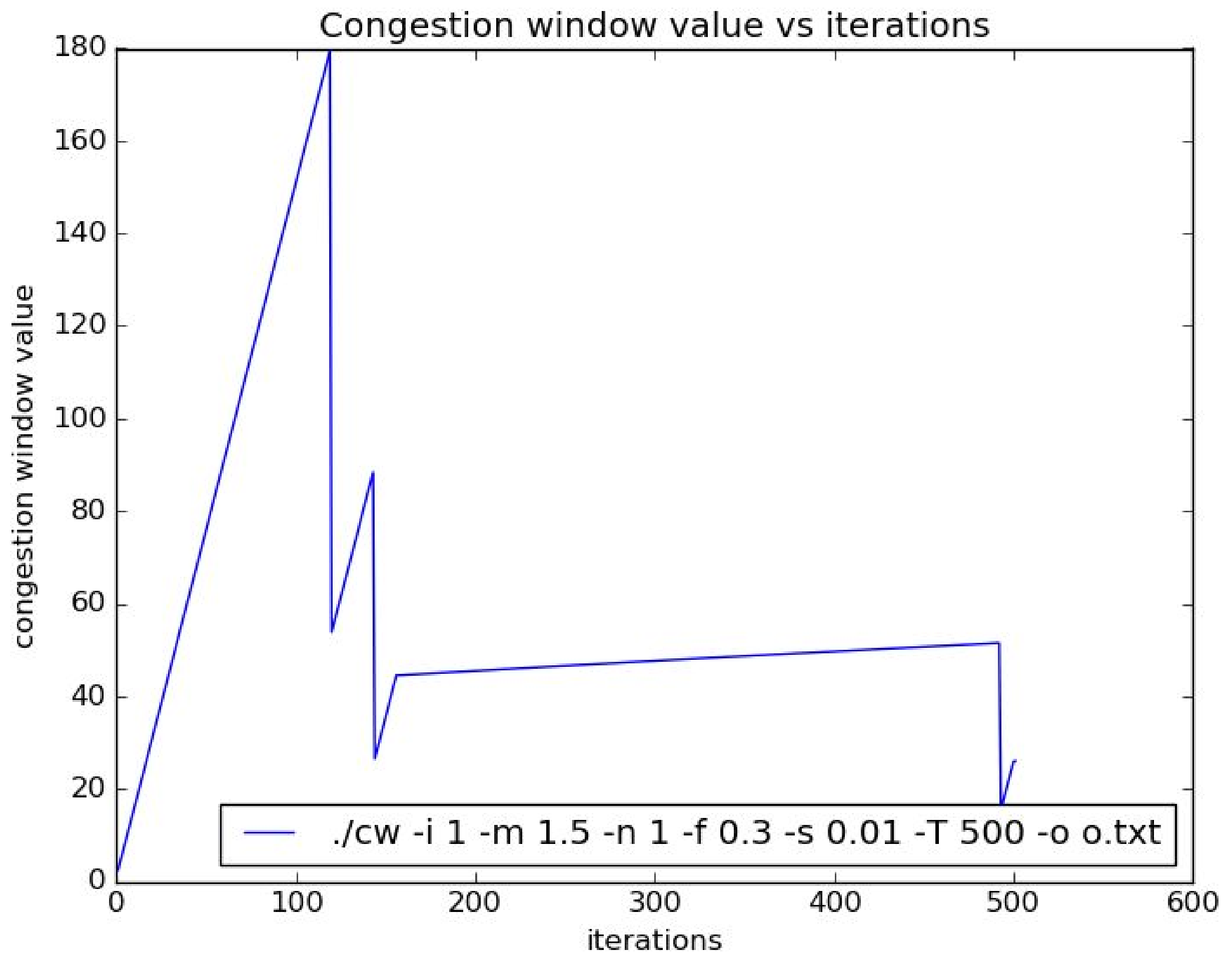
Congestion window value vs iterations
congestion window value
iterations
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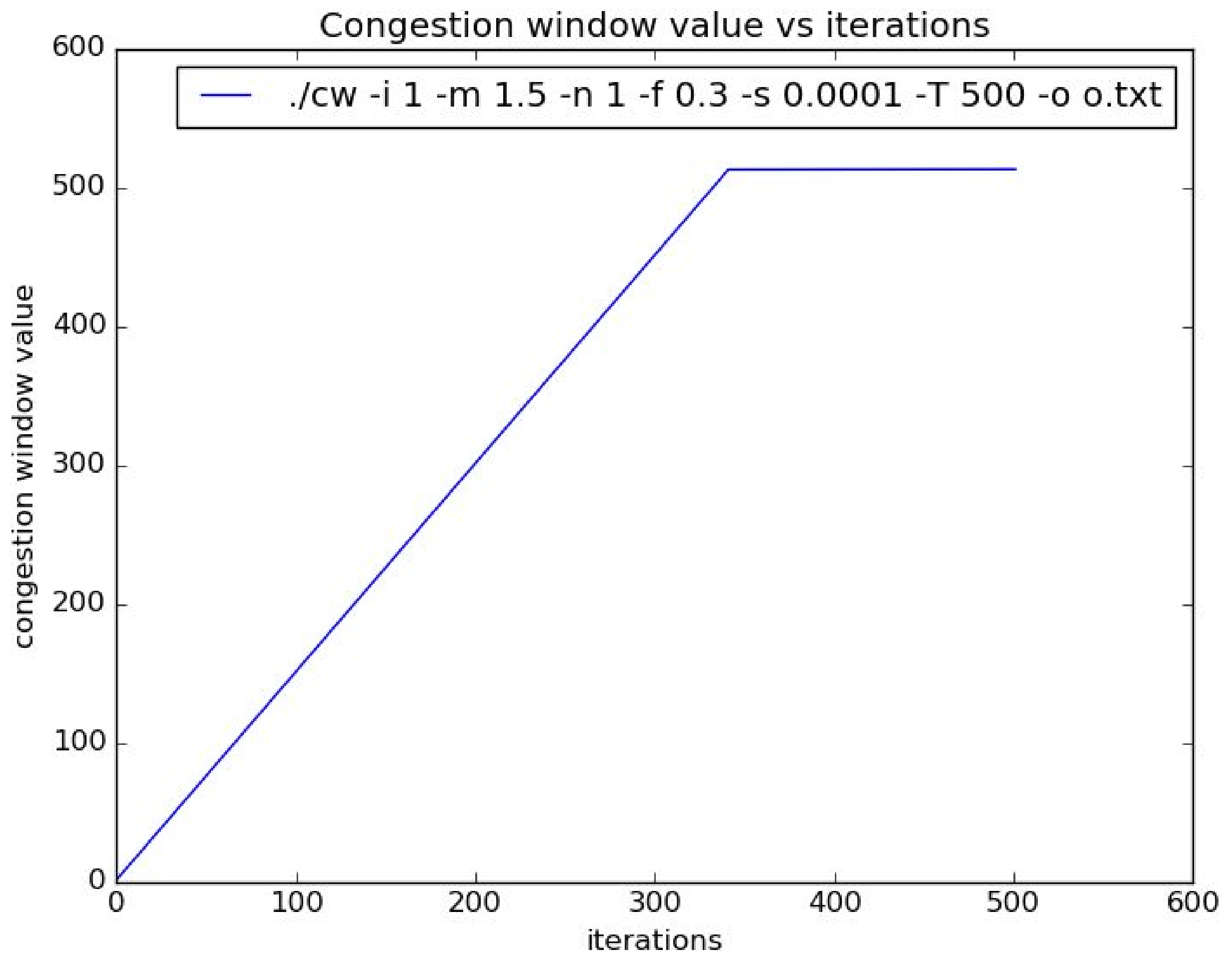
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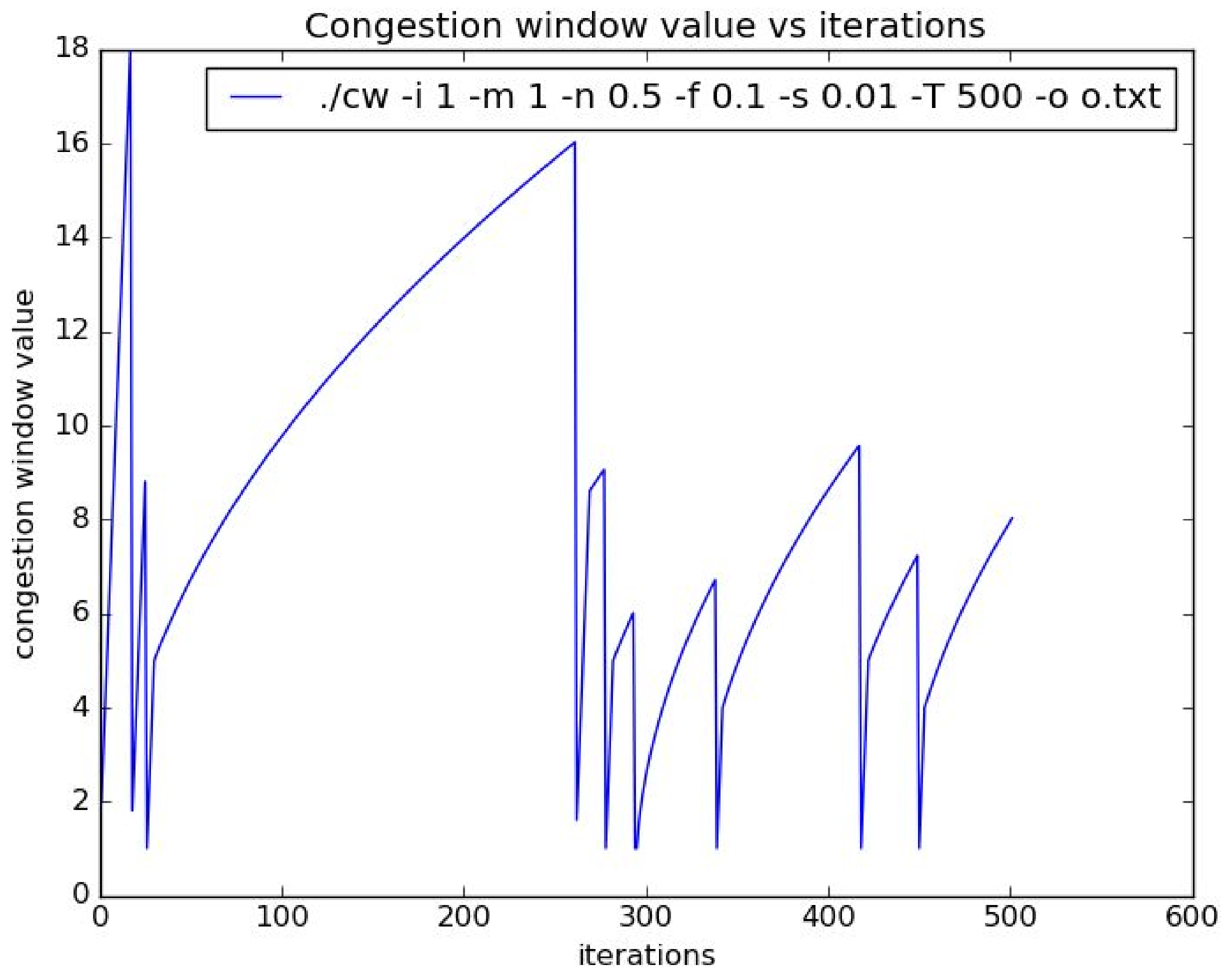
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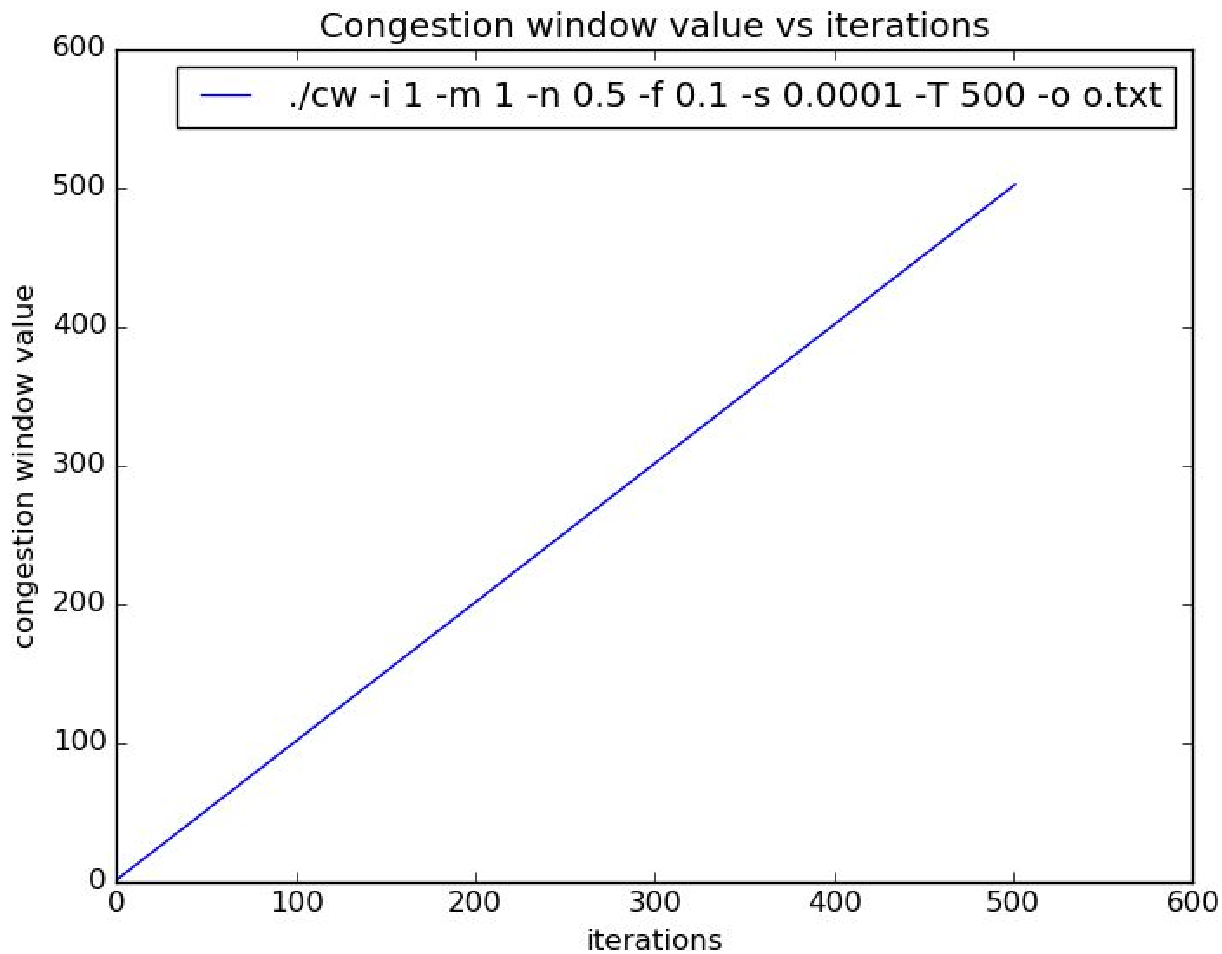
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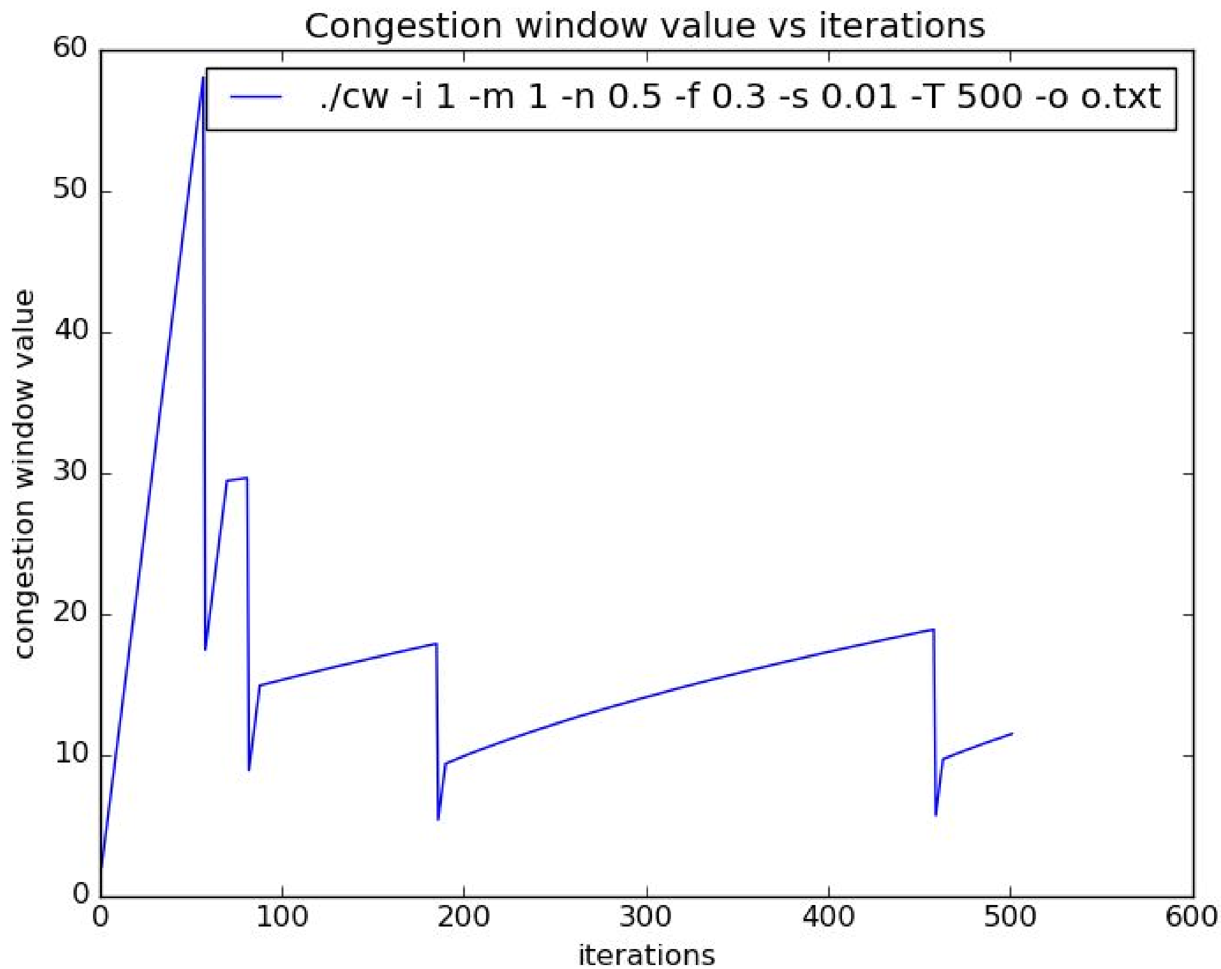

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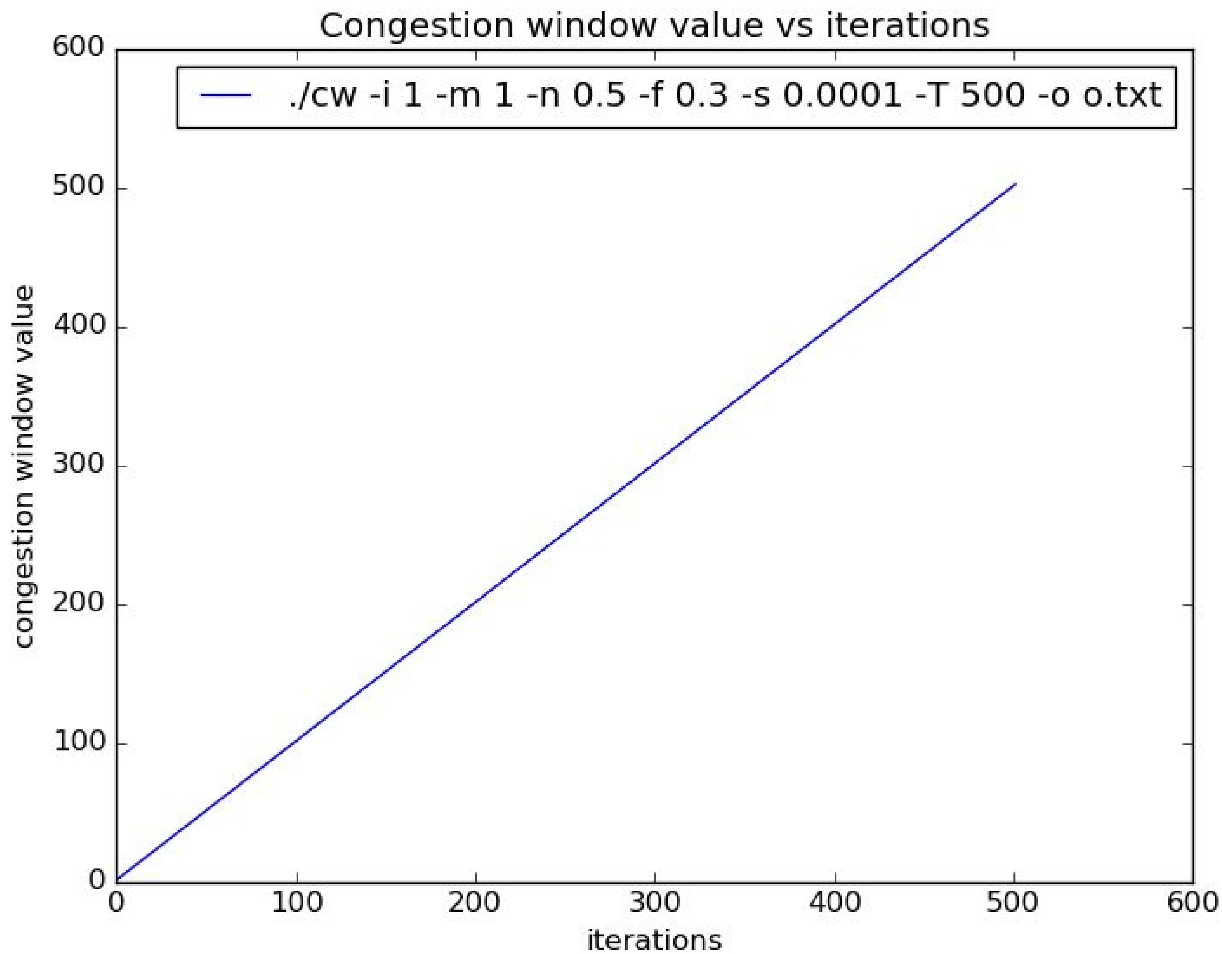
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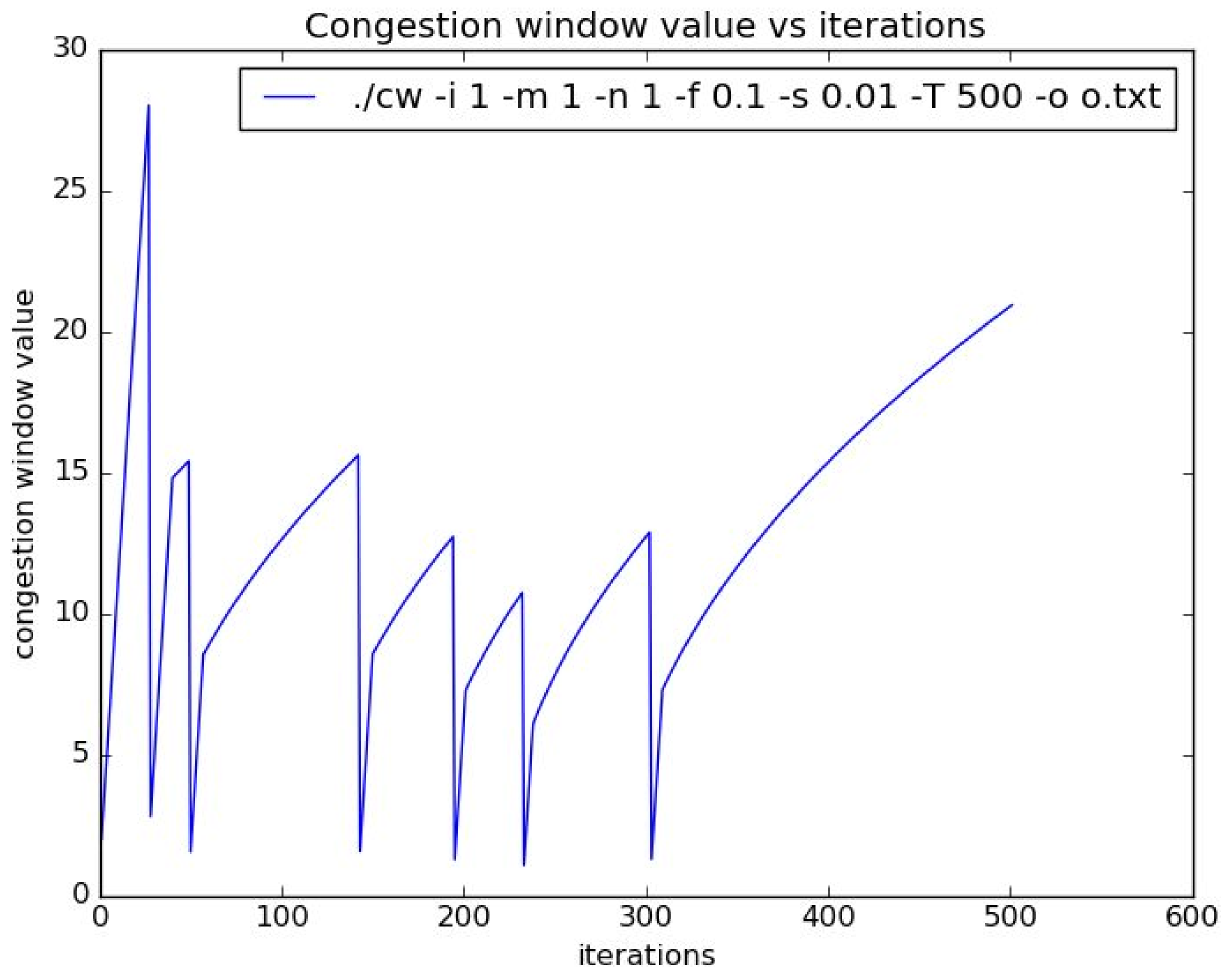
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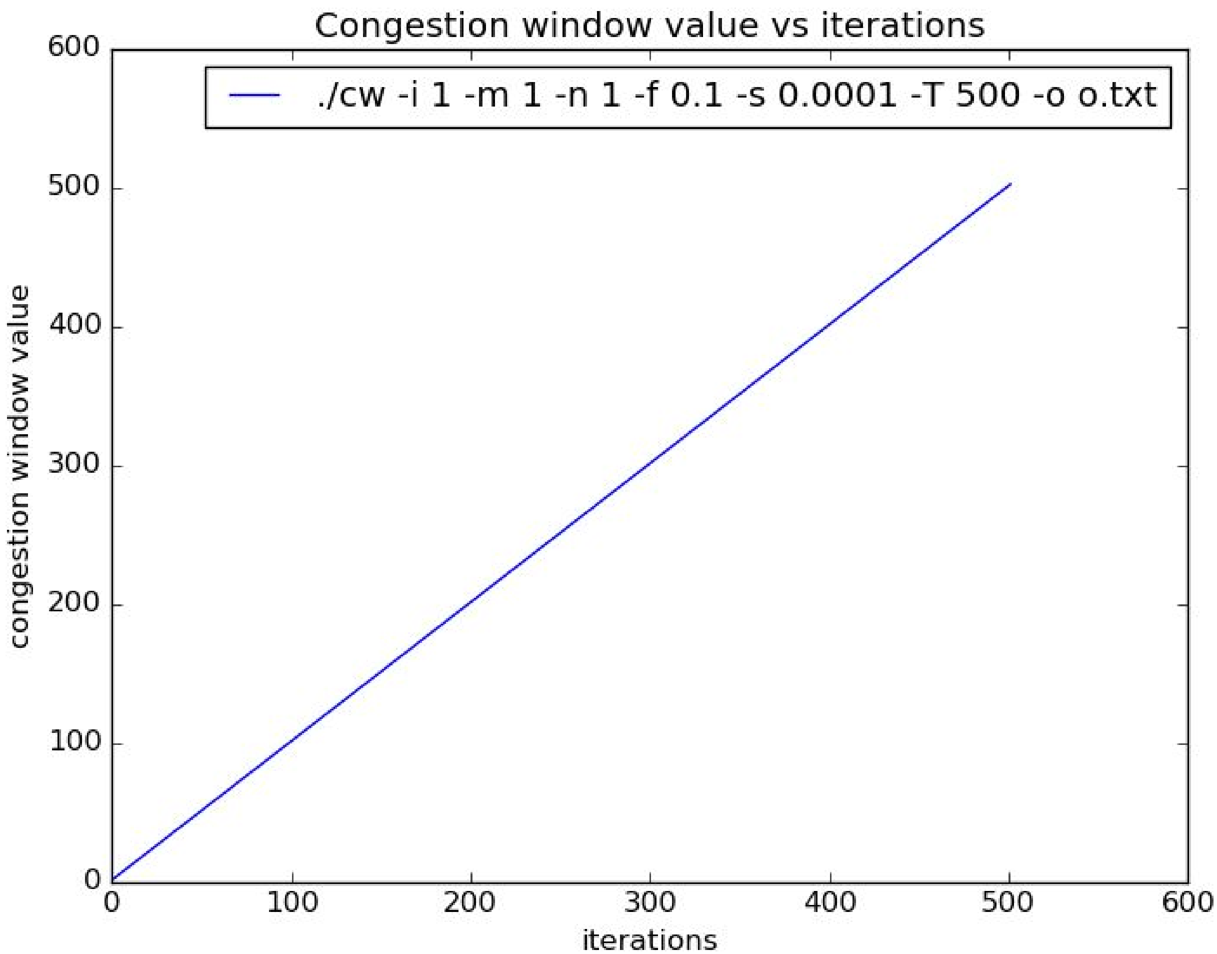
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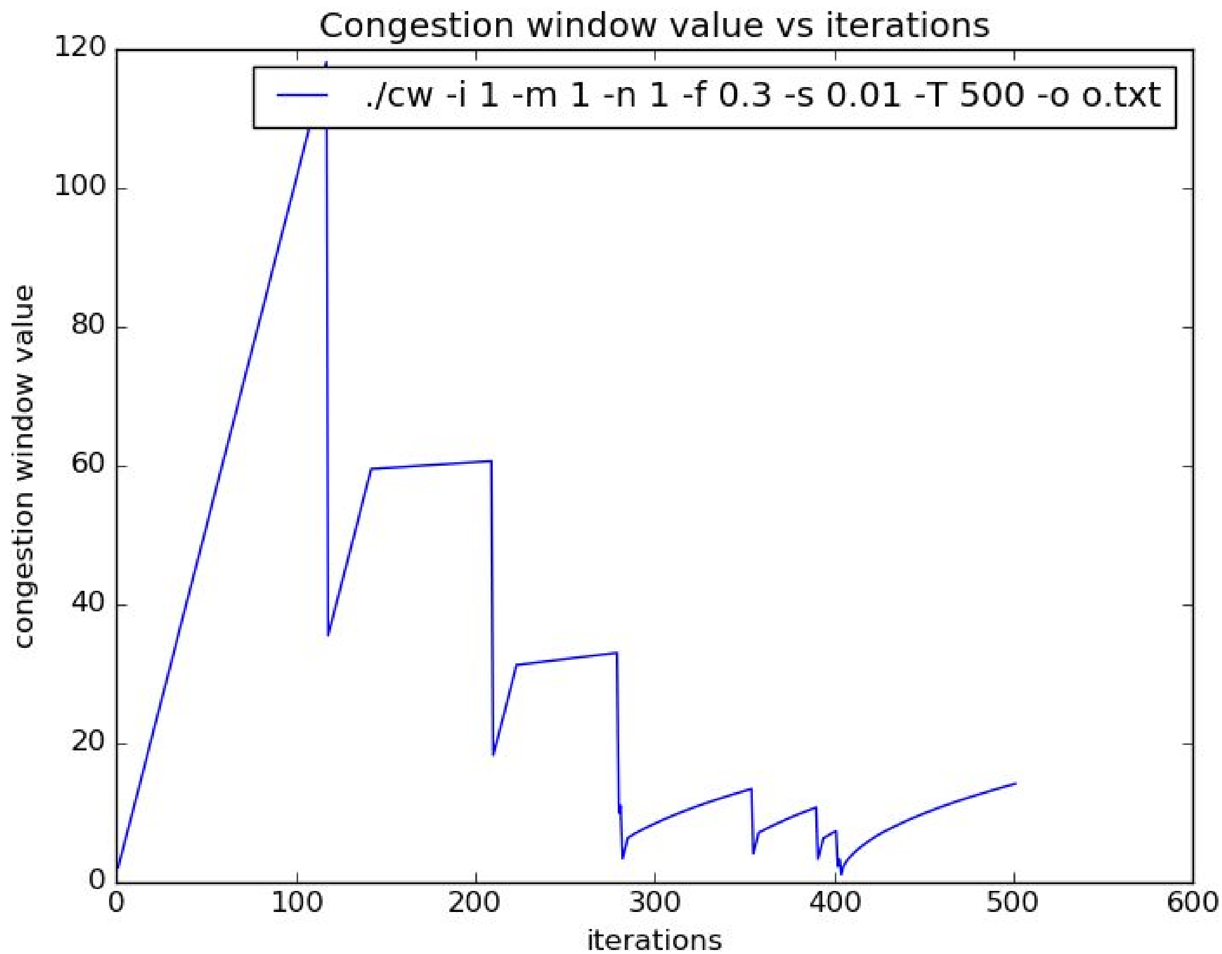
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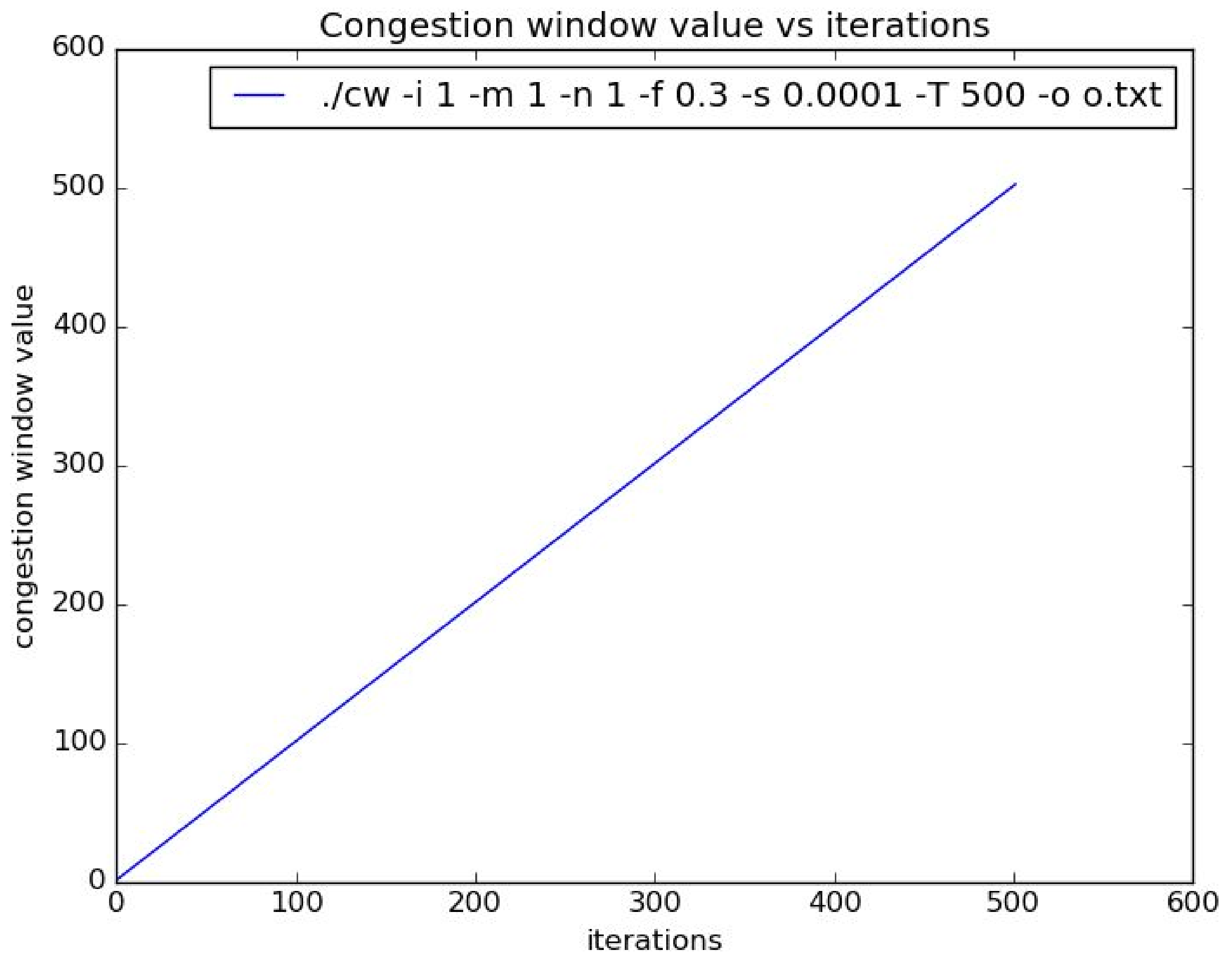
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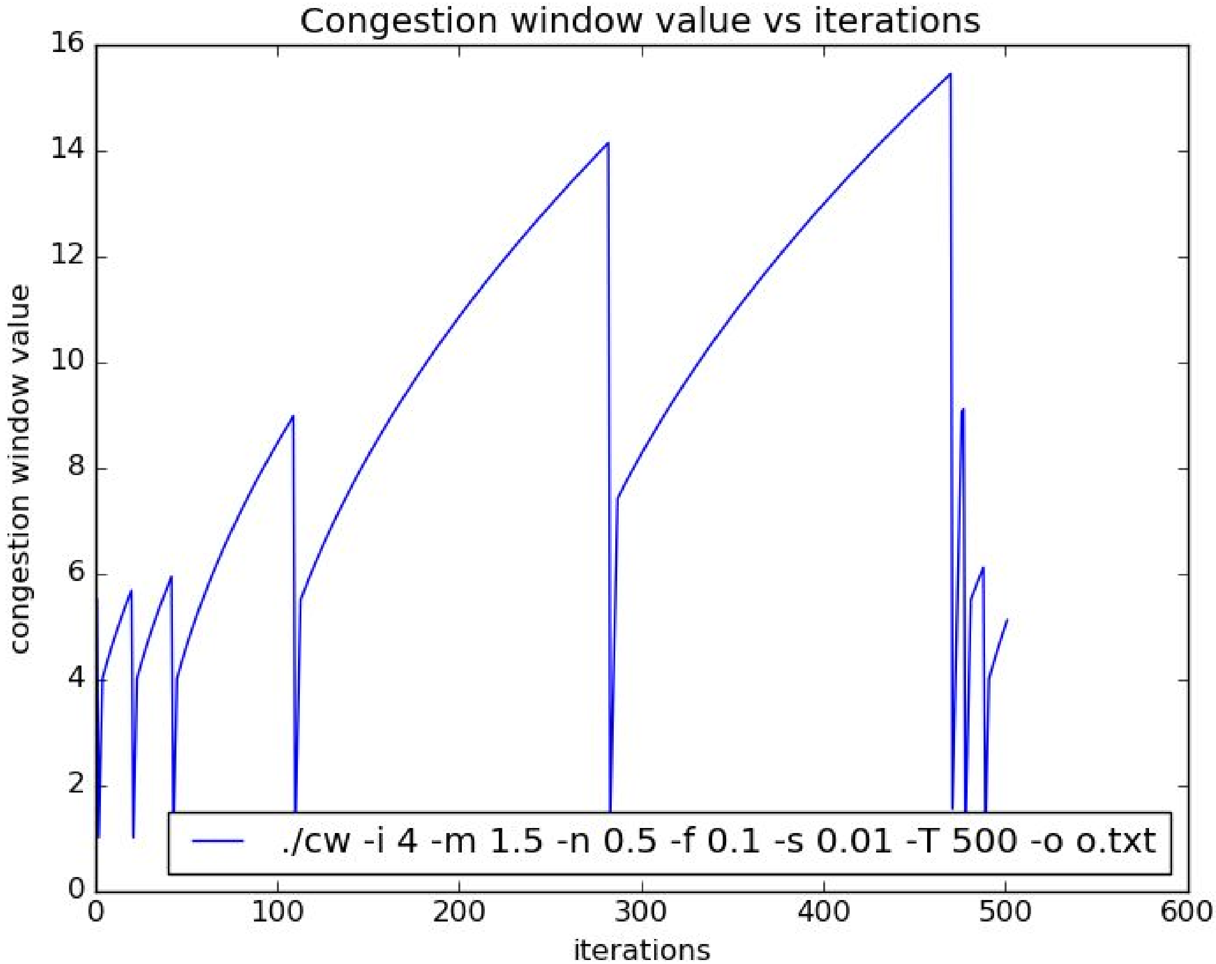
Congestion window value vs iterations
congestion window value
iterations
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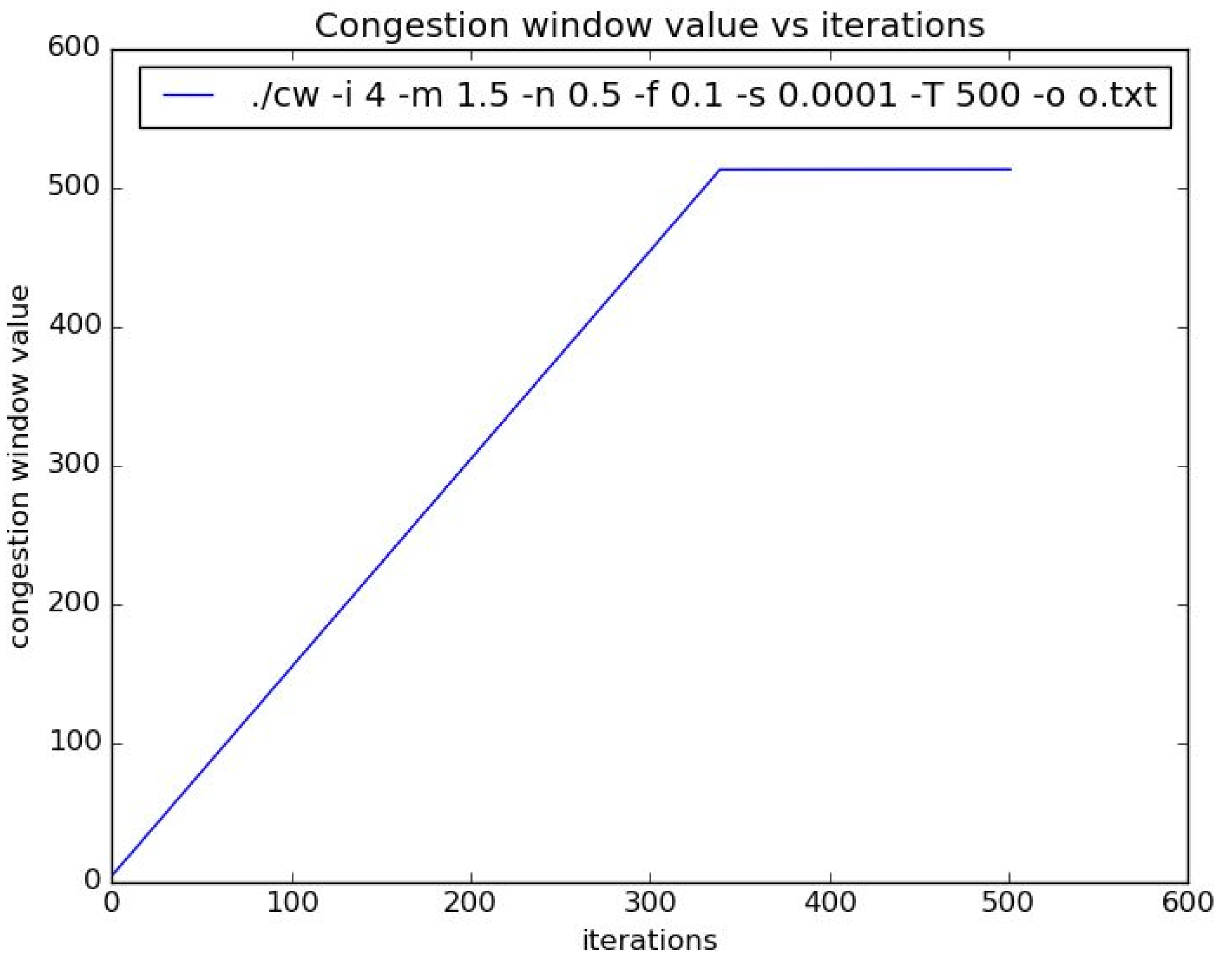
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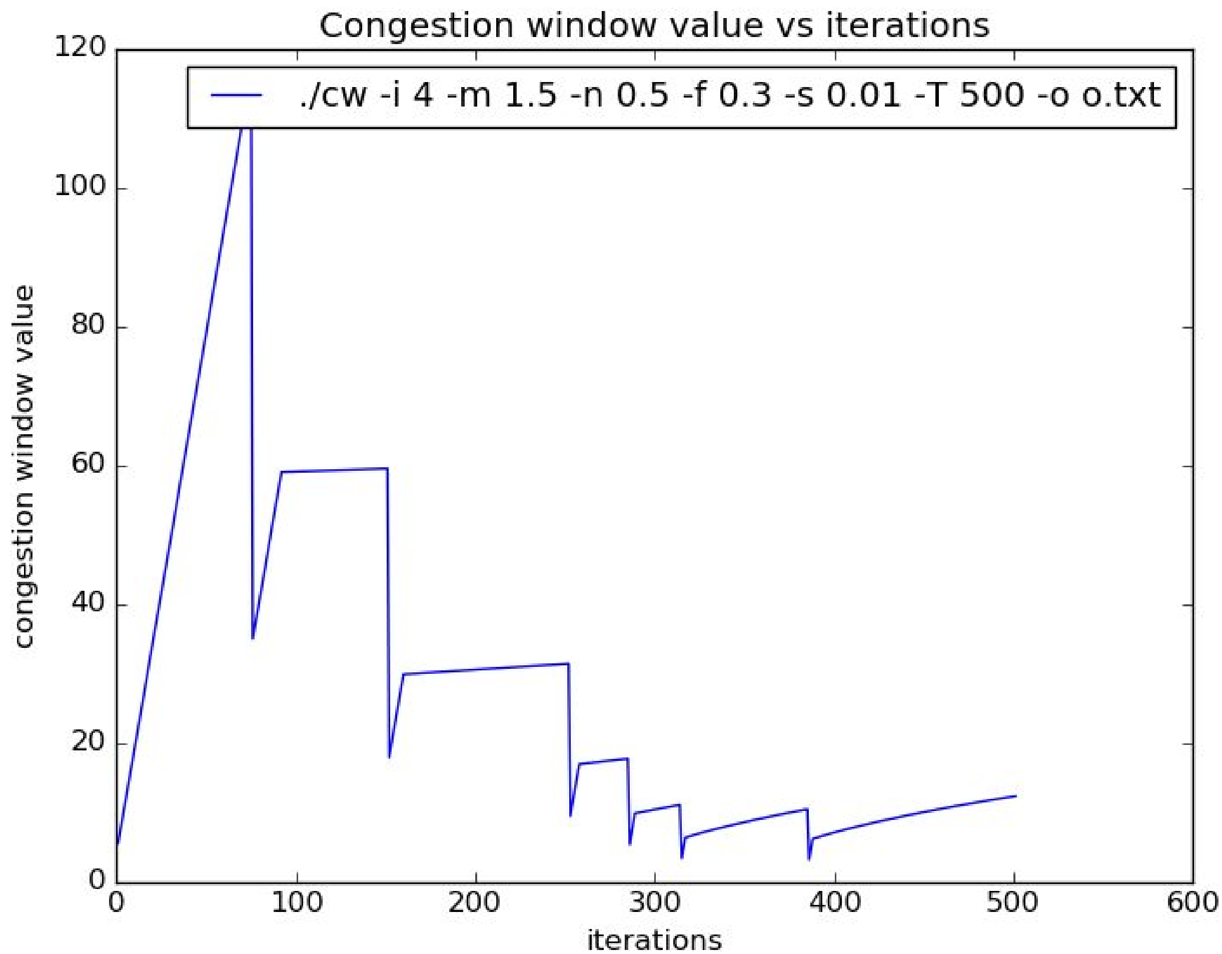
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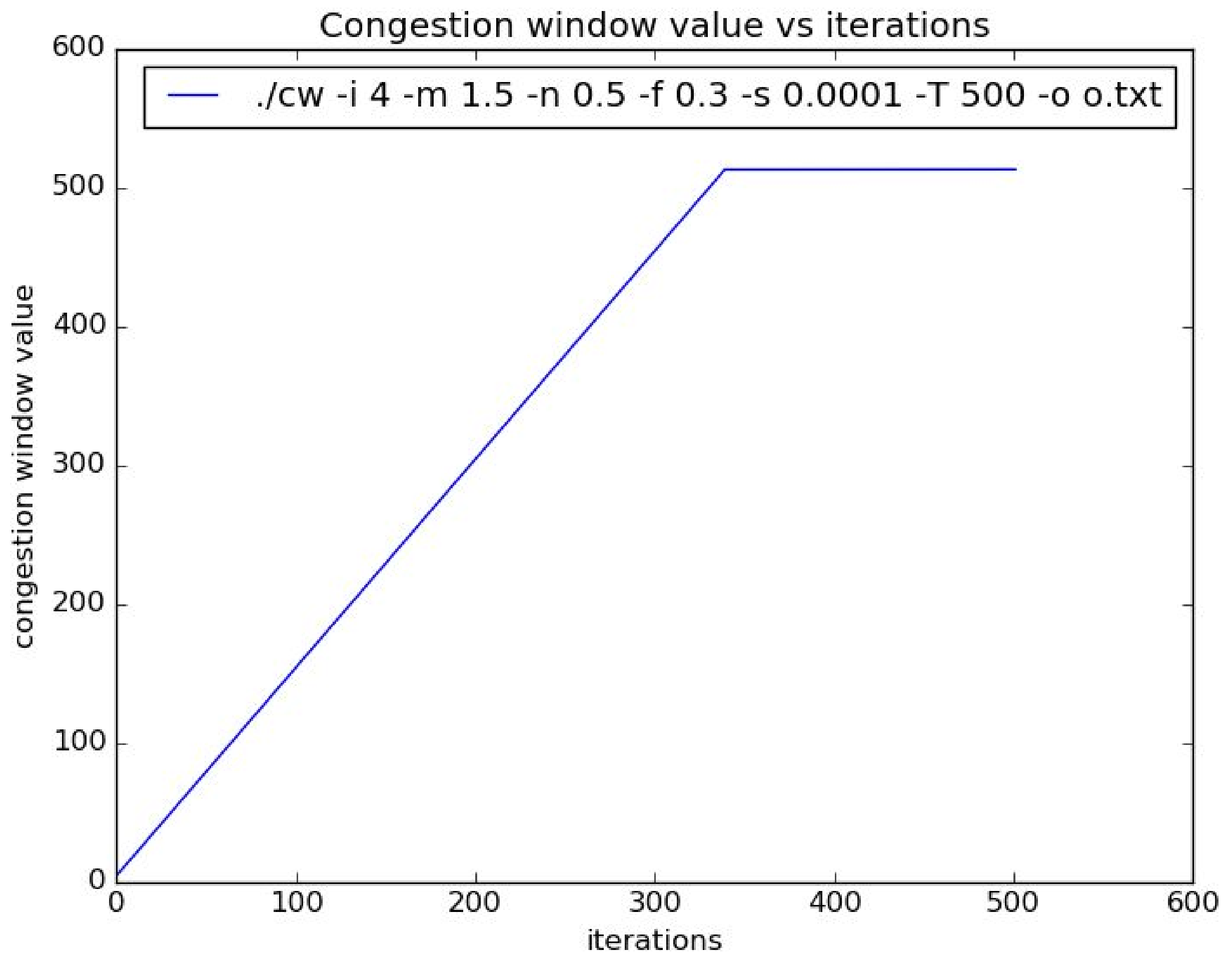
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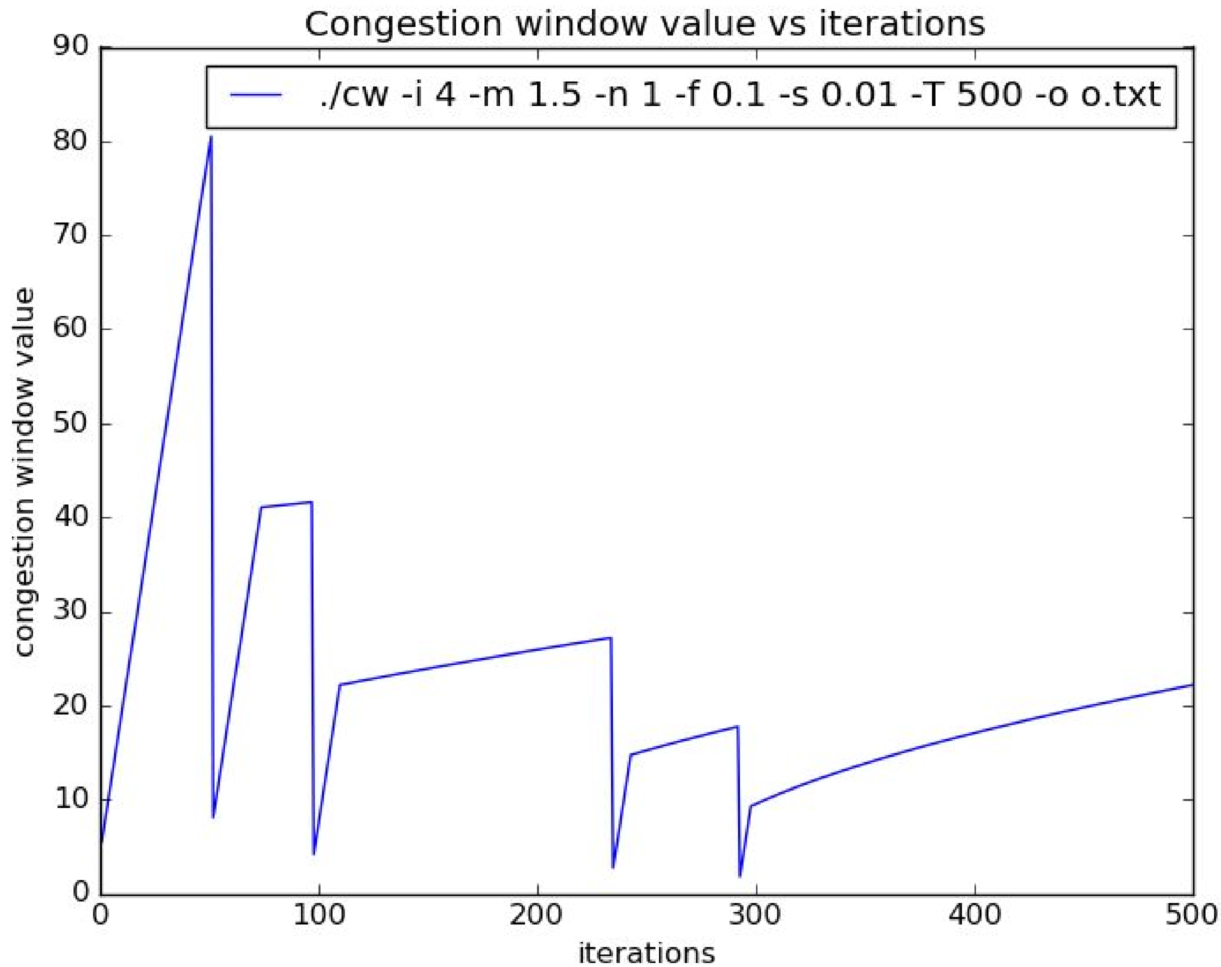

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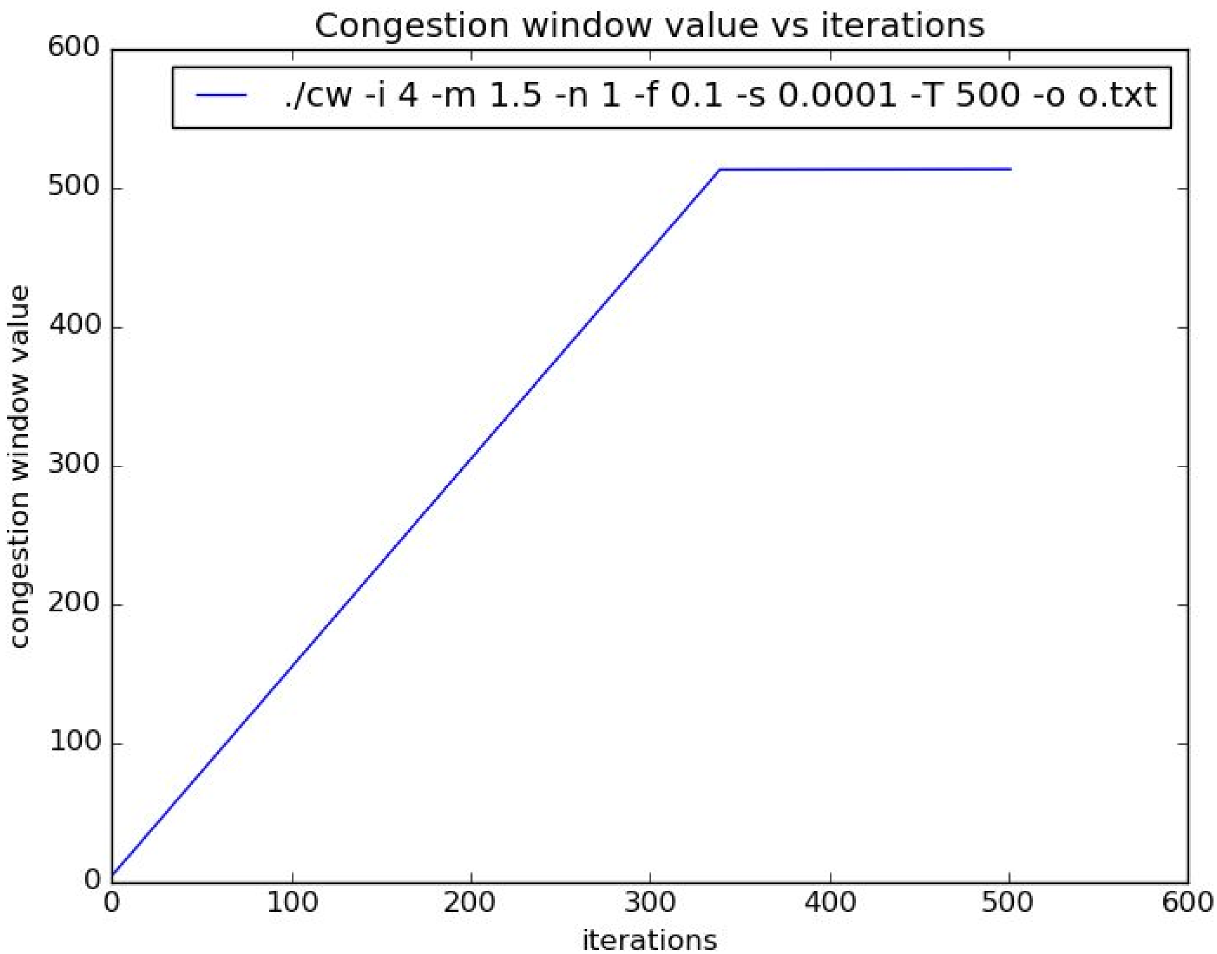
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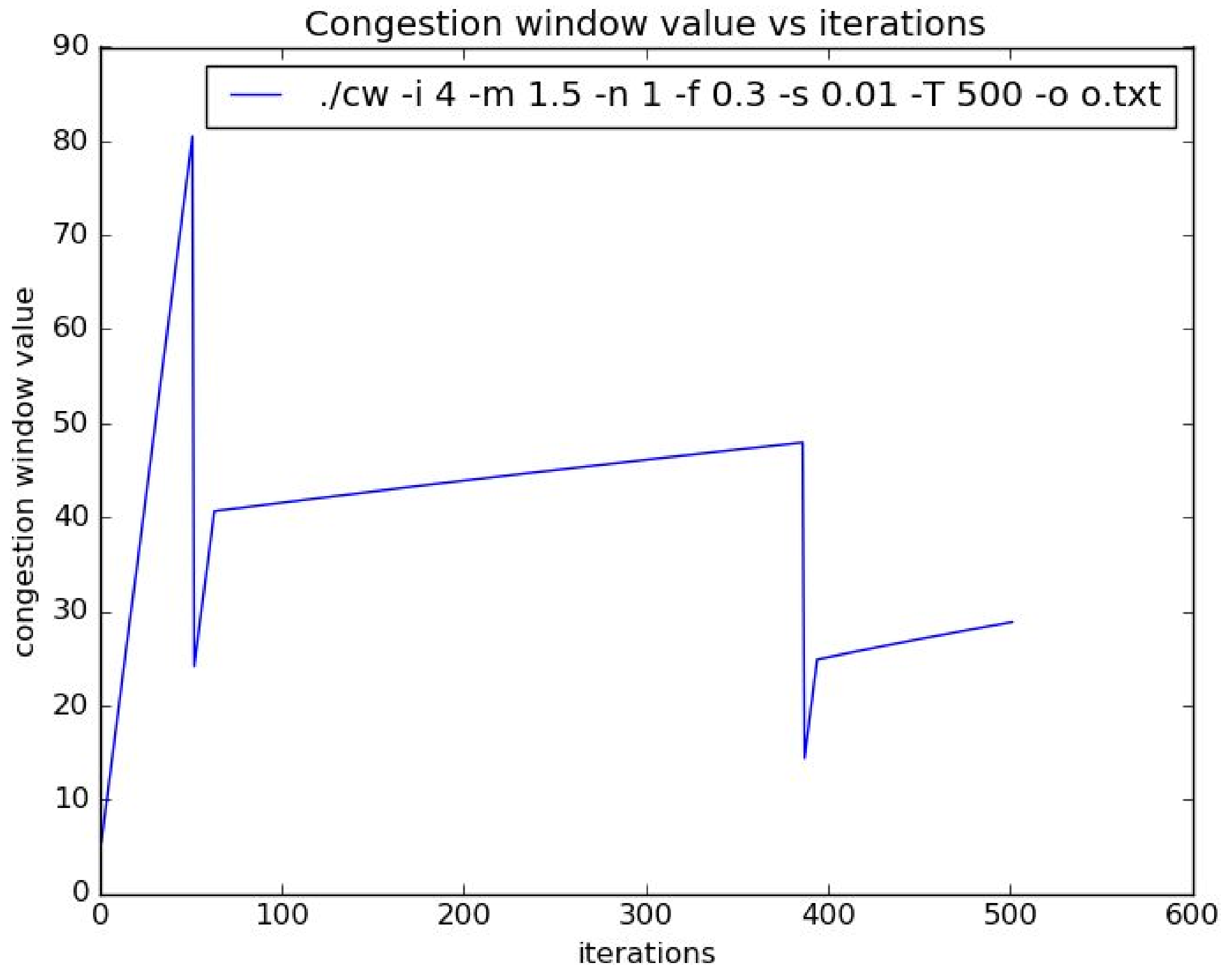
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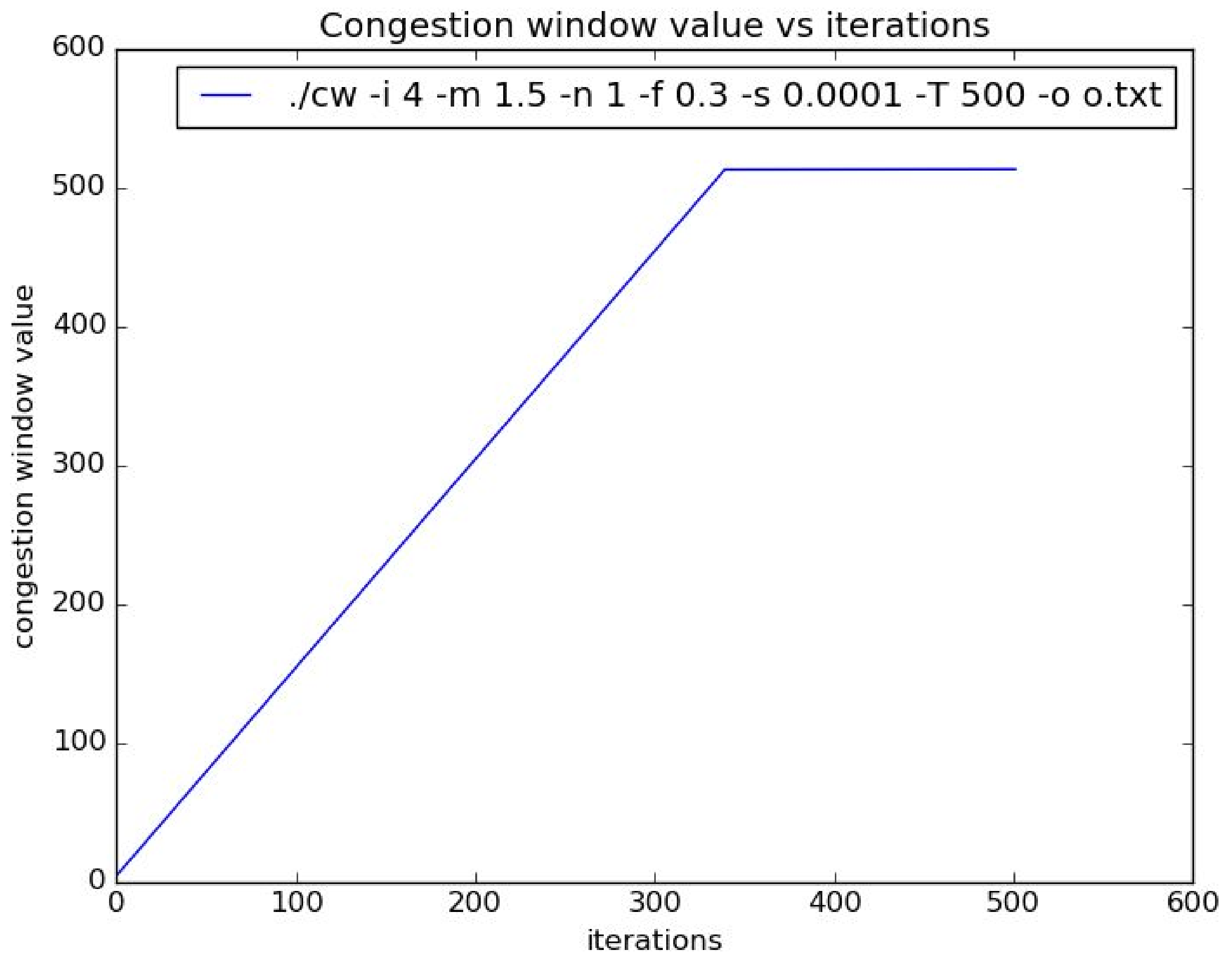
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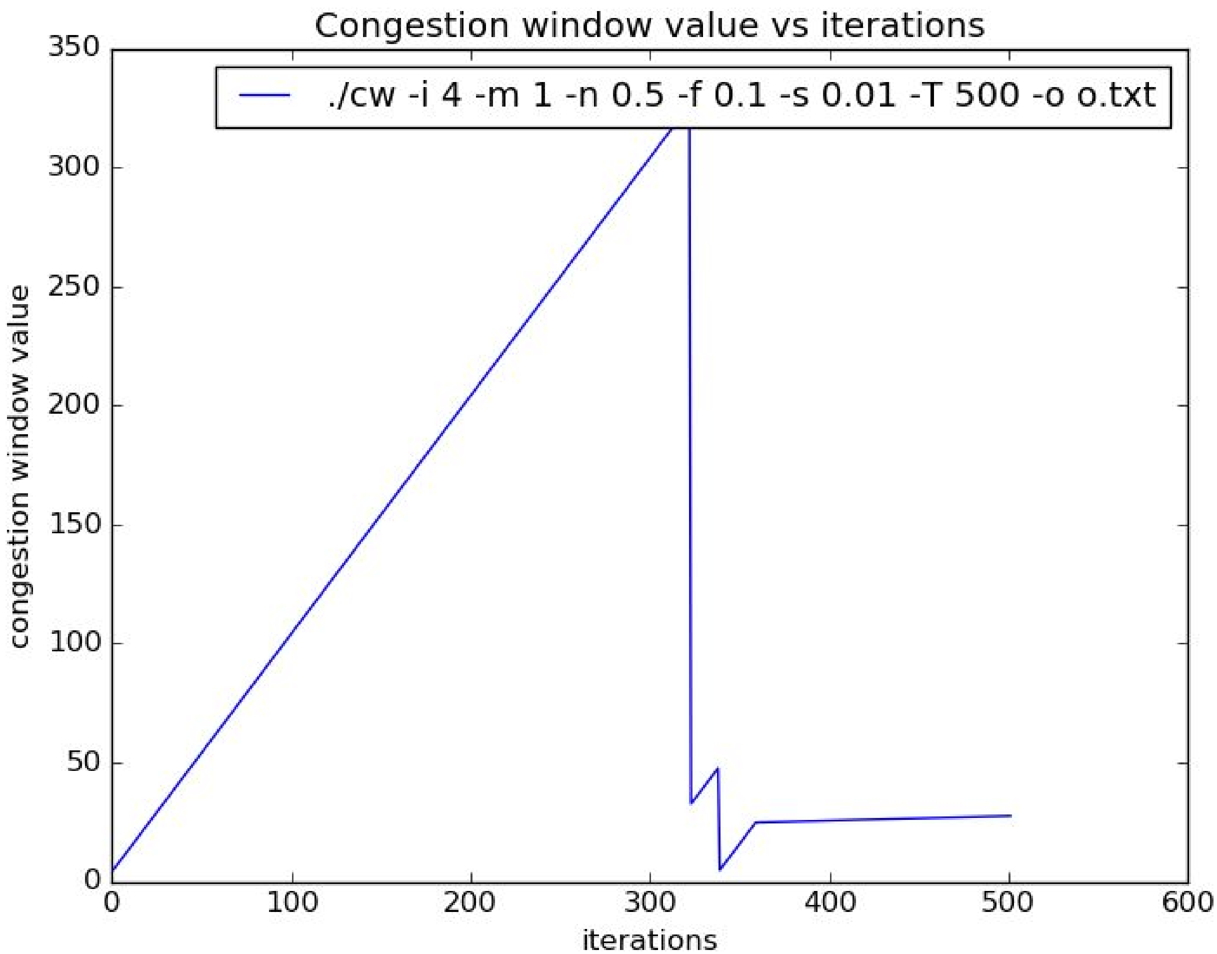
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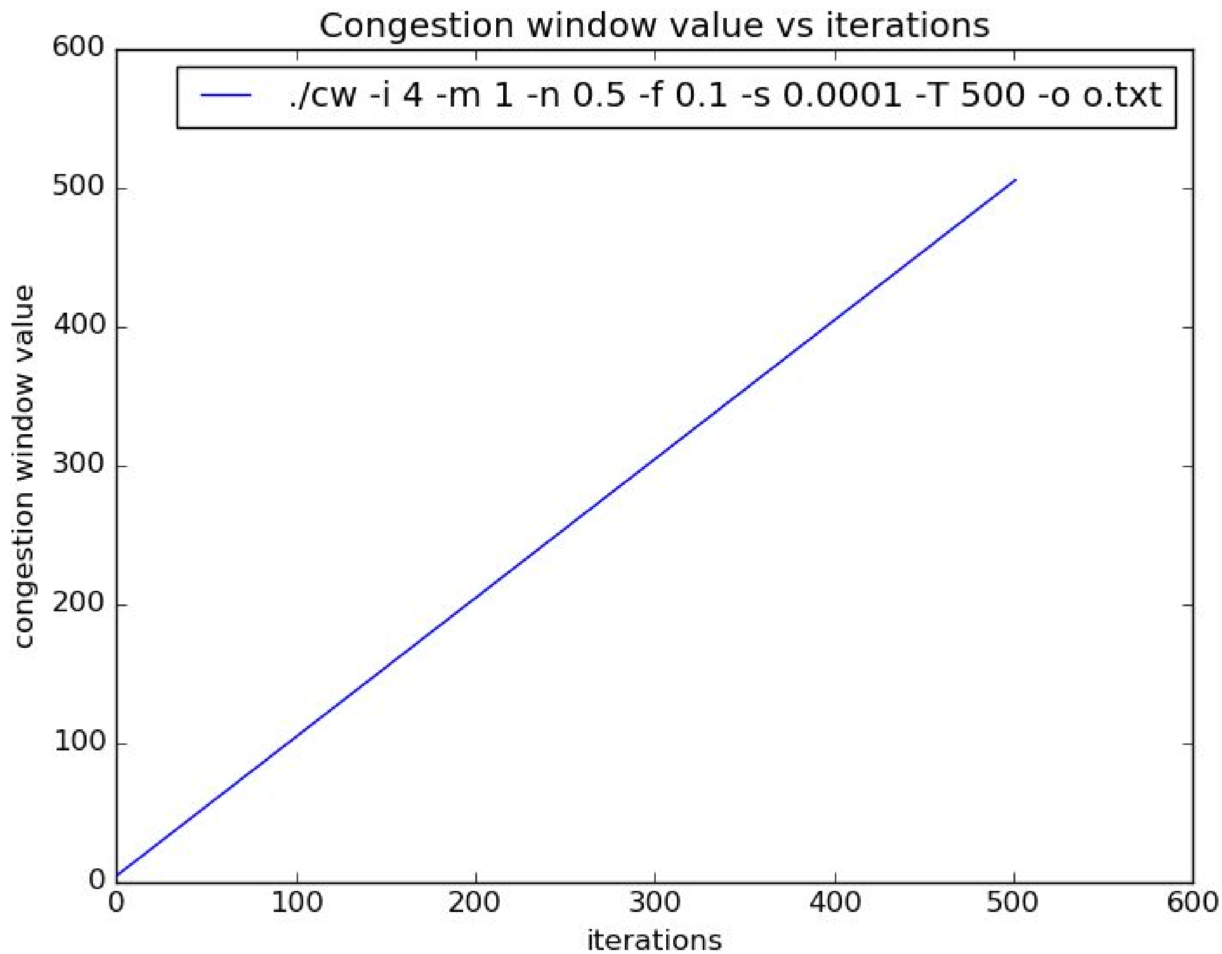

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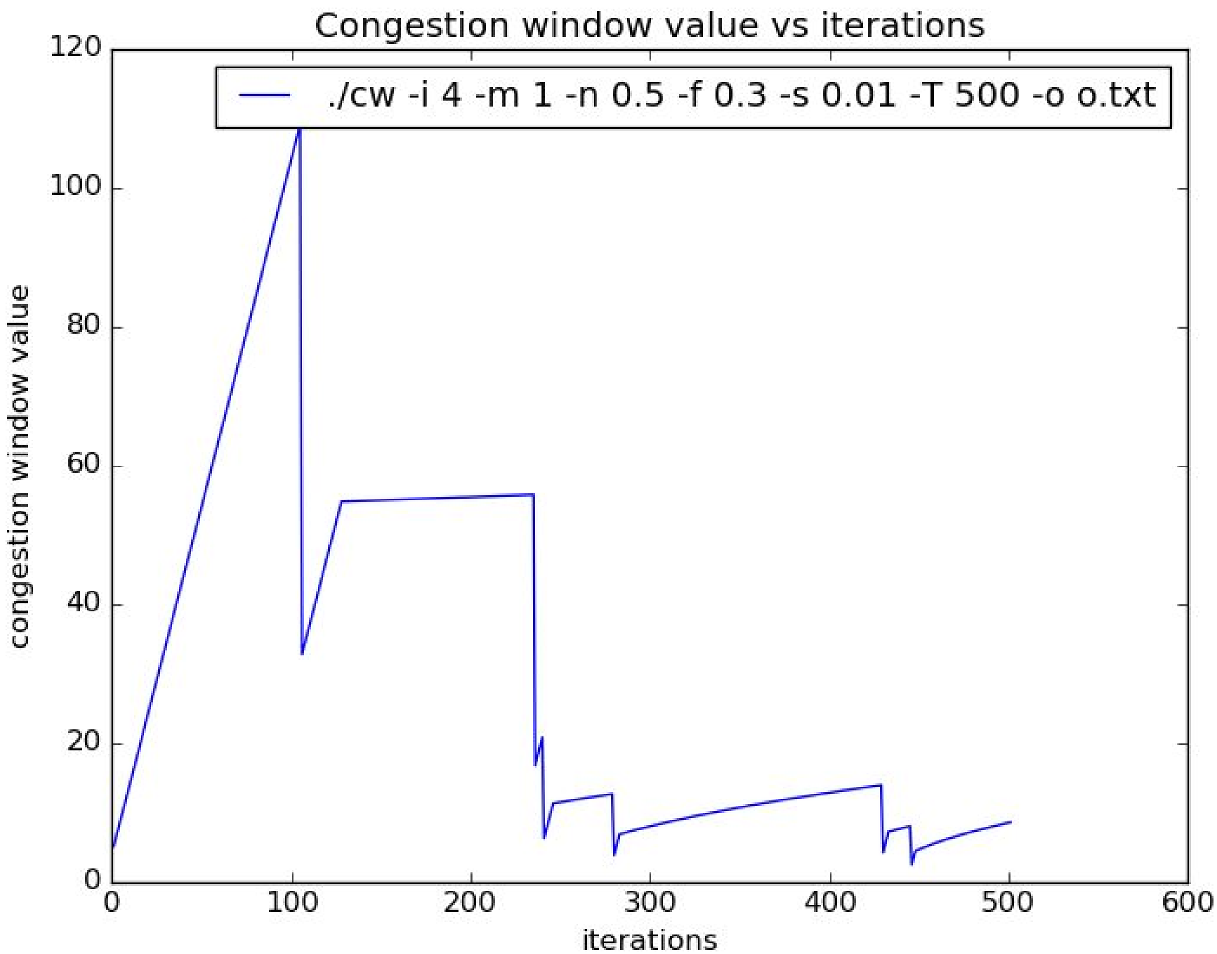
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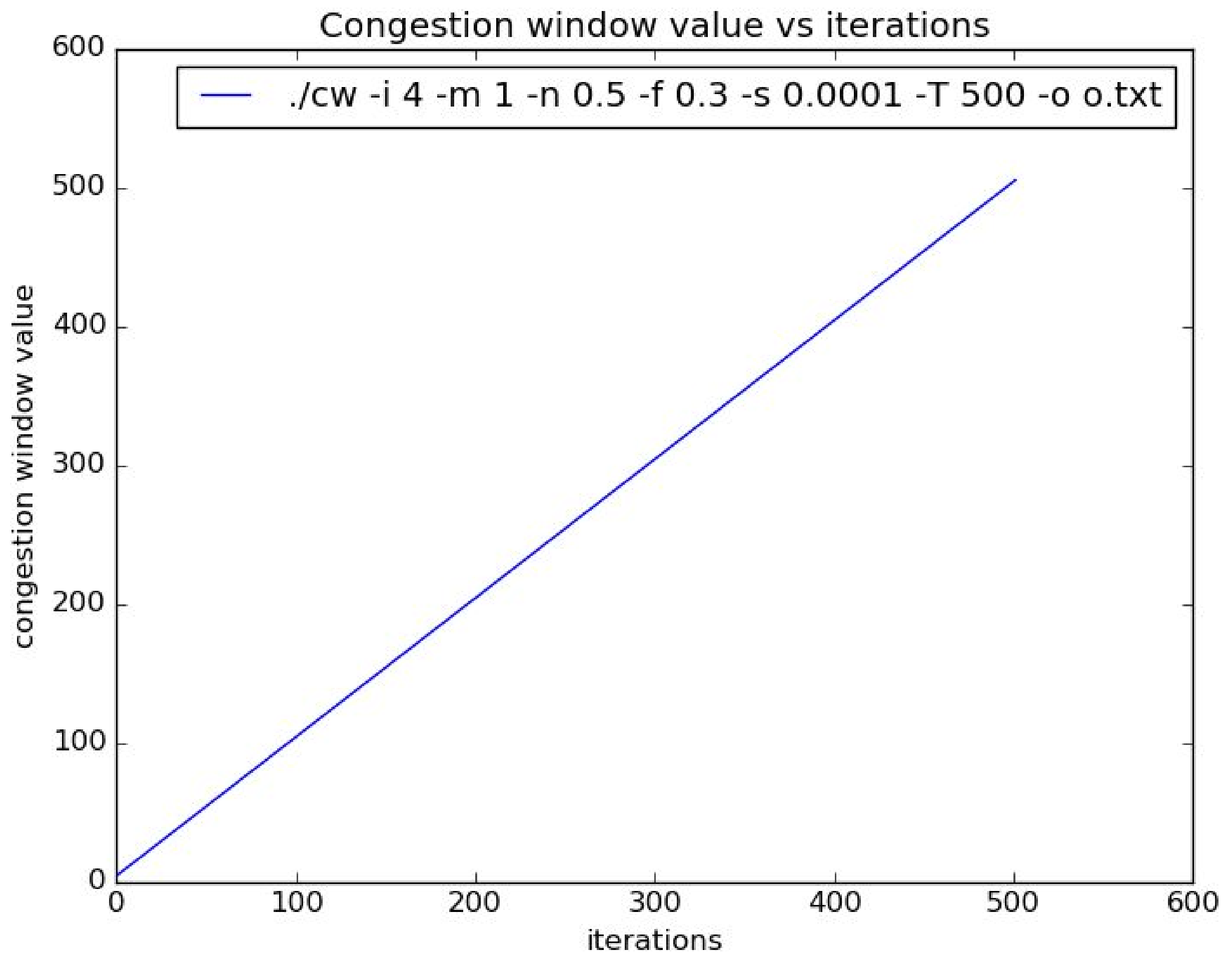
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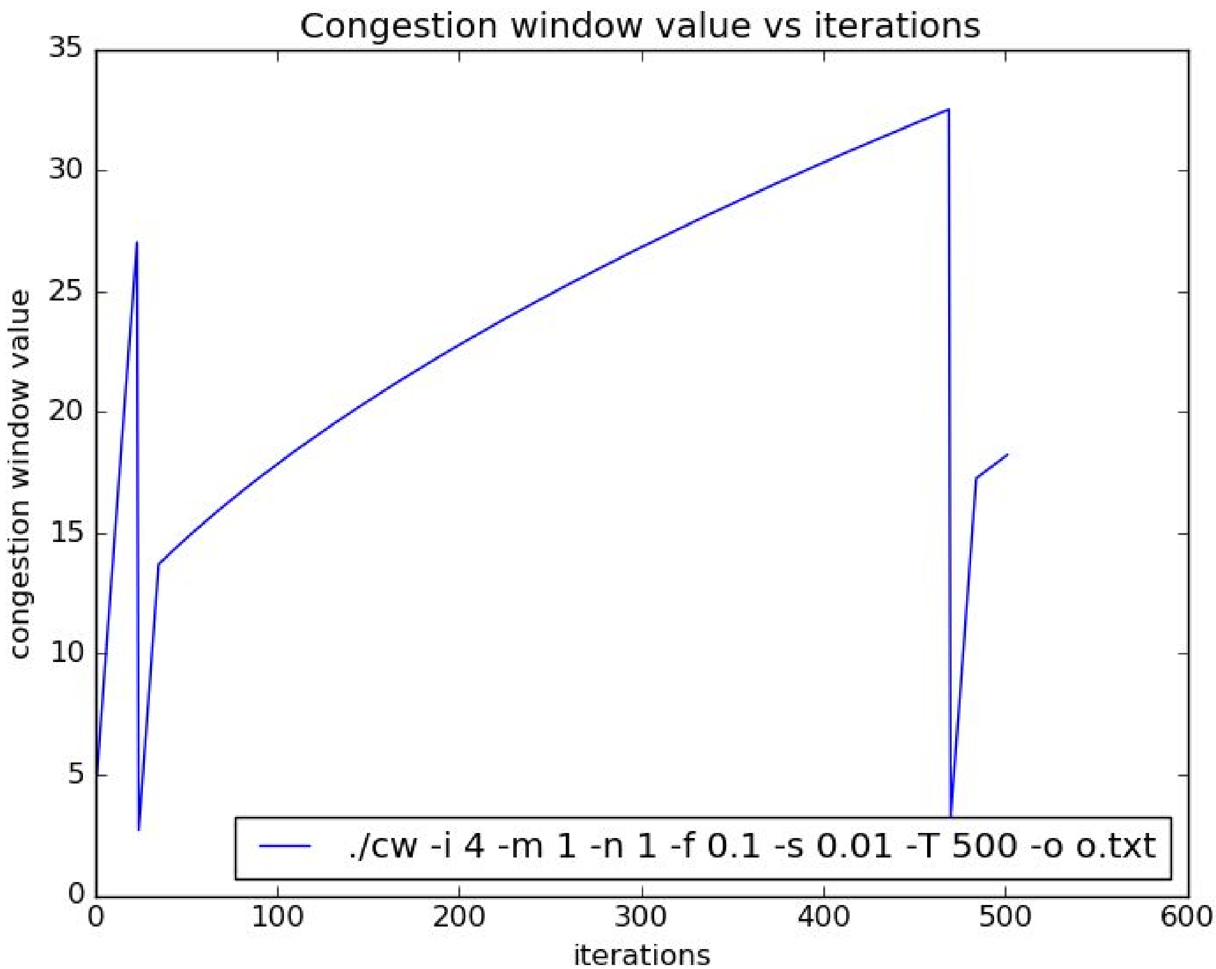
Congestion window value vs iterations
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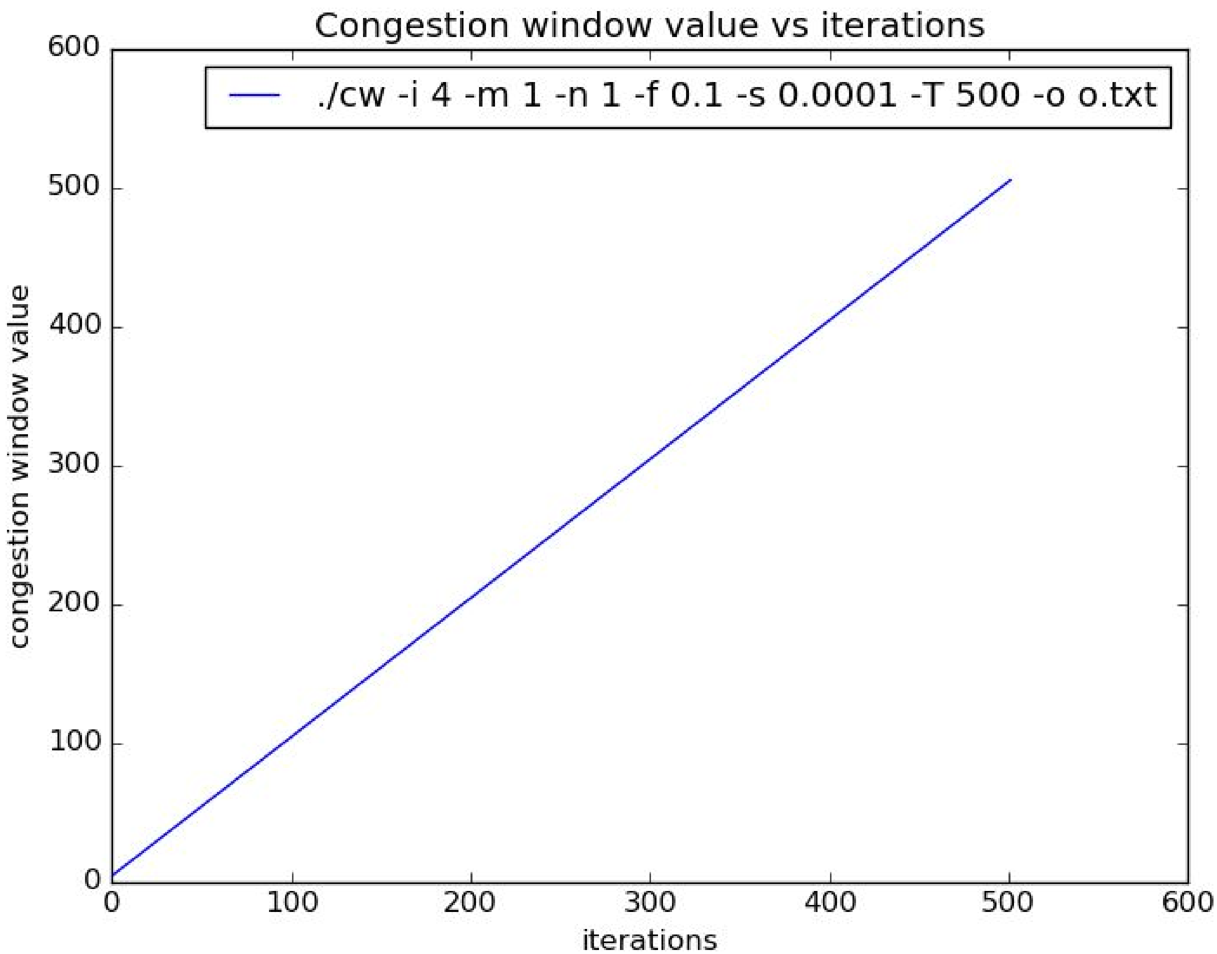
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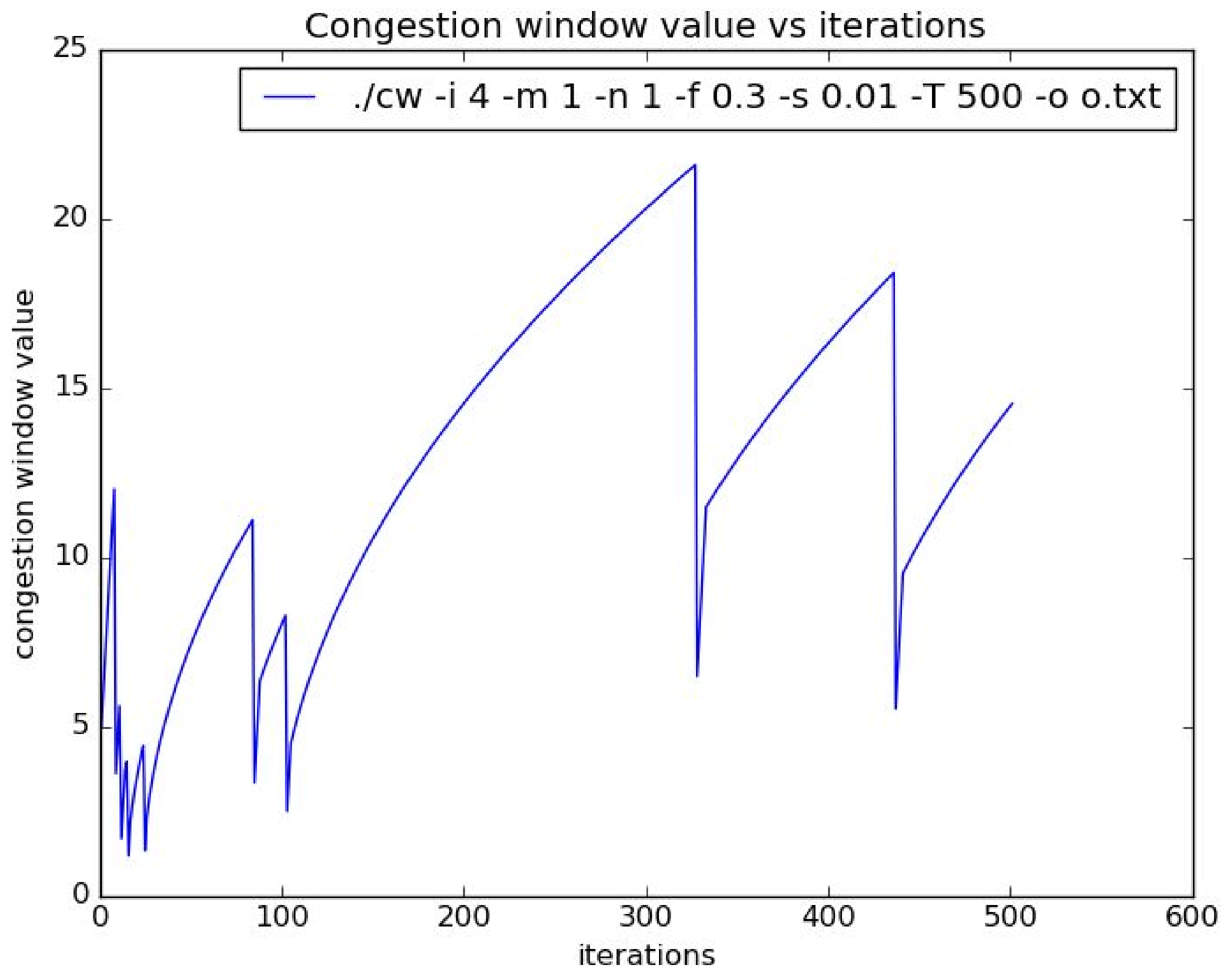
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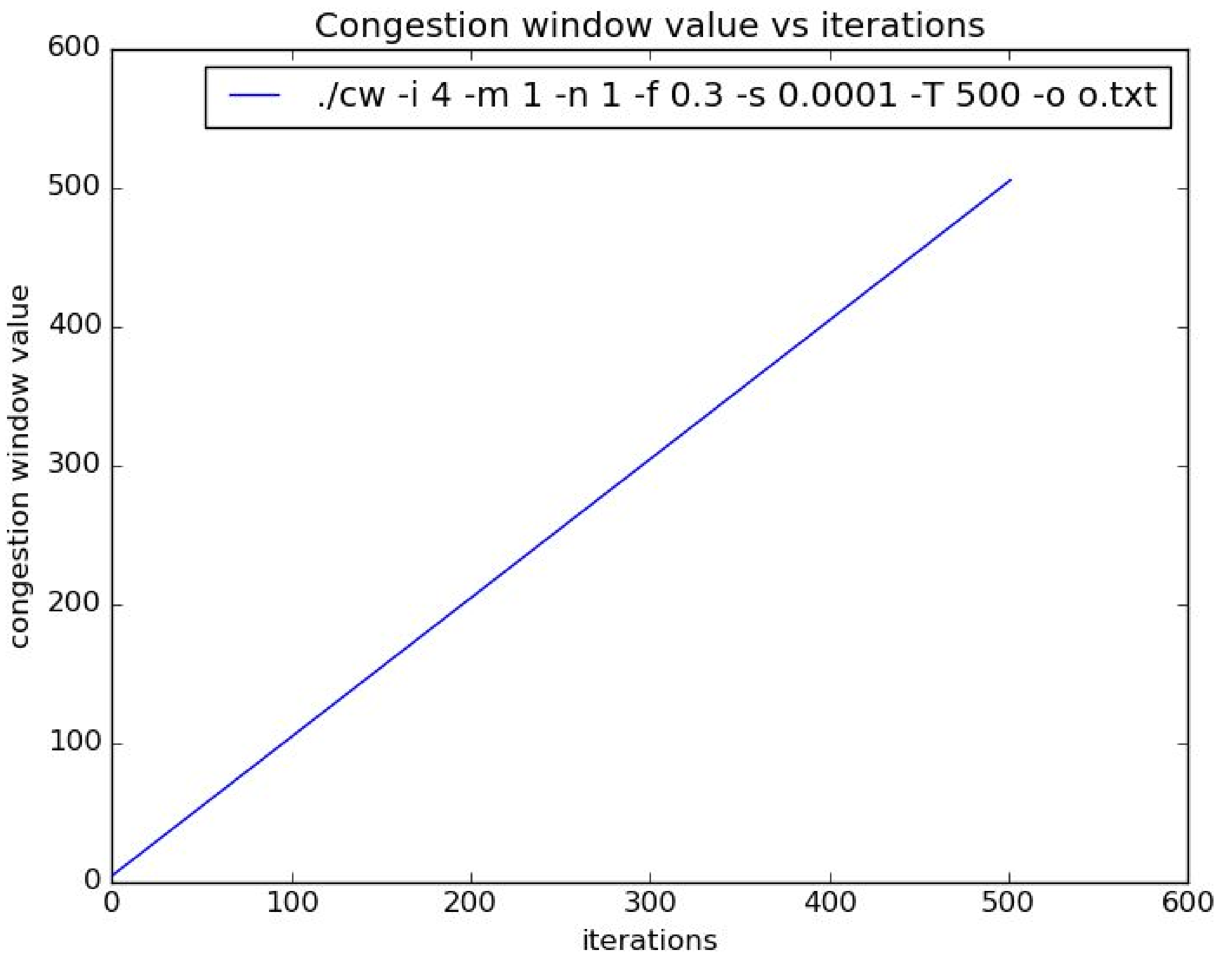

In these plots we can observe the linear relationship and the logarithmic relationship and observe the outcomes that were observed early on.

README

The command line arguments are followed as in the question.

Type make to compile the scripts.

To run type: ./cw -i 1 -m 1 -n 0.5 -f 0.1 -s 0.01 -T 100 -o o.txt'

The parameters are changed according to the problem statement

To run python script type: python graph.py

For running script: scriptreplay --timing=time.txt script.log