AJAYKRISHNAN JAYAGOPAL
CS14B033

TCP Congestion Control

8th April 2017

OVERVIEW

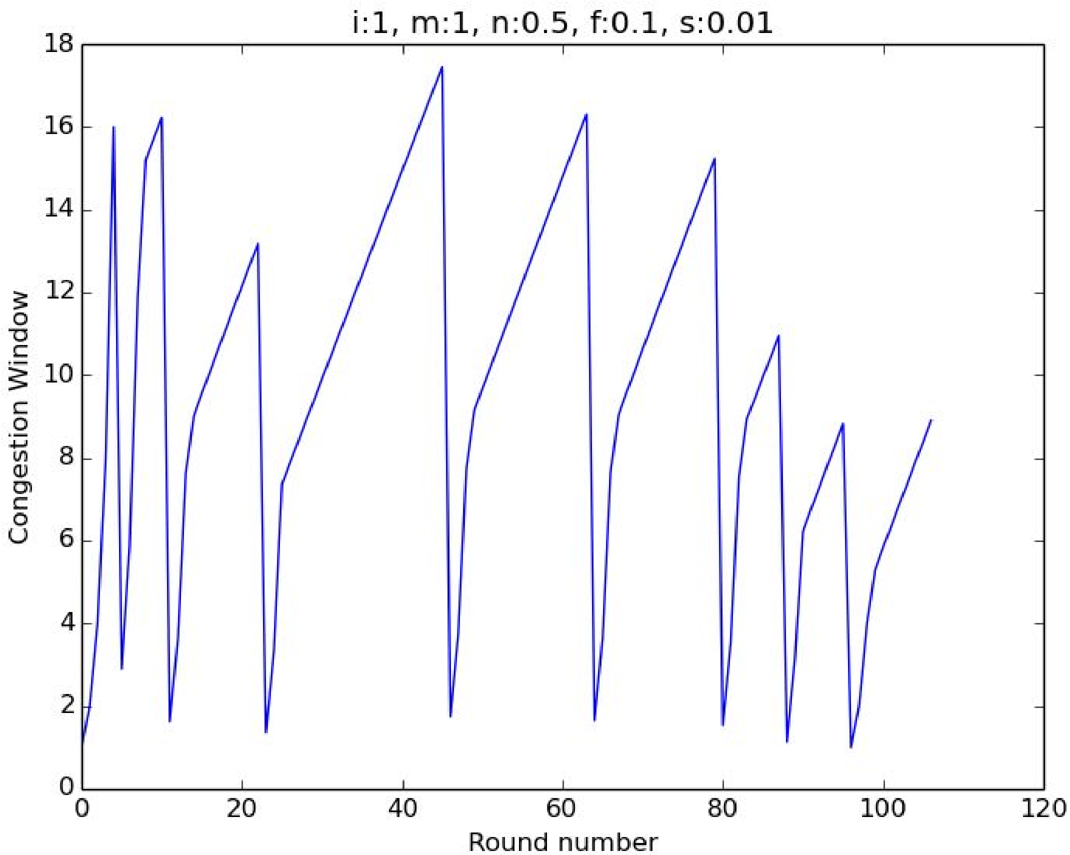
In this assignment, we simulated the TCP congestion window algorithm. The values of the congestion window size at the end of each round of transmissions was plotted and the resulting graphs are displayed below.

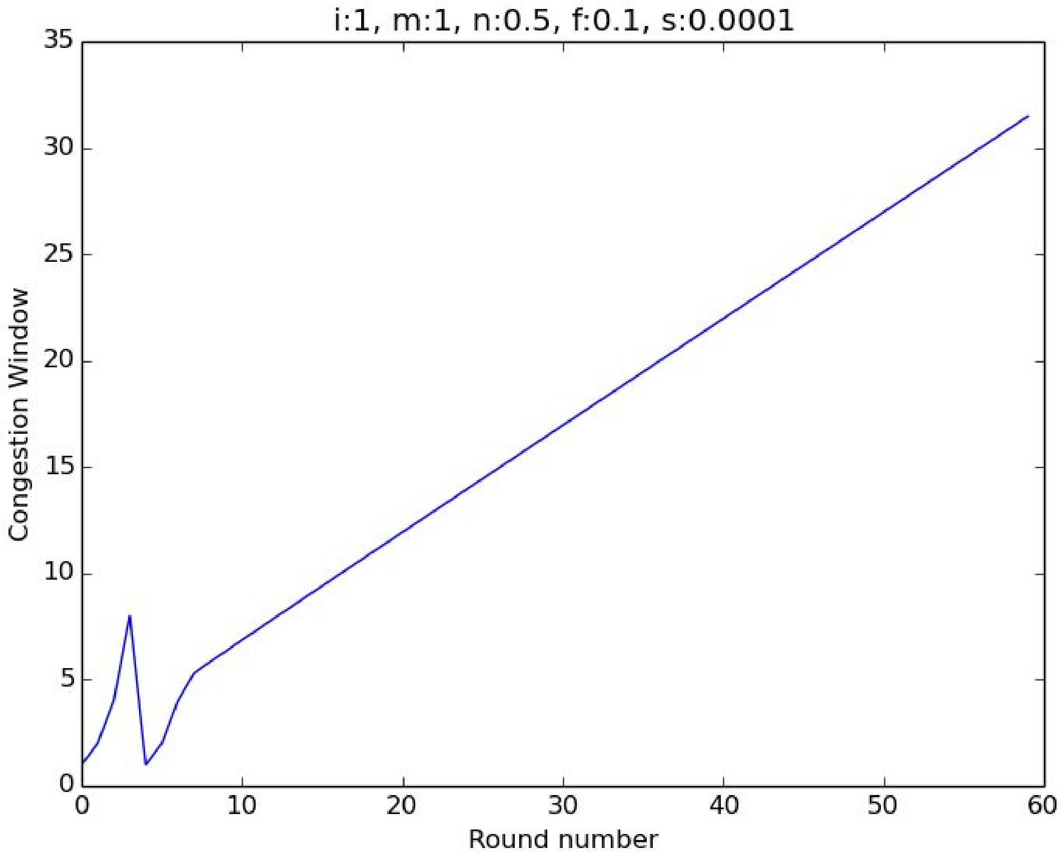
The following observations were made from this experiment:

1. At very low failure probability rates, the transmission occurs successfully most of the time and hence the resulting graph mostly follows an exponentially increasing curve. Only when a timeout occurs, the congestion window is reduced in size, so if timeouts do not occur at all, then the congestion window increases exponentially till it reaches the congestion threshold. After this point, the graph rises linearly.
2. At moderate failure probability values, timeouts occur more frequently and hence the number of spikes and falls in the graph are more numerous. After each timeout, the congestion window size drops sharply and the threshold is also updated. If the new congestion window size happens to be lower than the new threshold, then the graph again follows an exponential path; but if the new congestion window size is still higher than the threshold, then the path followed is again linear.
3. K_m is the multiplier for CW during the exponential phase. It is observed that increasing it also rapidly increases the slope of the exponential sections of the graph and hence, the congestion window crosses the threshold in a fewer number of rounds itself, and hence the length of the exponential portion is shorter, but steeper. On decreasing it, the length of the exponential portion increases, but it becomes flatter.
4. K_n is the multiplier for CW during the linear phase. The value of K_n directly affects the rate at which the congestion window grows after its value has exceeded the threshold ie. the slope of the linear portions of the graph. The congestion window size continues to grow linearly till a timeout happens.
5. K_f represents the fraction to which the CW is reduced whenever a timeout occurs. If $K_f >= 0.5$, then the new CW might still be above the threshold and hence even after the CW drops, the graph continues to be linear and not exponential. On the other hand, if

$K_f < 0.5$, then whenever a timeout occurs, the CW value will drop below the threshold. In this experiment, we have always chosen $0.1 < K_f < 0.5$.

GRAPHS





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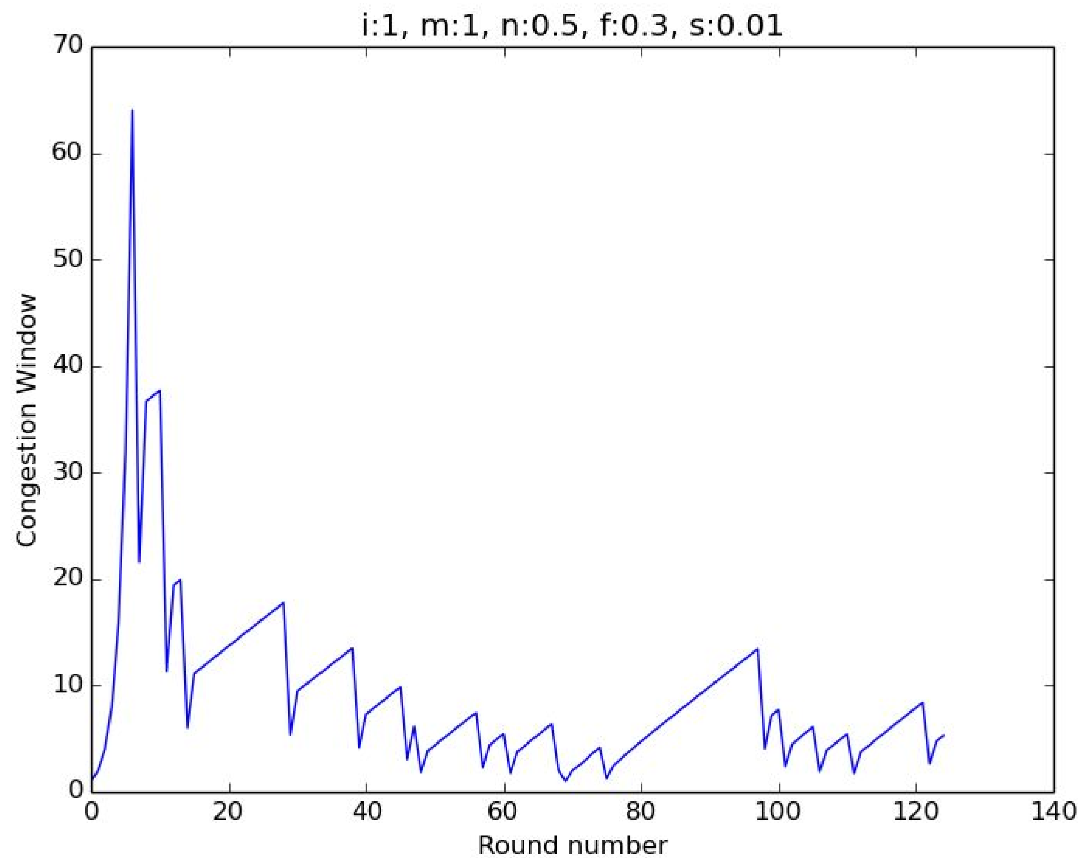
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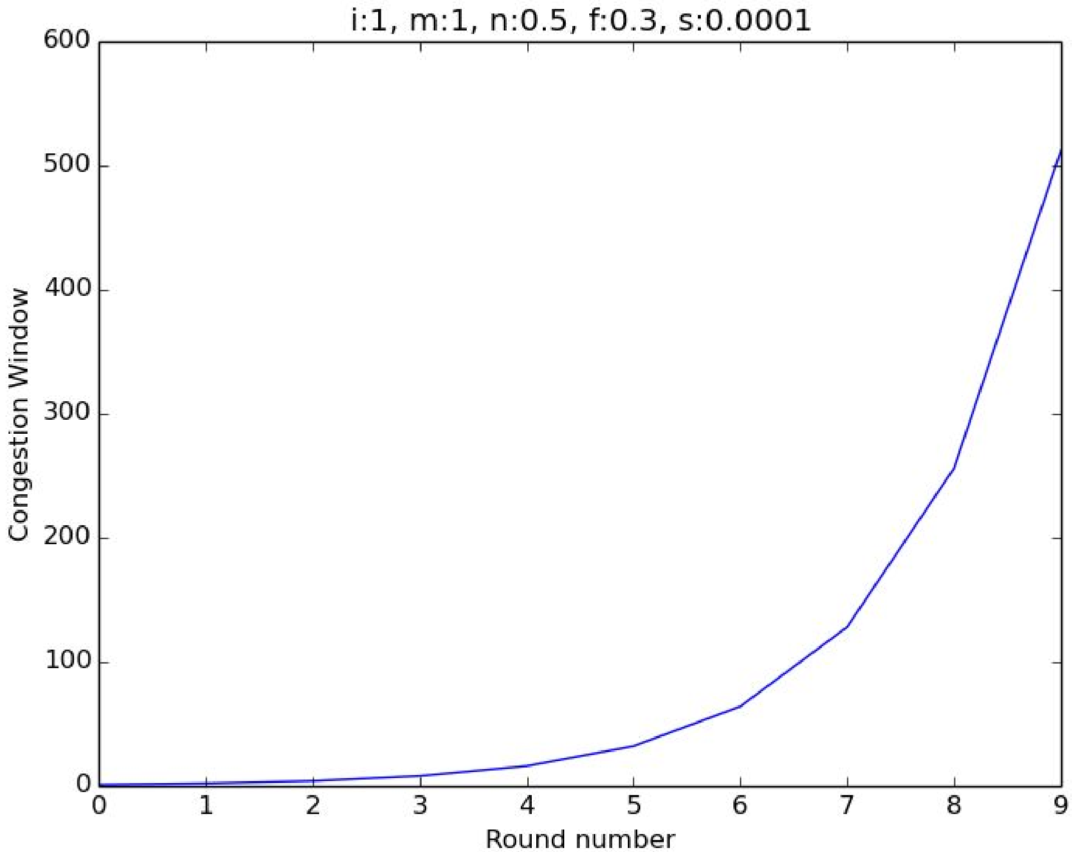
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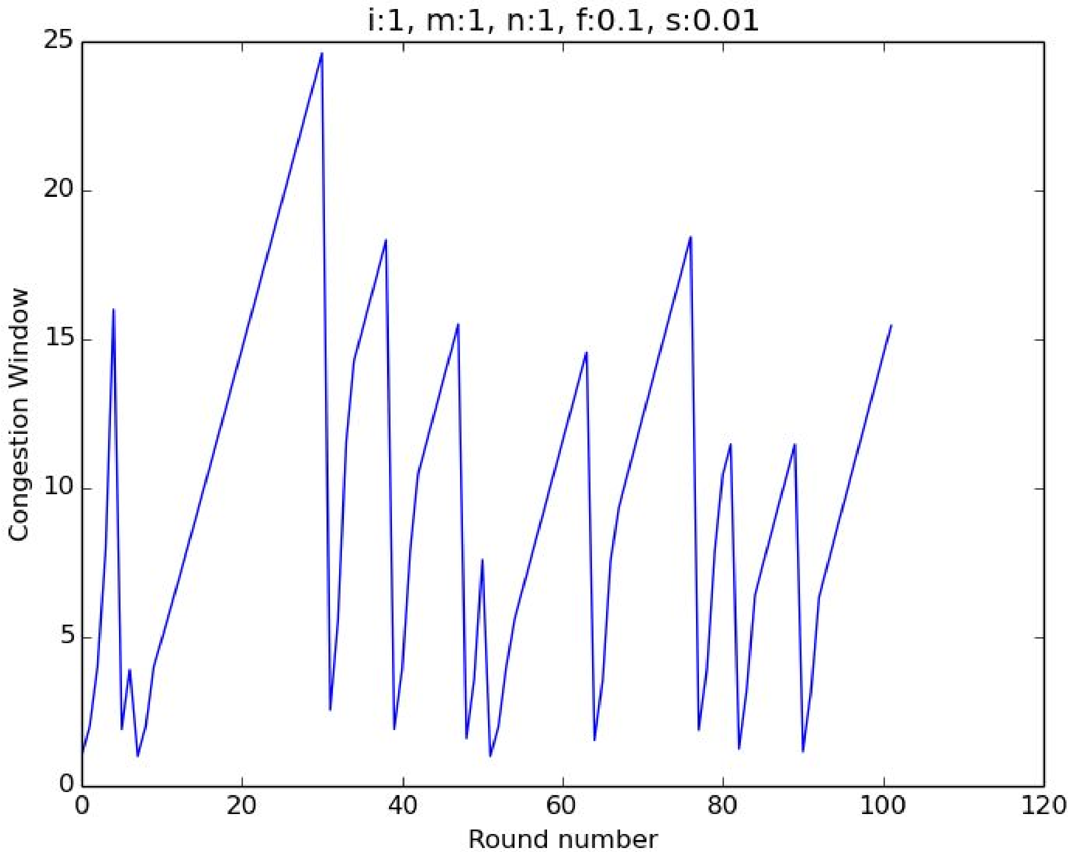
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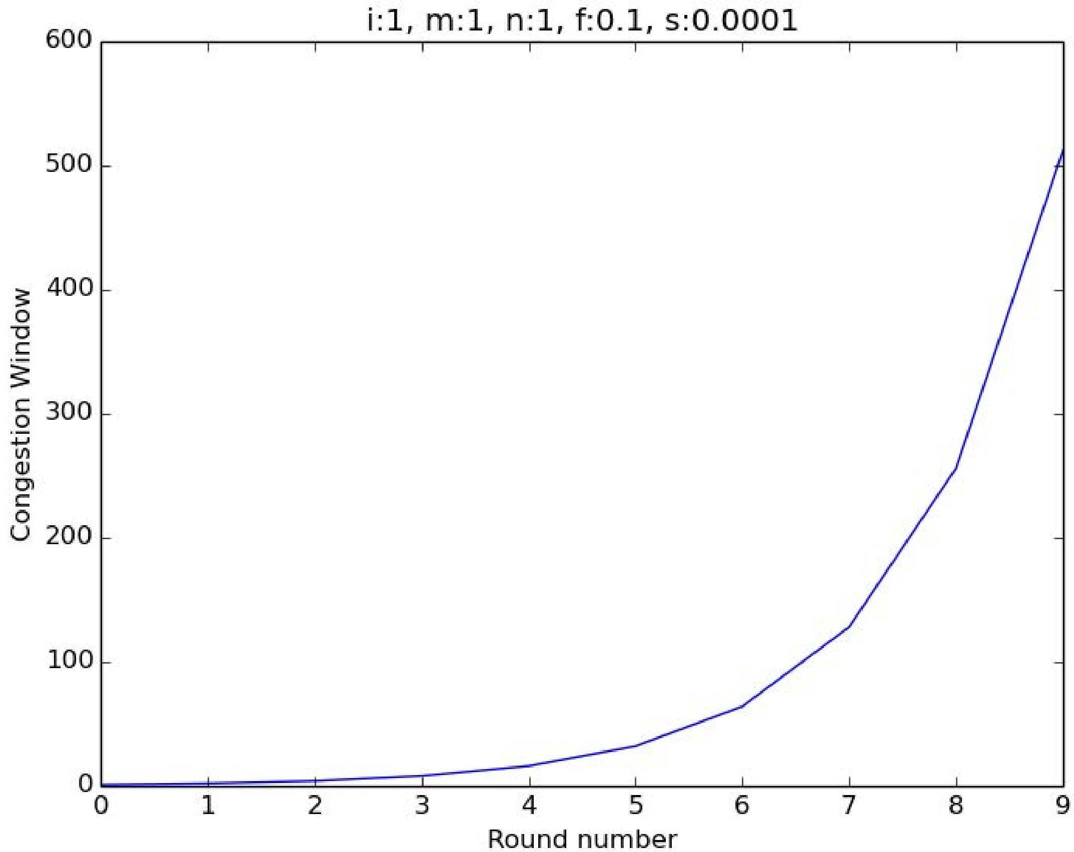
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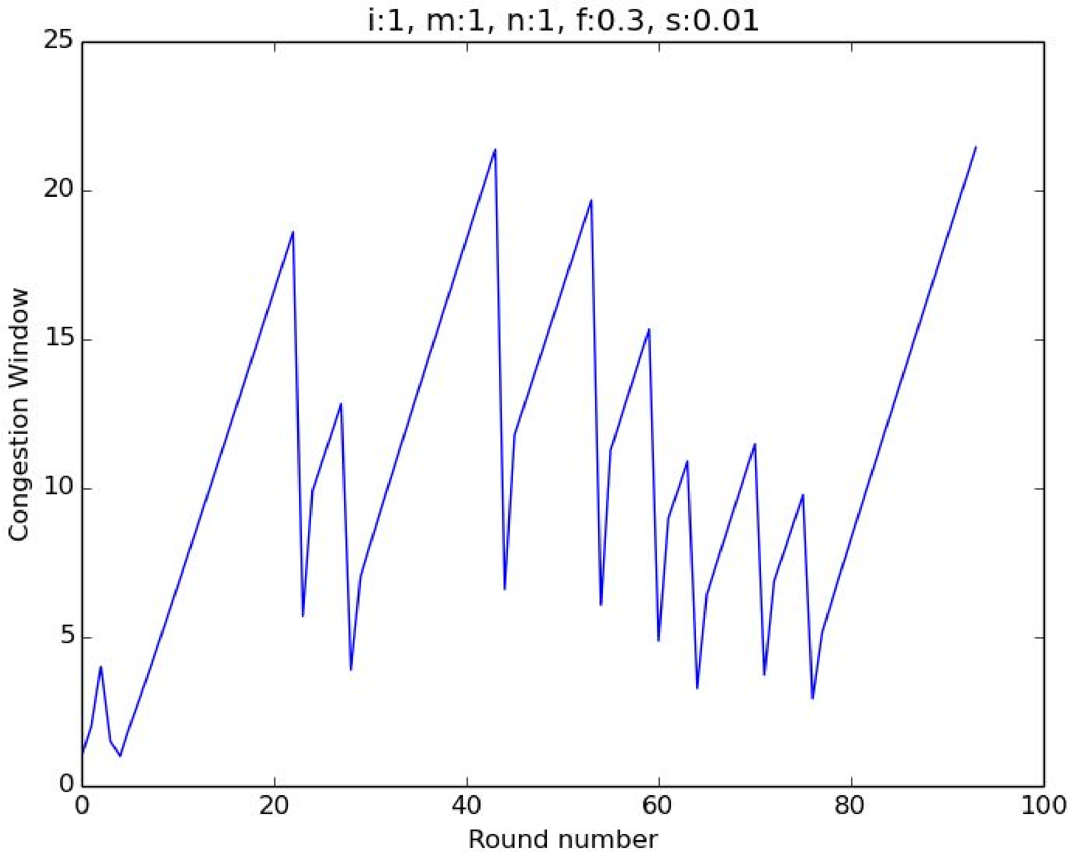
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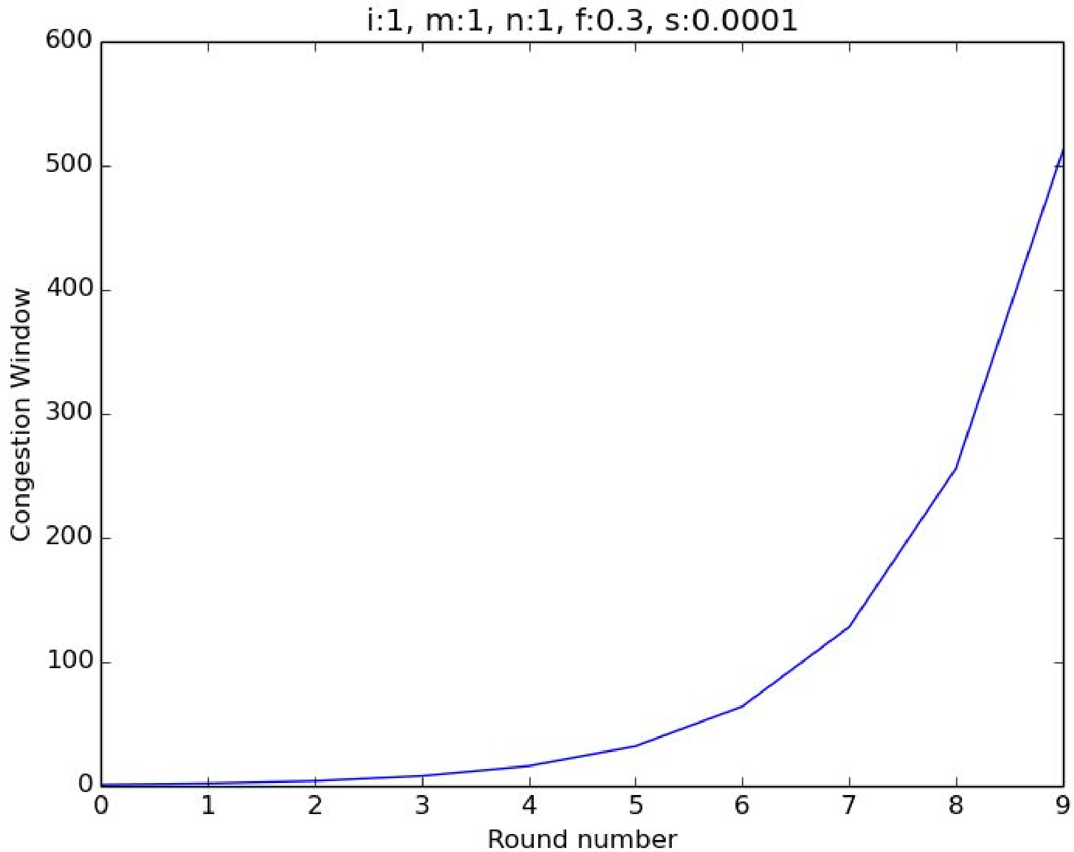
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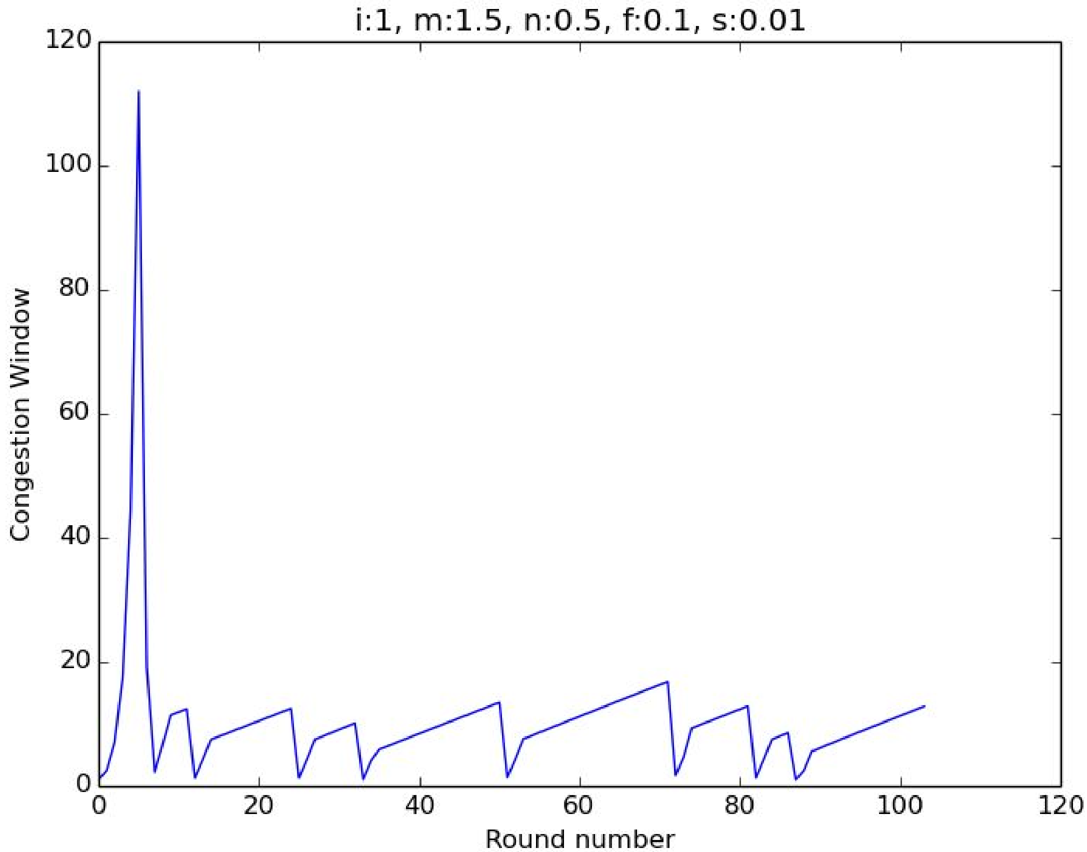
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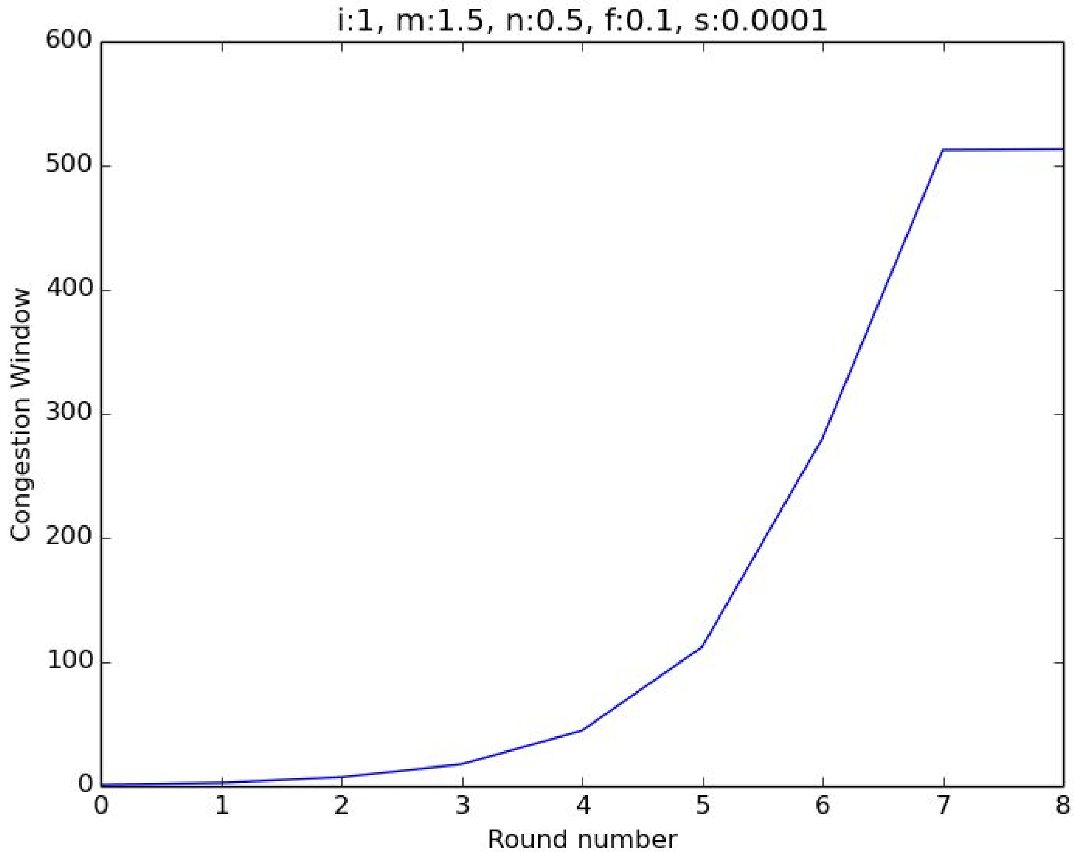
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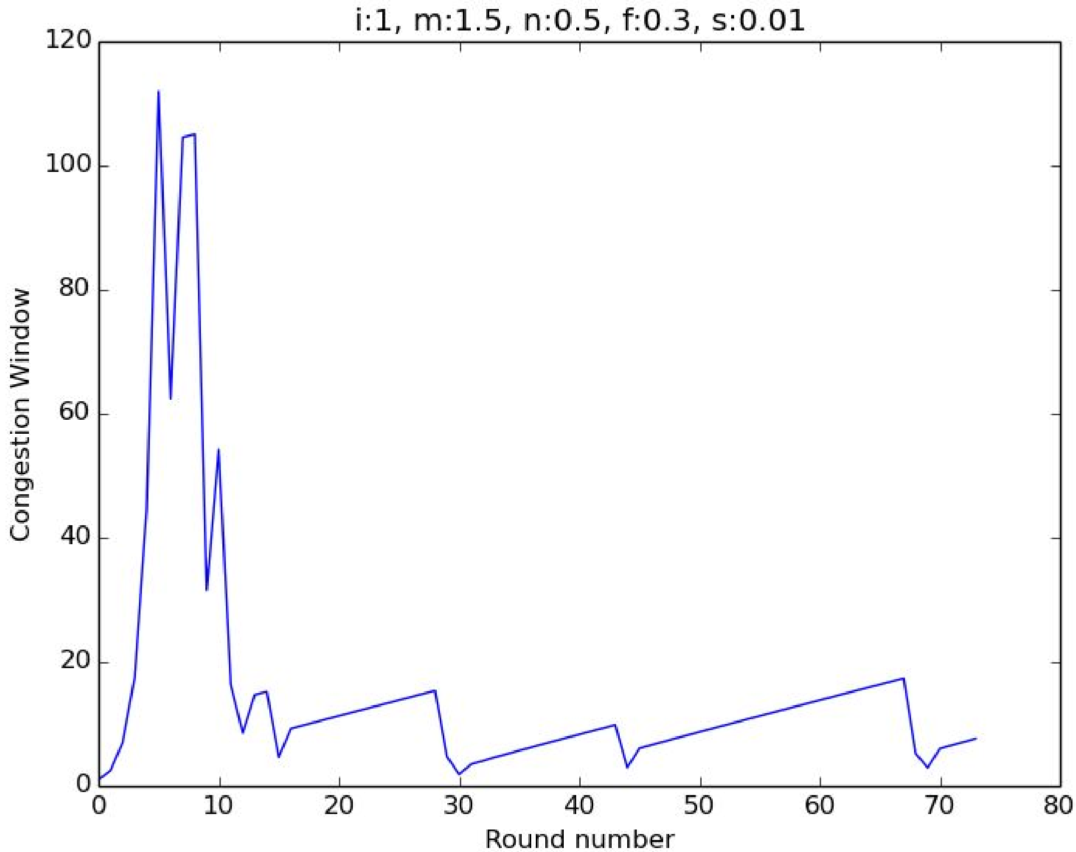
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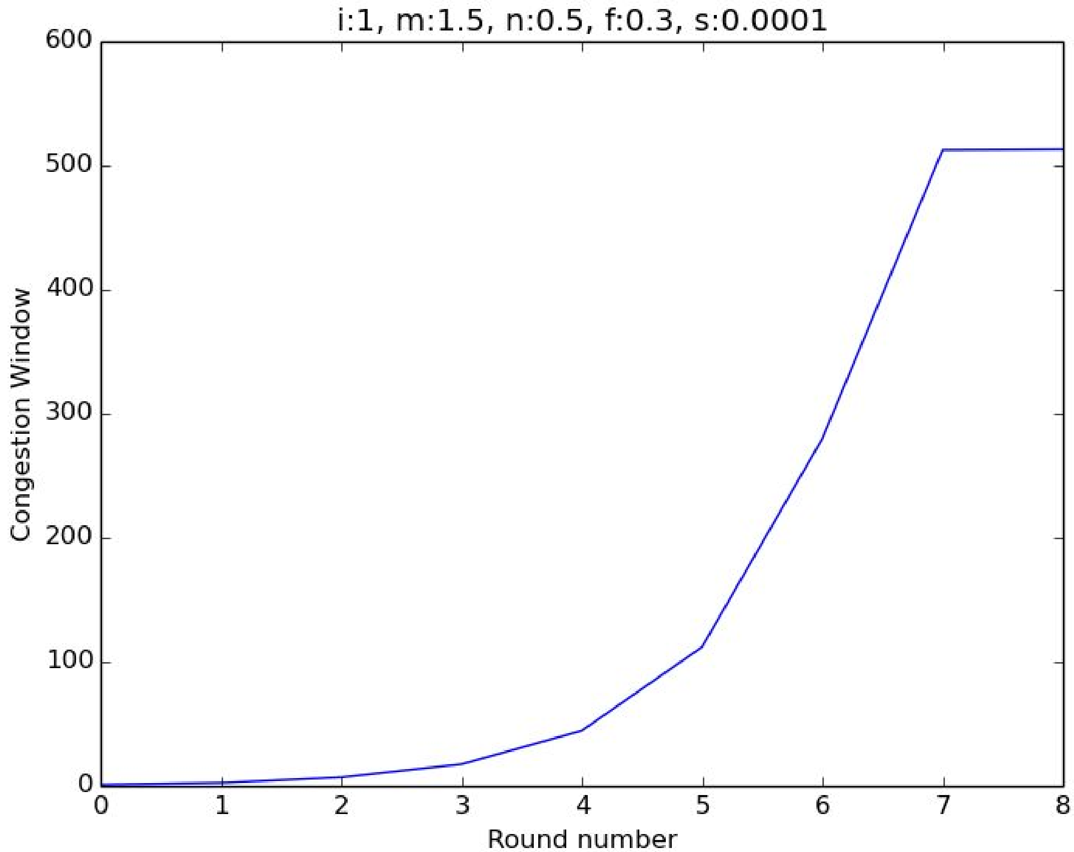
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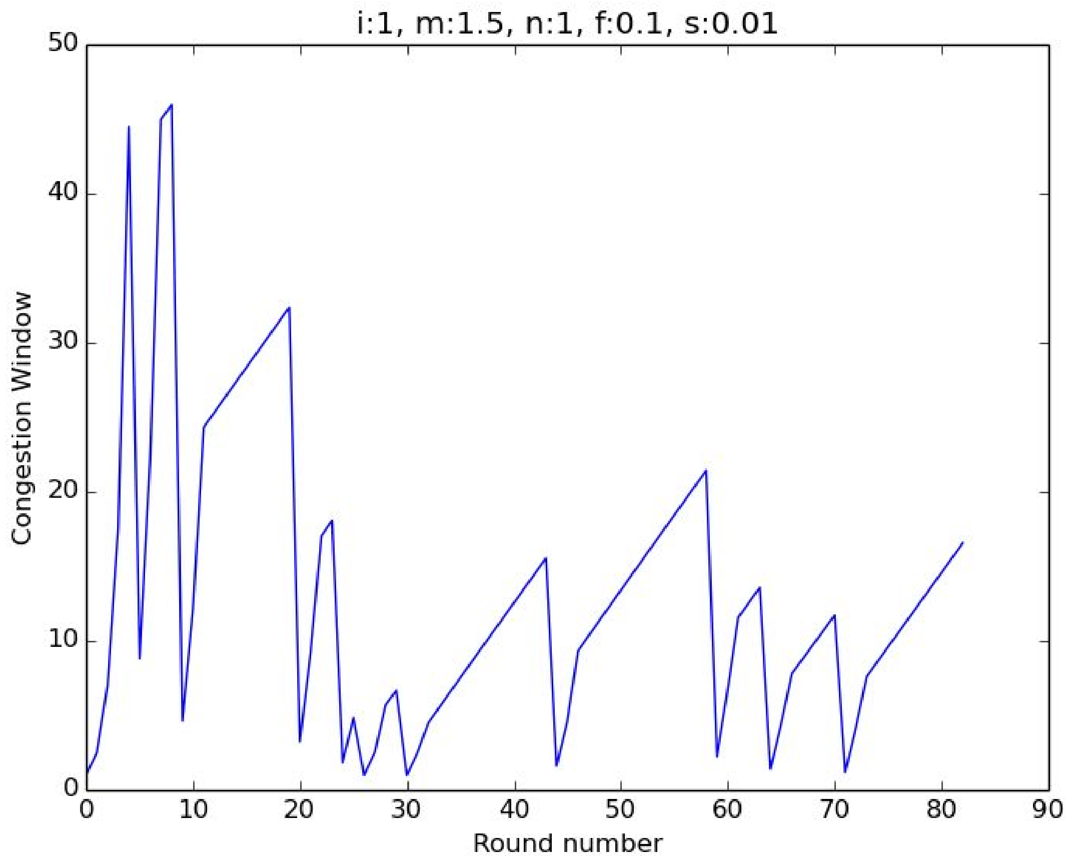

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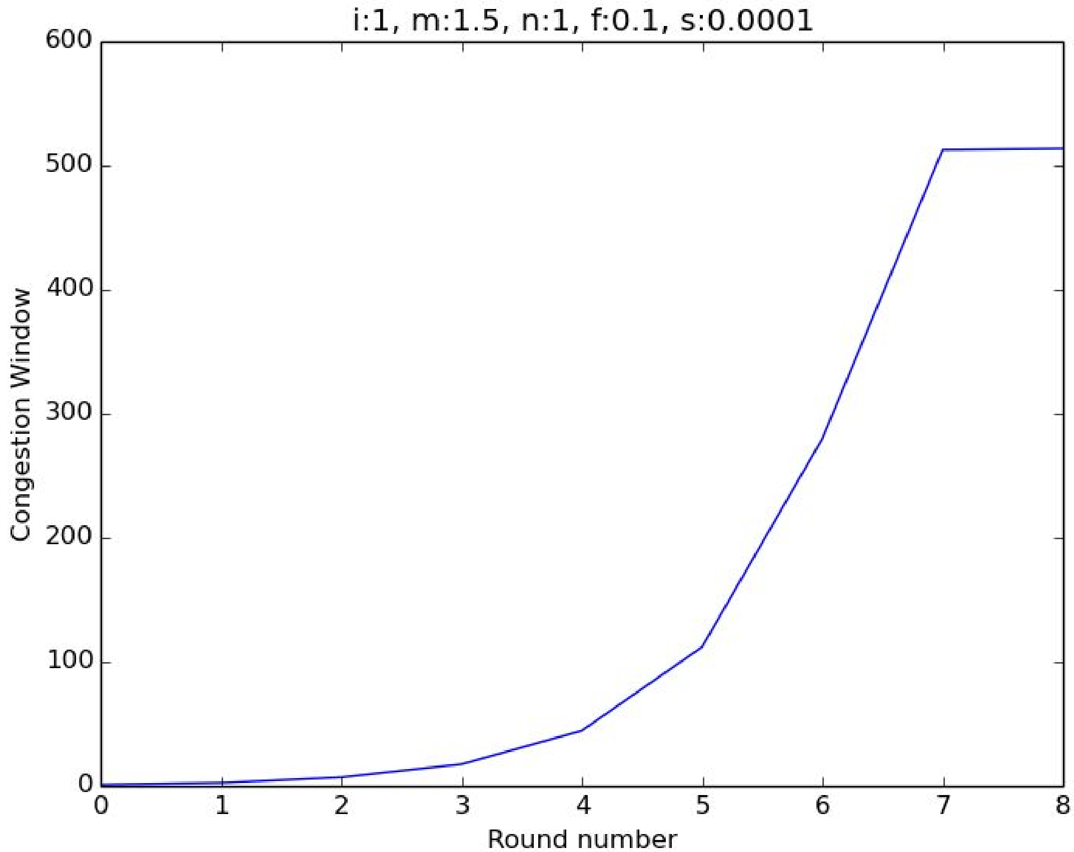
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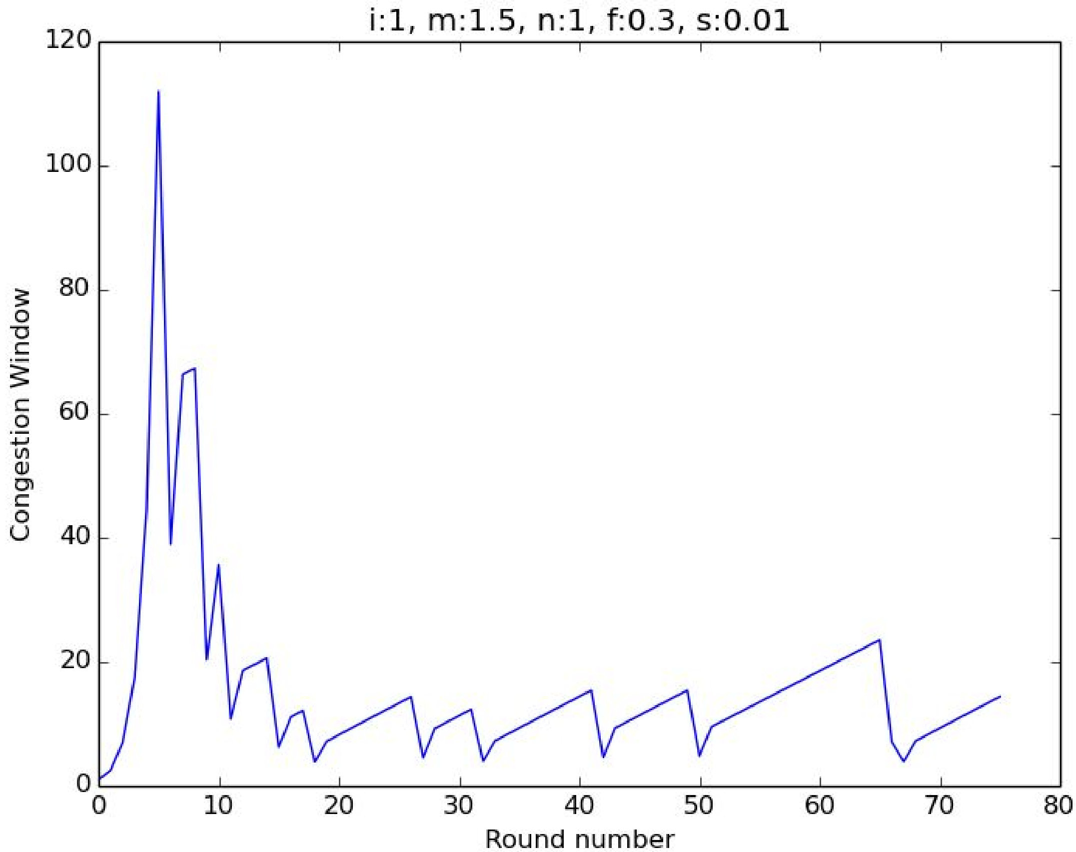

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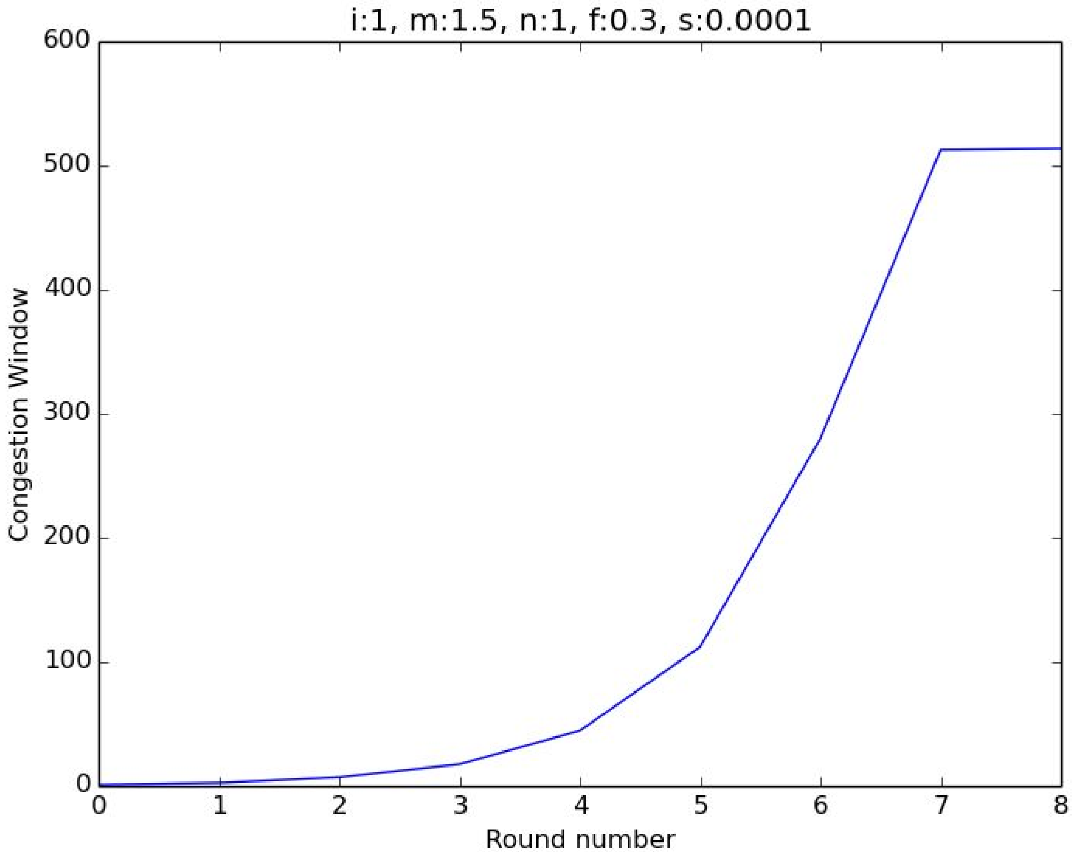
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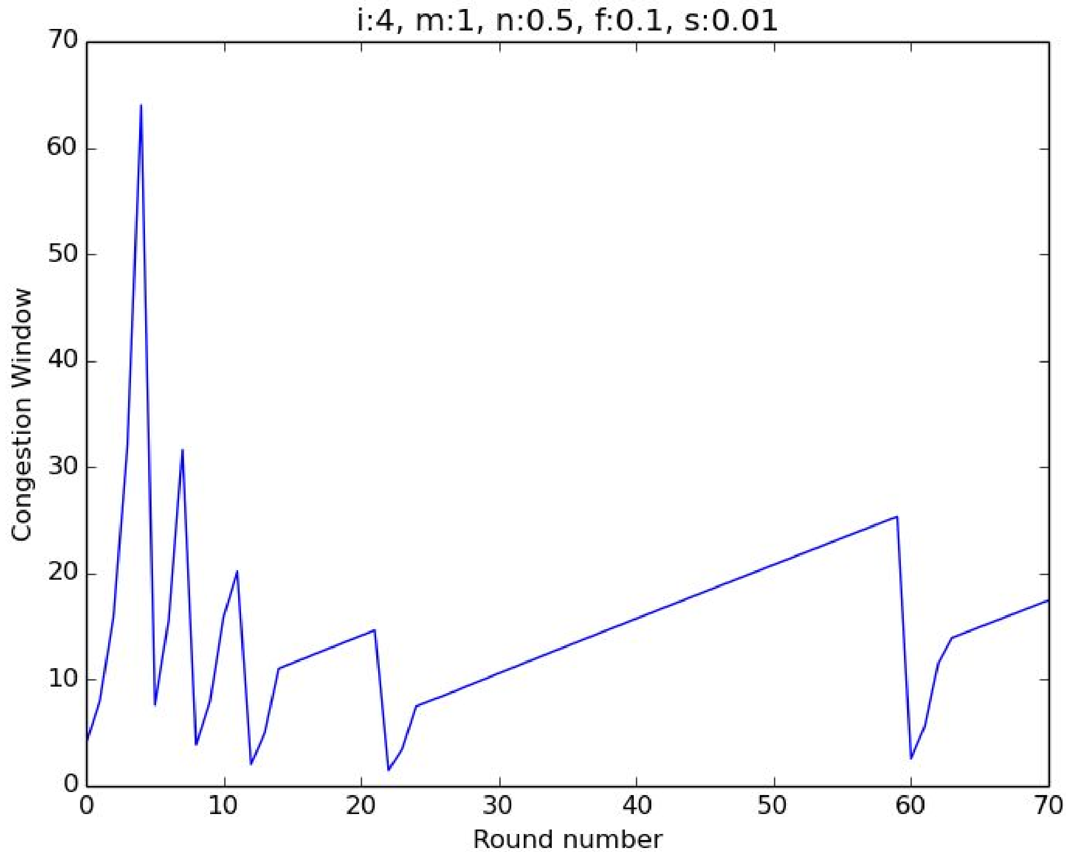
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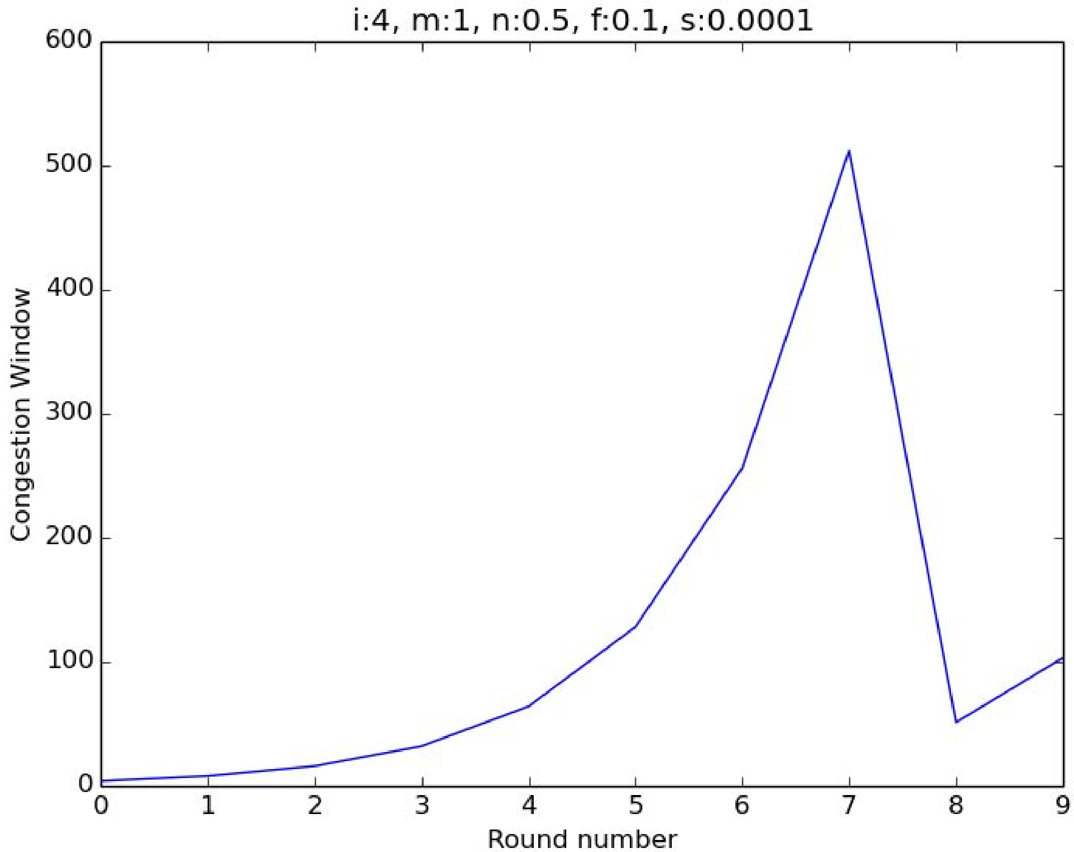

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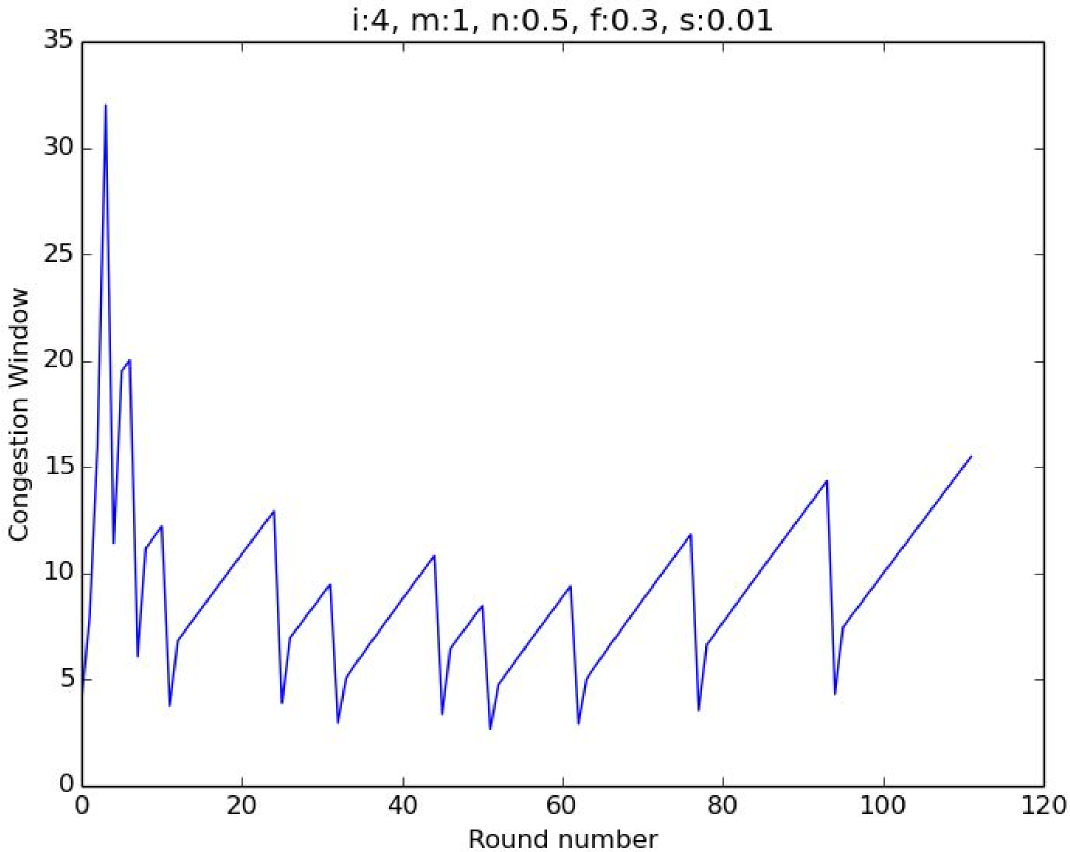

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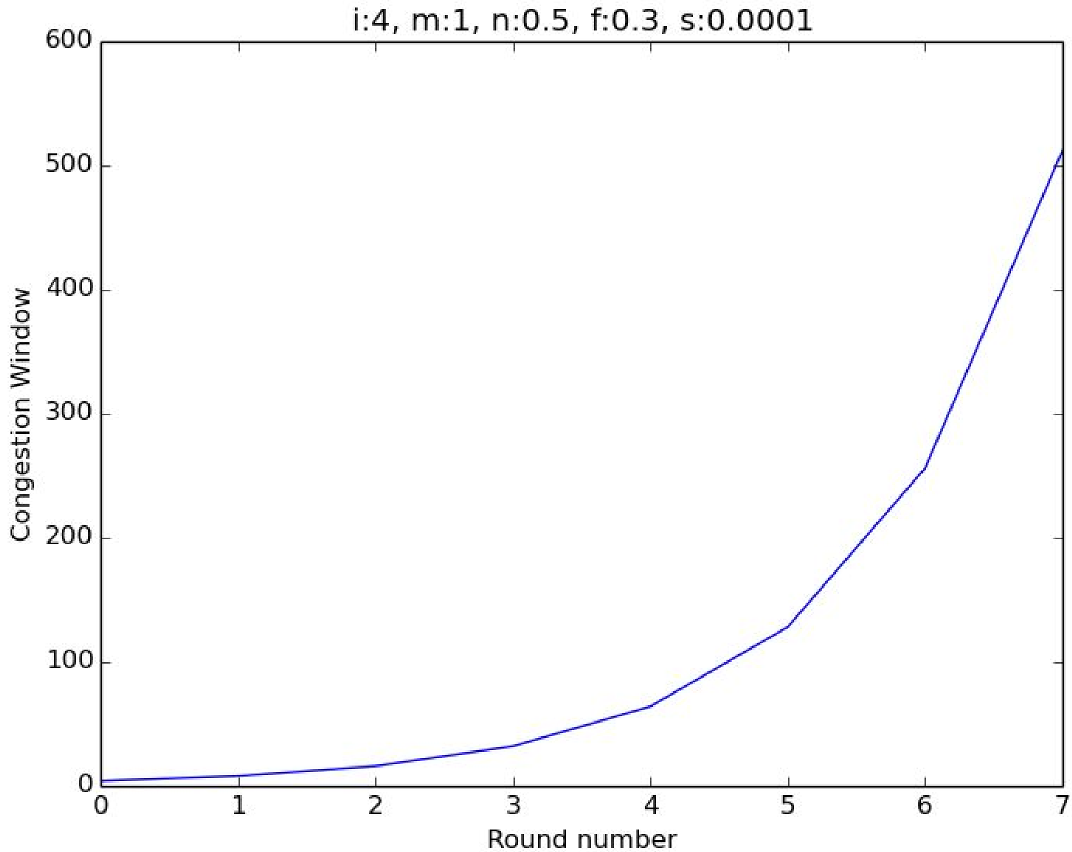

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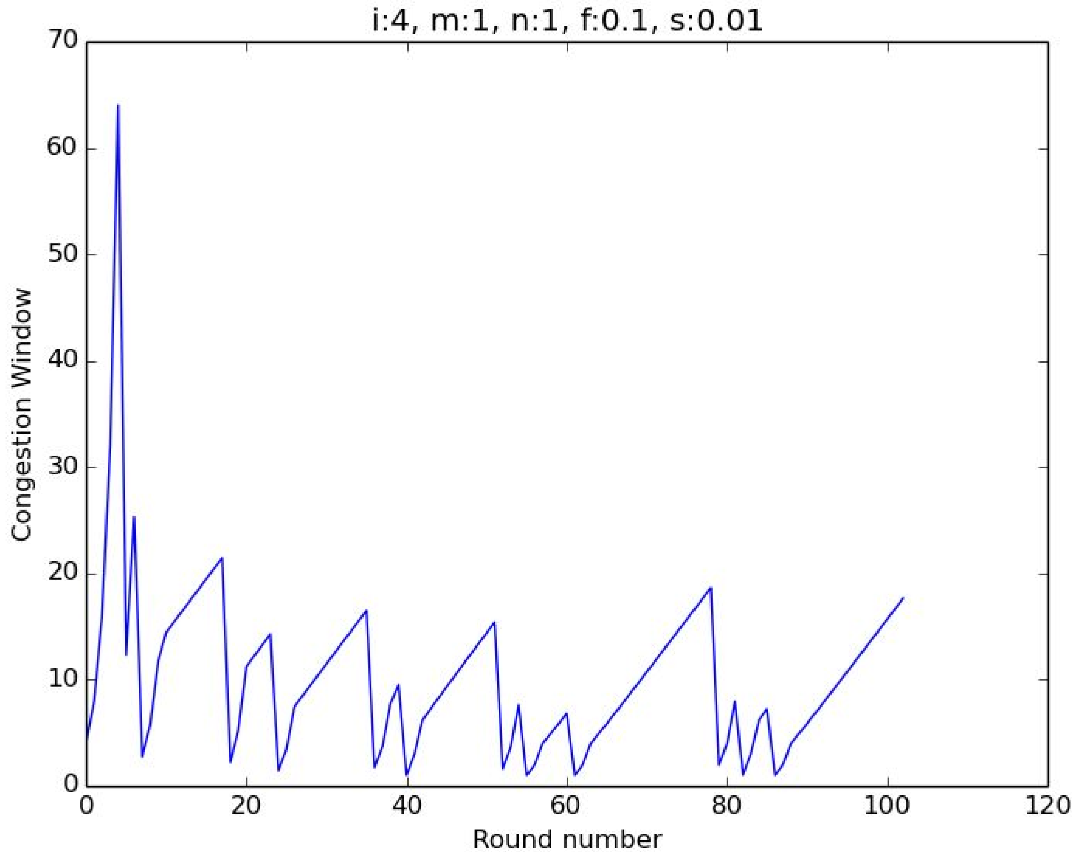
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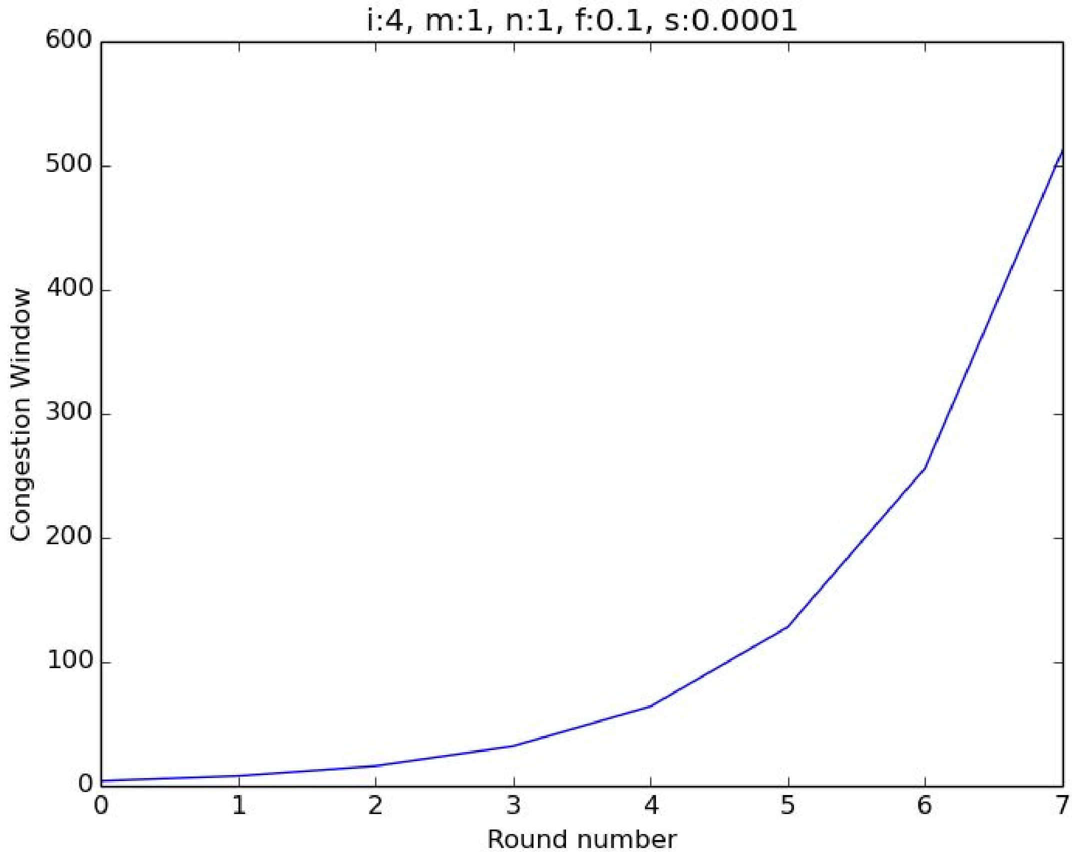

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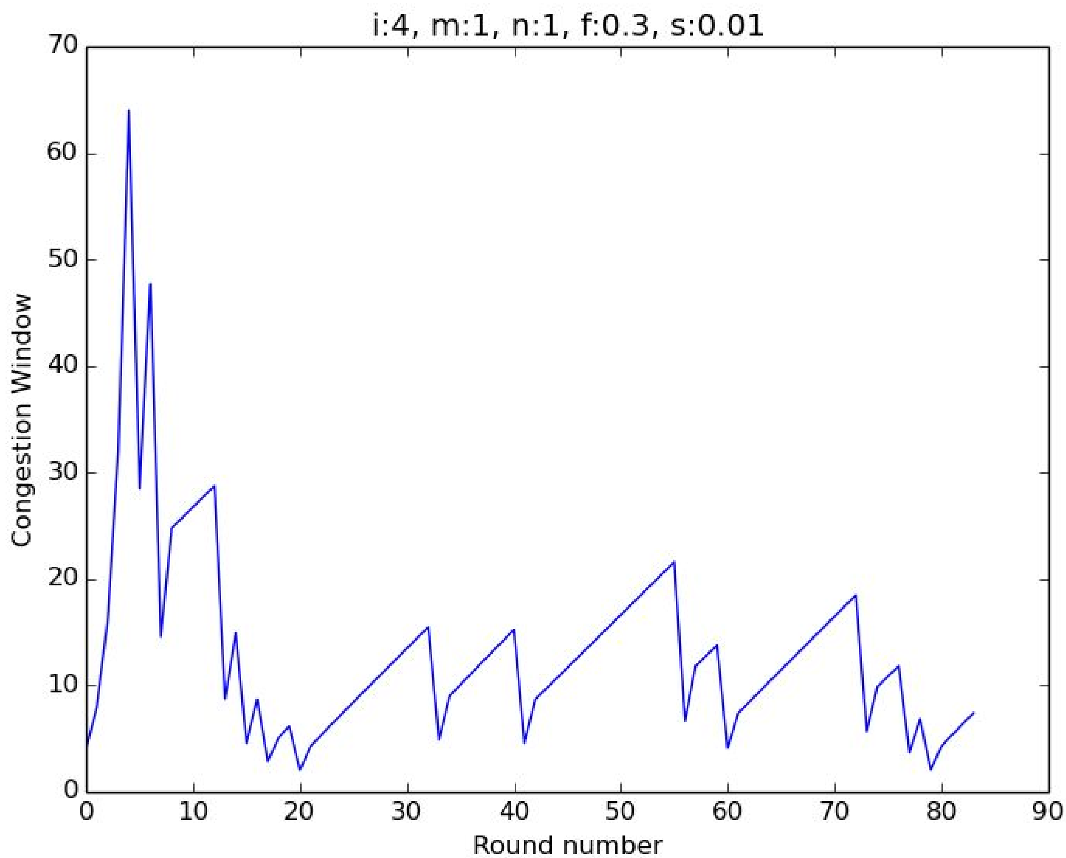
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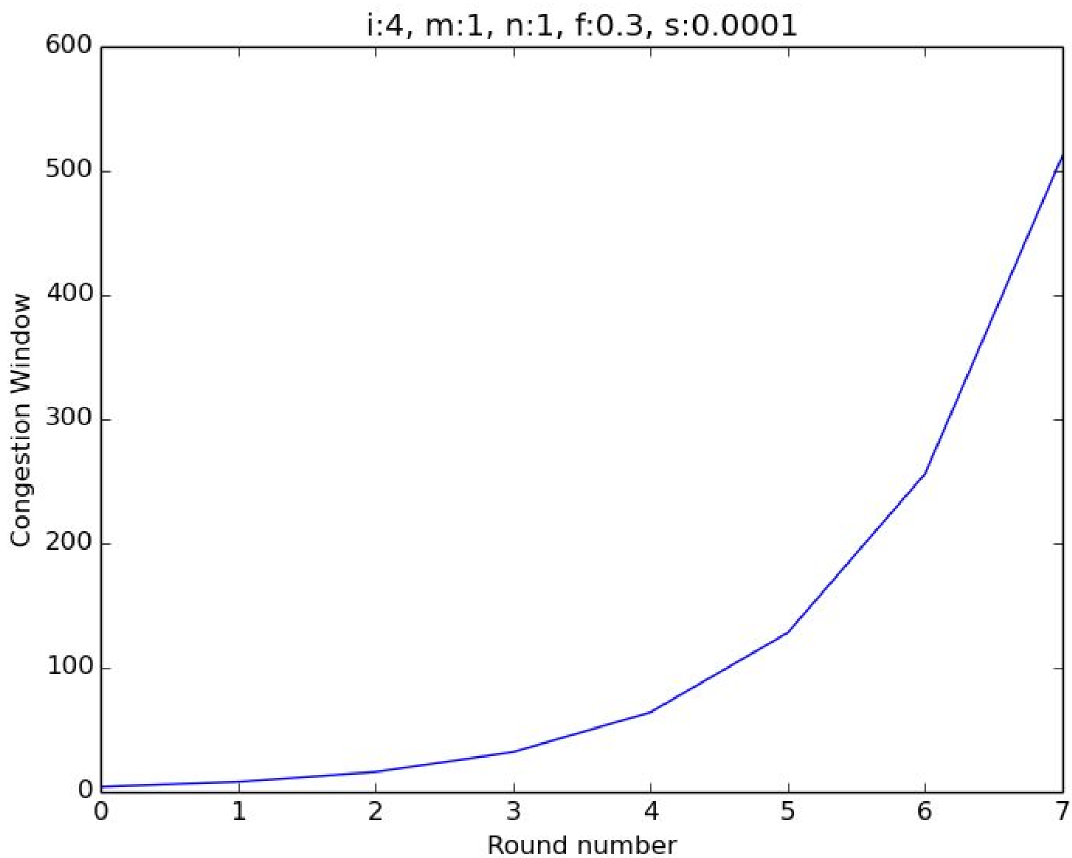

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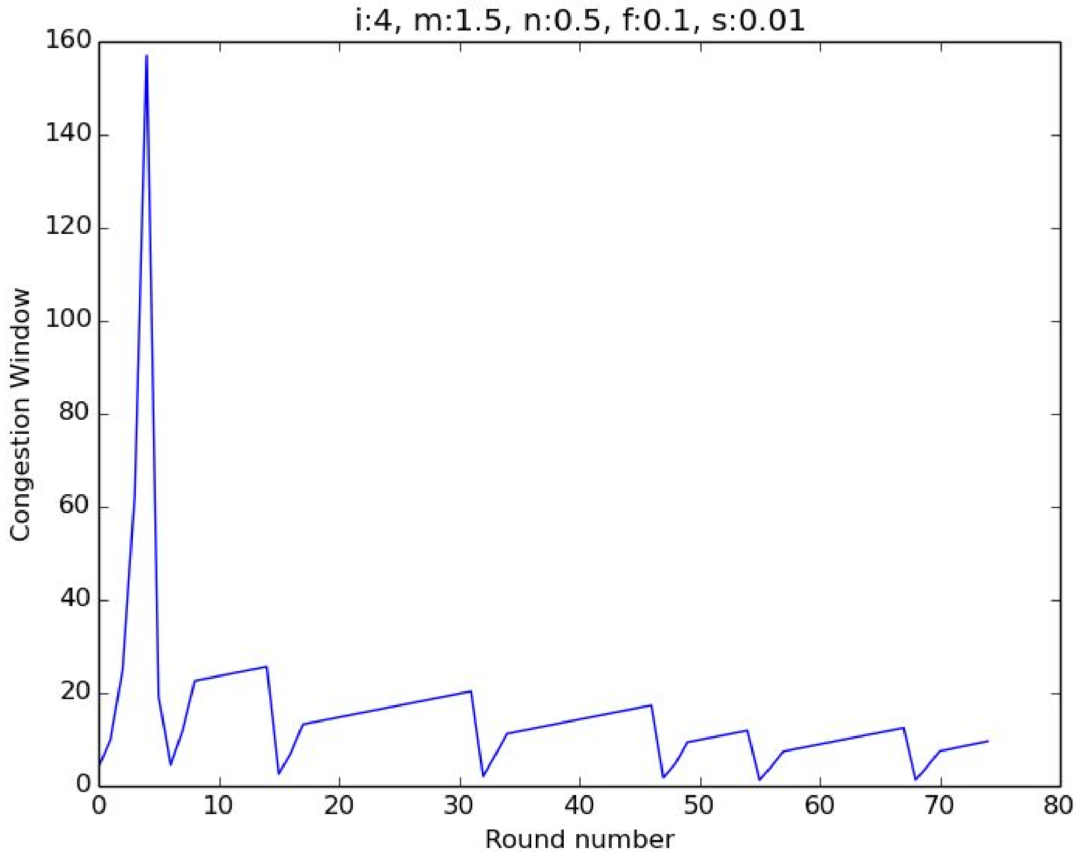

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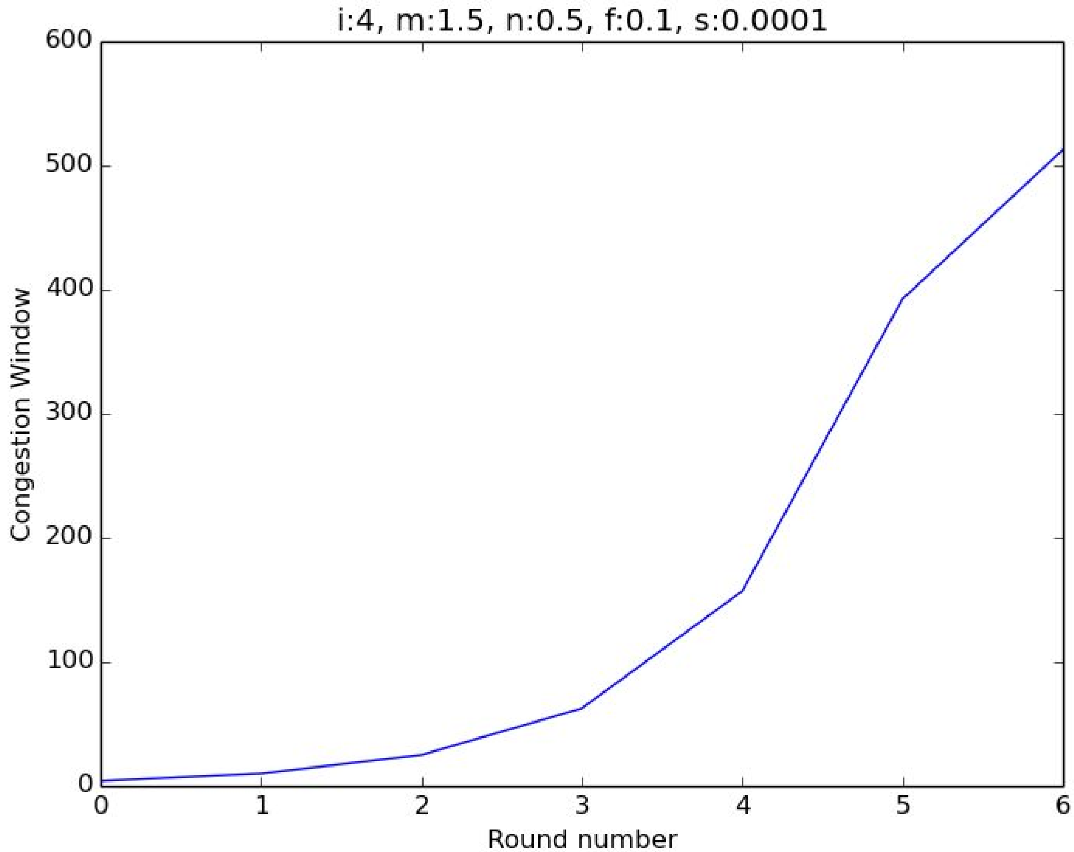
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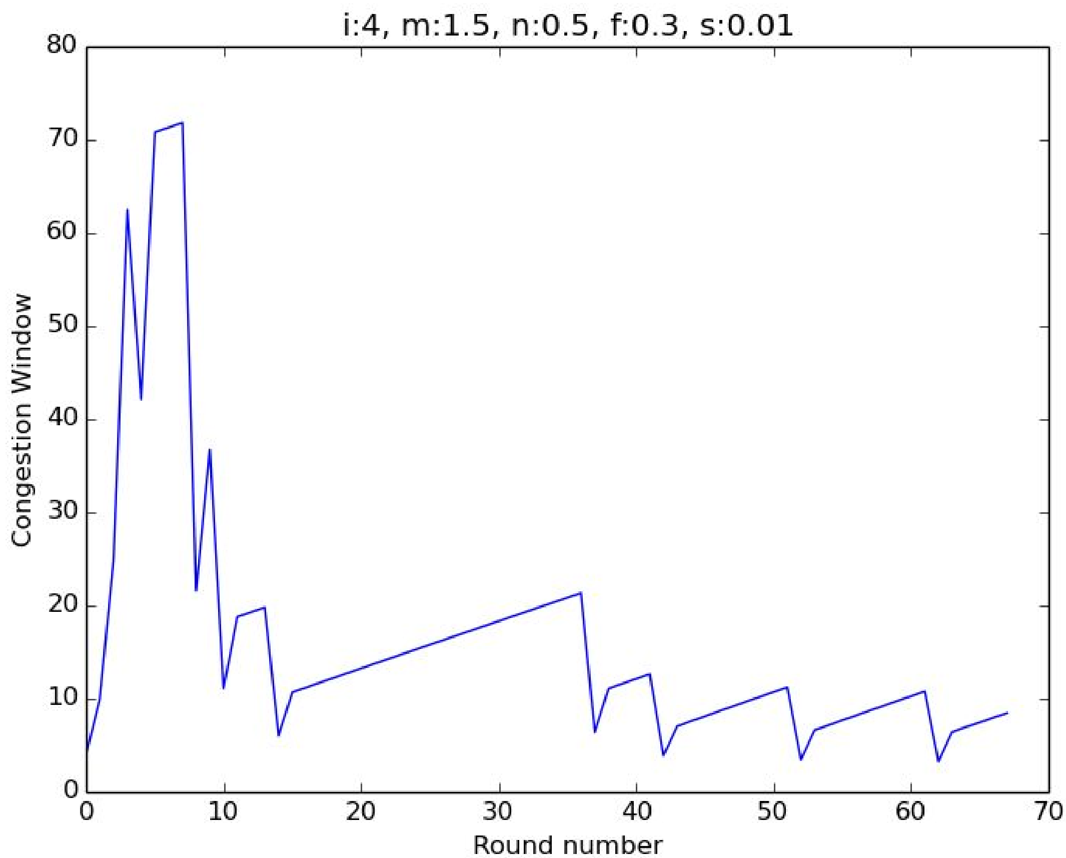

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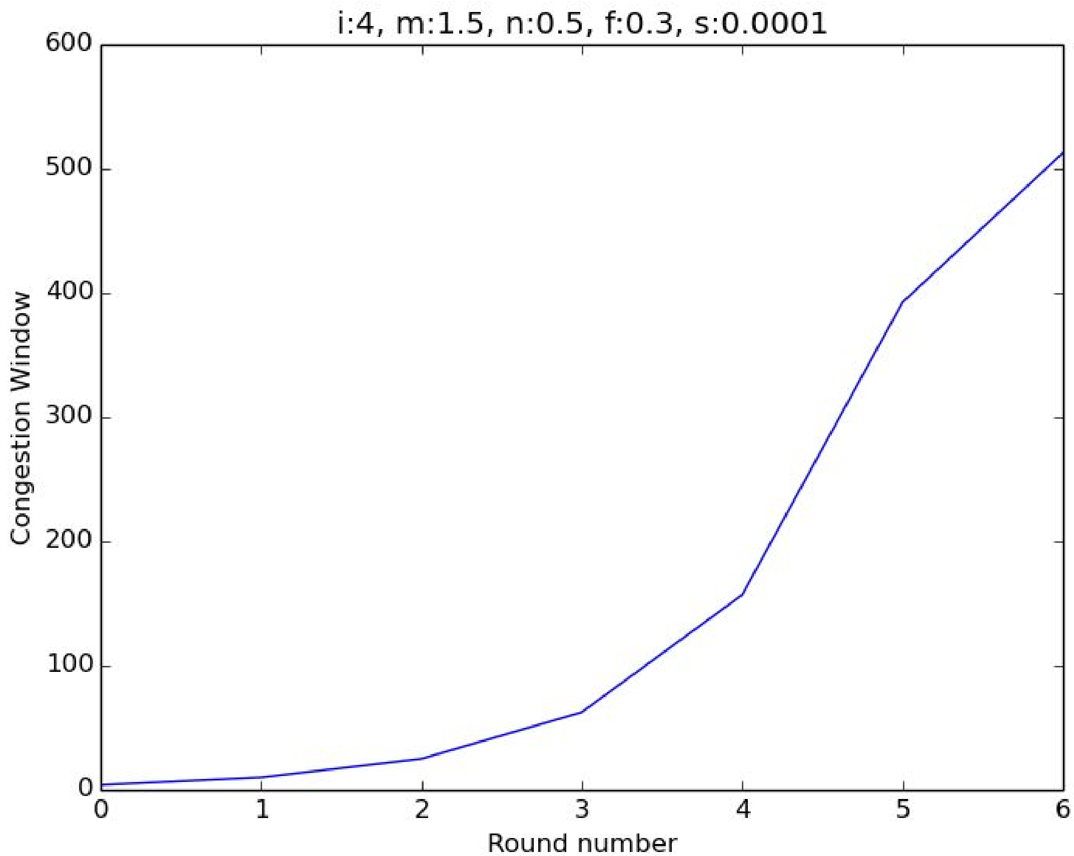
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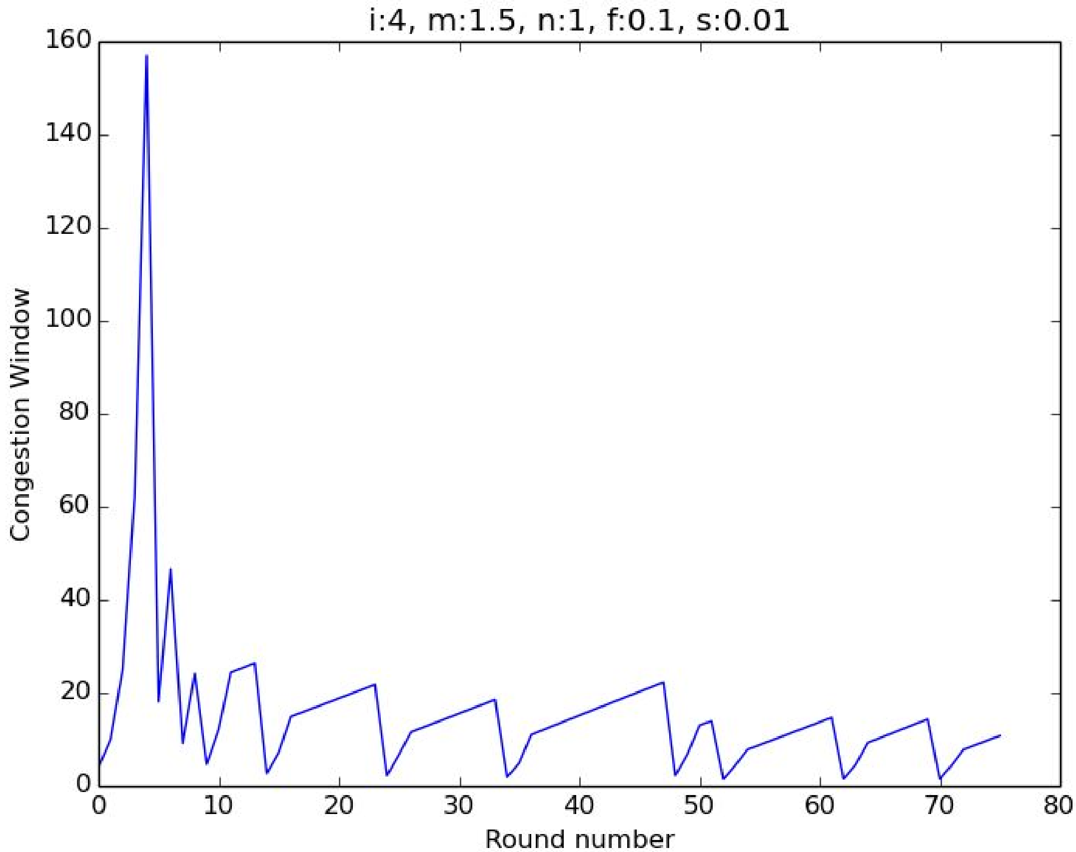

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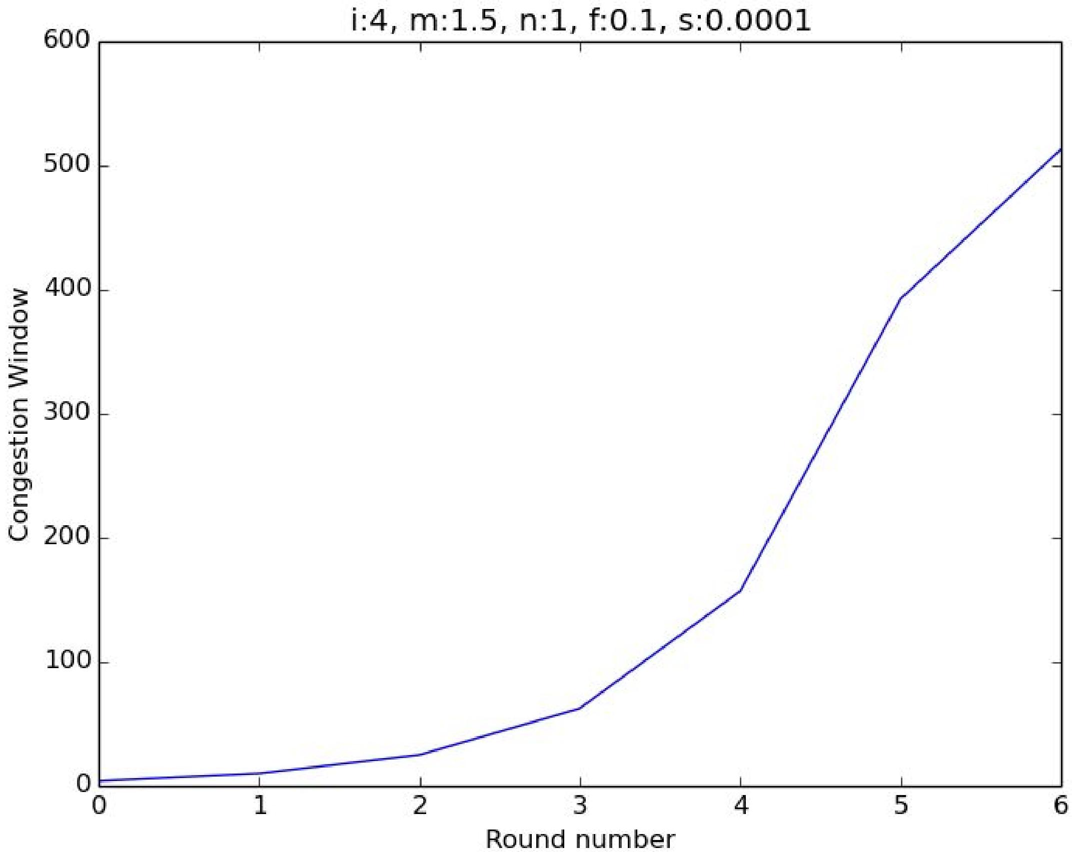

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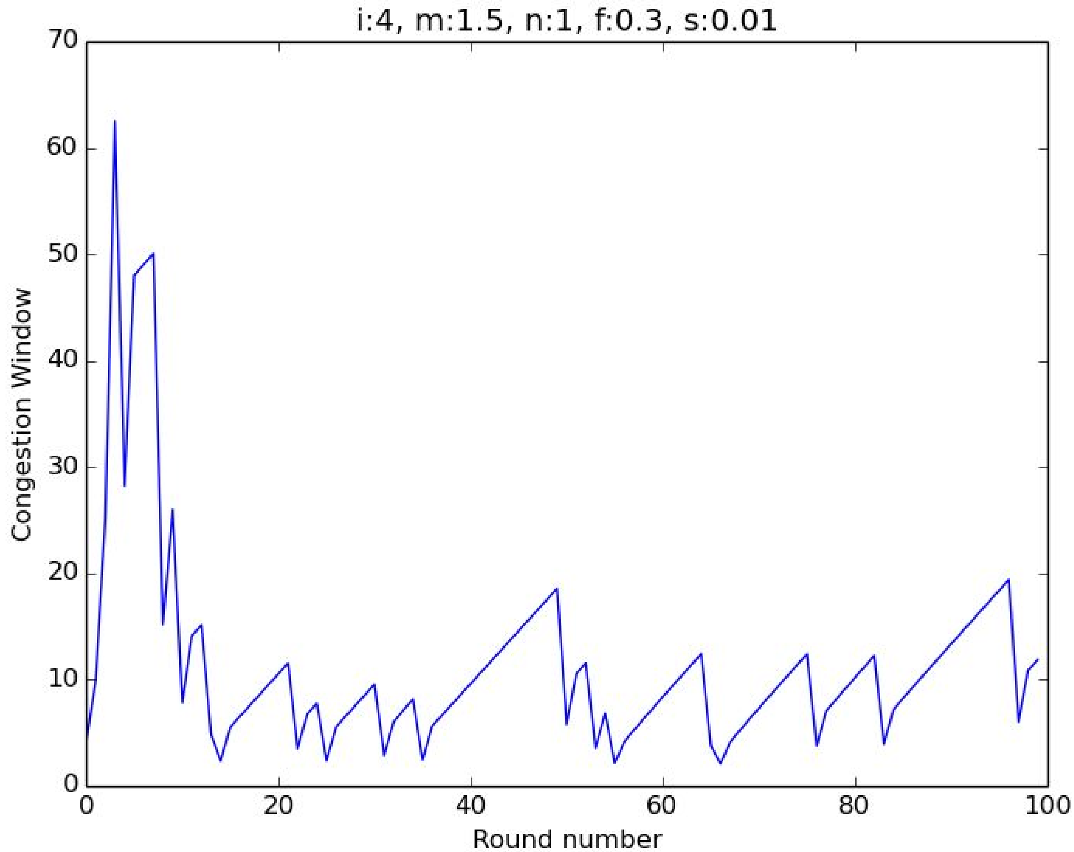
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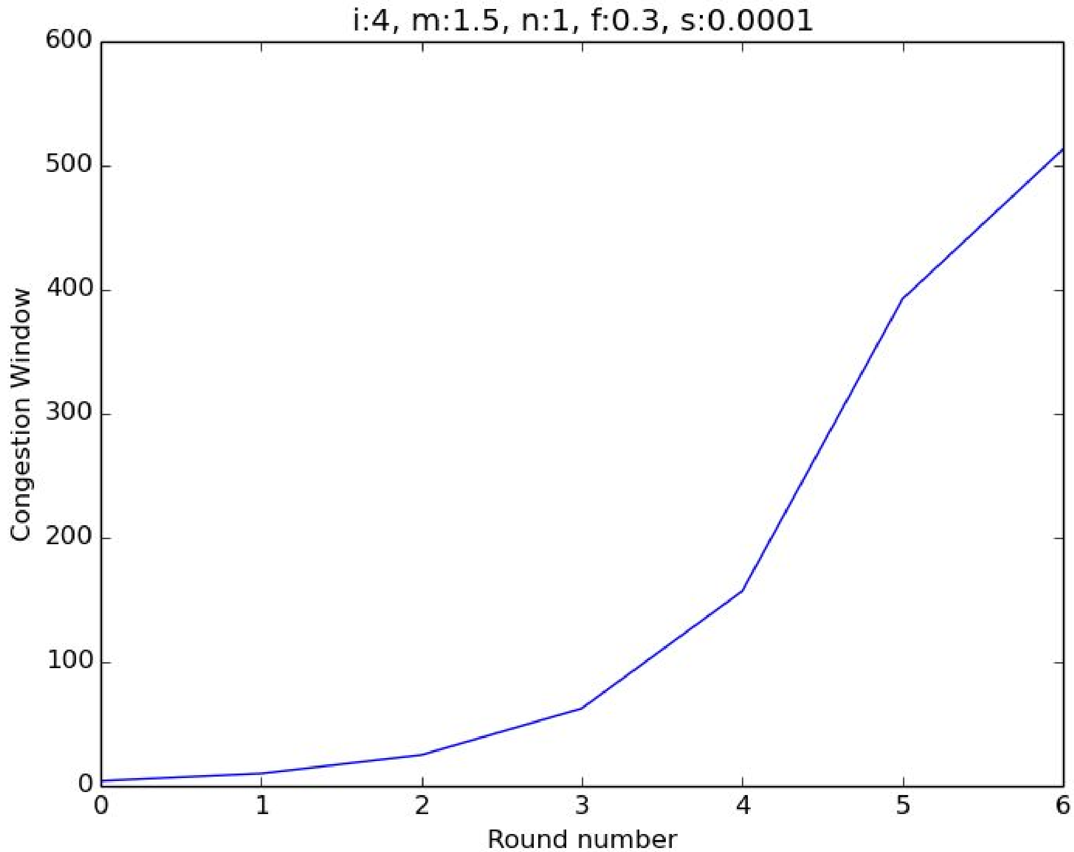

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