Analysis of Cumulative Performance Evaluated for Smart Middleware Approach in VANET

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Abstract - The Intelligent VANET System is dynamic in nature that makes use of dynamic information exchange for a tower to transmit its location and send the signal to the tower and through tower to the base station. Sensors are placed along the roadside areas and the dynamic clustering of the sensors based networks sends the signal to the sensors to collect the data of vehicles i.e. its location. A vehicle moves in circular direction where sensors are placed along a highway so as to transmit the location. Intelligent IoT based Approach for vehicles transmitting signal to tower where vehicles are continuously transmitting data and this data reach to the base station. The distance can be analyzed and the collision can be avoided using Clustering approach. A minimum threshold distance is maintained so that the vehicles may not collide with each other. At a threshold distance they can get the signals through which information of the coming vehicle can be analyzed. This paper analyses cumulative performance of existing heuristic approach with the smart middleware Vanet approach using different performance parameters. The results obtained has been validated through simulation of different scenarios

Keywords: VANET, Intelligent IoT.

I. ANALYSIS OF CUMULATIVE PERFORMANCE

For the network output calculation of the data or the number of data packets which can be transmitted within a predefined time period is determined by their throughput. Bandwidth is a characterization of the data volume that can be transmitted over a specified duration, typically calculated in bit per second.
Sometimes relevant are the following measures:

- Commonly defined bandwidth in bits/seconds
- The rate of transmission of information is the real rate
- Delay of decoding from the sender to the recipient is primarily a feature of the signal time and processing time
- Jitter shift in packet delay at the receiver
- Error rate of percentage of the overall sent out amount of corrupted bits.

Bandwidth and throughput are two distinct terms that are closely related. In short, the output tests how efficiently data is transmitted from source to destination. Bandwidth is a statistical measure of how far data from the source to the destination can be transported. The rate is only implicitly related to the speed when calculating bandwidth. Bandwidth will perceptively speed up your internet connection, but not theoretically fast. Related but closely linked terms include bandwidth and throughput. In brief, the data is a measure of how efficiently data is transmitted from the source to the destination and bandwidth is a potential measure of how far data from the source to the destination can be transmitted.

Therefore, measures of network performance are defined as the total collection of processes and instruments which can be used to determine network performance quantitatively and qualitatively and to provide realistic knowledge to fix any network performance problems. Understanding that network efficiency means the consistency of the service delivered by an entire network, one must evaluate all the parameters and components in the network before an evaluation of such a network can be made. Given the sophistication of current wireless networks, it is virtually difficult to analyse in detail and tediously method and infer manual approaches. An effort to calculate network efficiency without using specifically built procedures and instruments would also chew into the competitiveness of an organization and cause financial loss with each minute of downtime.

Table 1.1: Cumulative Performance: 100 Nodes

Simulation Attempt Scenario	Smart Middleware Architecture	Greedy Heuristics Approach		Improvements (Percentage)
1	93	82		6.29
2	94	85		5.03
3	94	83		6.21
4	91	82		5.20
5	92	86		3.37

Figure 1.2 shows that on evaluation of Cumulative Performance on 100 nodes, the improvements (in percentage) is 6.29, 5.03, 6.21, 5.20, 3.37 respectively for the different simulation attempts.

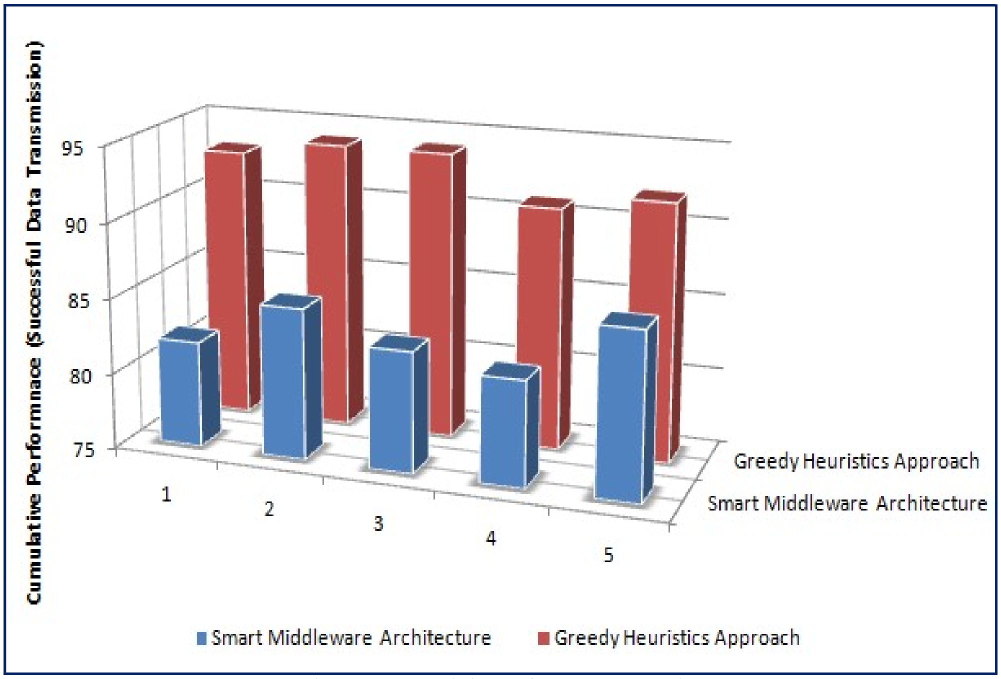

Figure 1.2: Cumulative Performance: 100 Nodes

Table 1.2: Cumulative Performance: 200 Nodes

Simulation Attempt Scenario	Smart Middleware Architecture	Greedy Heuristics Approach	Improvements (Percentage)
1	94	90	2.17
2	95	91	2.15
3	94	84	5.62
4	98	92	3.16
5	99	95	2.06

On assessment of Cumulative Performance on 200 nodes, the improvements (in percentage) is 2.17, 2.15, 5.62, 3.16, 2.06 correspondingly for the different simulation attempts. Figure 1.3 displays that on increasing number of nodes from 100 to 200, the middleware approach performs better than the greedy heuristic approach in every simulation attempt. The cumulative is varying from 2.06% to 5.62%

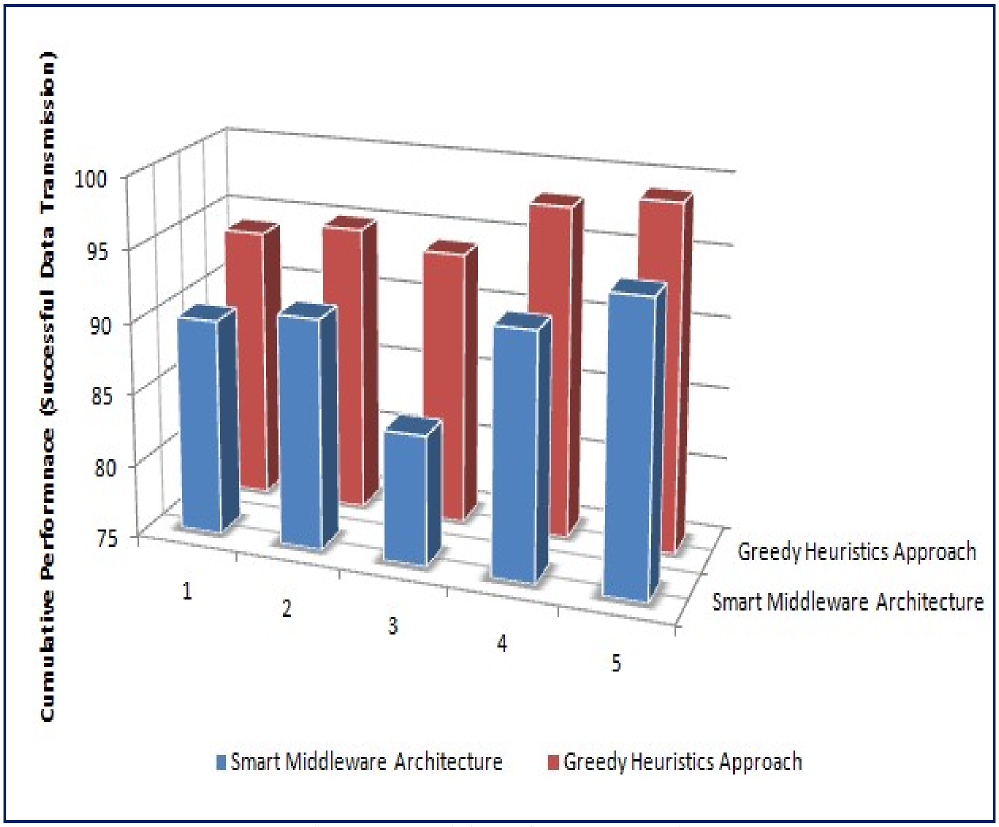

Figure 1.3: Cumulative Performance: 200 Nodes

Table 1.3: Cumulative Performance: 300 Nodes

Simulation Attempt Scenario	Smart Middleware Architecture	Greedy Heuristics Approach	Improvements (Percentage)
1	85	81	2.41
2	88	82	3.53
3	94	84	5.62
4	94	84	5.62
5	93	82	6.29

Figure 1.4 indicates that smart middleware approach leave behind the greedy heuristic in all subsequent attempt and achieves 2.41% to 6.29% improvement with varying number of simulations. On estimation of Cumulative Performance on 300 nodes, the improvements (in percentage) is 2.41, 3.53, 5.62, 5.62, 6.29 correspondingly for the different simulation attempts.

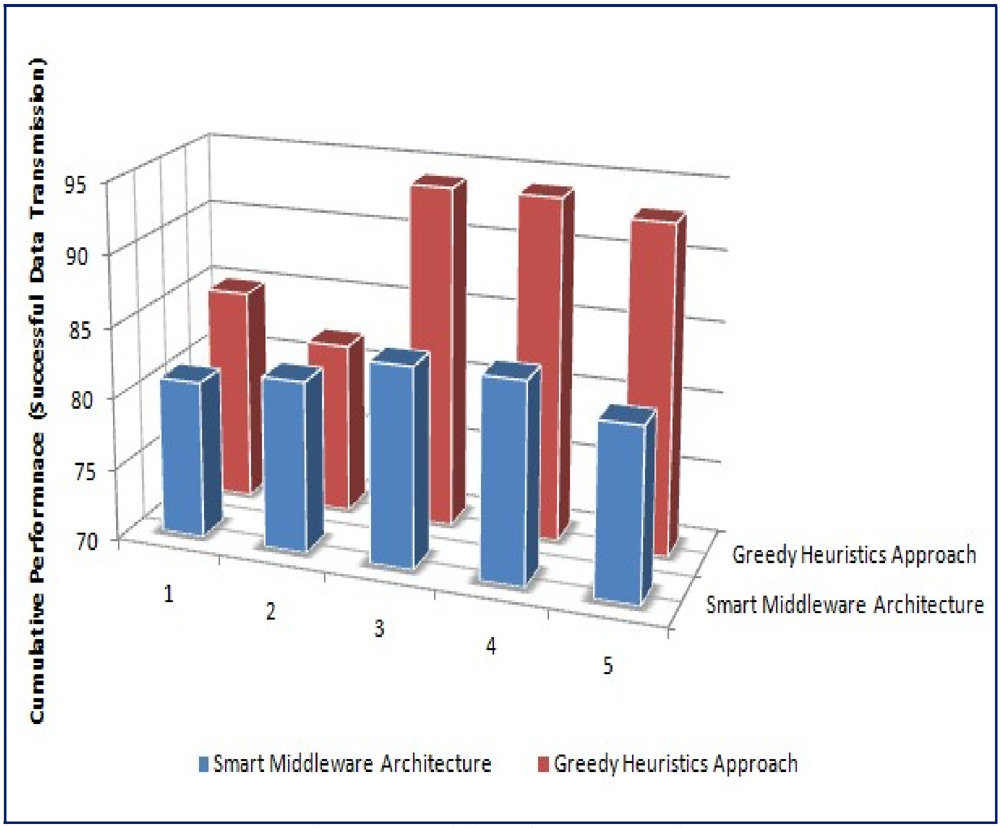

Figure 1.4: Cumulative Performance: 300 Nodes

Table 1.4: Cumulative Performance: 400 Nodes

Simulation Attempt Scenario	Smart Middleware Architecture	Greedy Heuristics Approach	Improvements (Percentage)
1	92	91	0.55
2	96	94	1.05
3	95	82	7.34
4	94	81	7.43
5	92	81	6.36

On calculation of Cumulative Performance on 400 nodes, the improvements (in percentage) is 0.55, 1.05, 7.34, 7.43, 6.36 correspondingly for the different simulation attempts. Figure 1.5 specifies that smart middleware approach outperforms the greedy heuristic in all successive effort and attains 0.55% to 7.43% improvement with varying number of simulations.

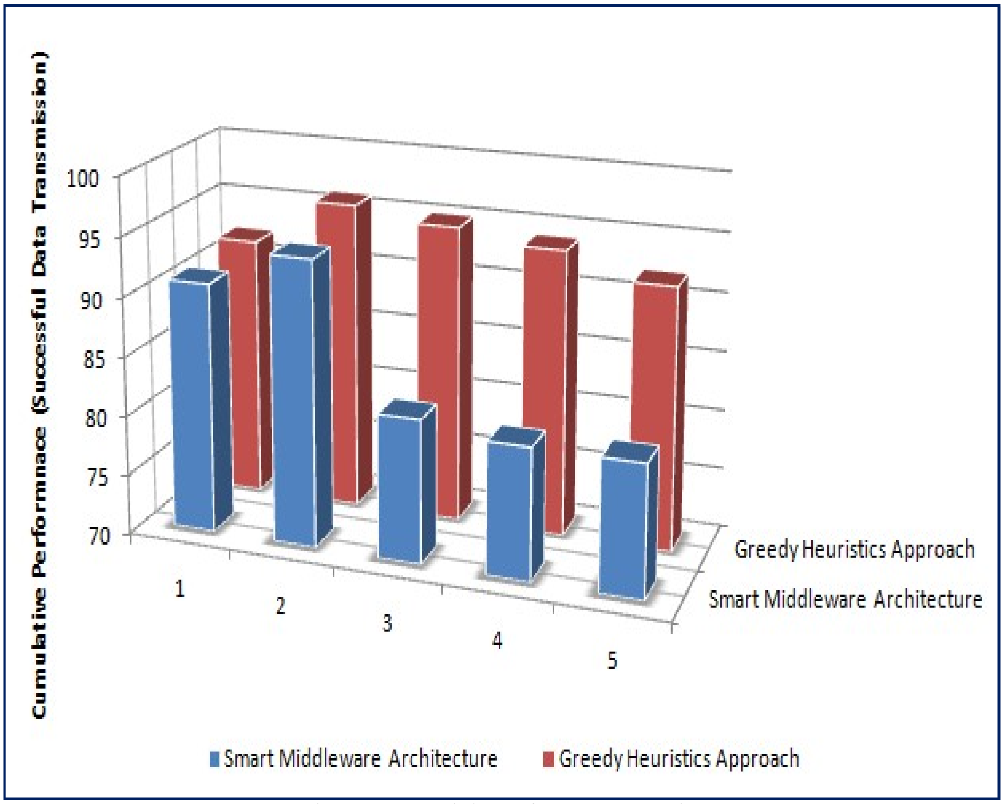

Figure 1.5: Cumulative Performance: 400 Nodes

Table 1.5: Cumulative Performance: 500 Nodes

Simulation Attempt Scenario	Smart Middleware Architecture	Greedy Heuristics Approach	Improvements (Percentage)
1	95	92	1.60
2	95	84	6.15
3	94	66	17.50
4	93	84	5.08
5	92	82	5.75

Figure 1.6 illustrates that smart middleware approach outclasses the greedy heuristic in all continual effort and reaches 1.60% to 20.51% improvement with varying number of simulations. On valuation of Cumulative Performance on 500 nodes, the improvements (in percentage) is 1.60, 6.15, 17.50, 5.08, 5.75 respectively for the different simulation attempts respectively for the different simulation attempts.

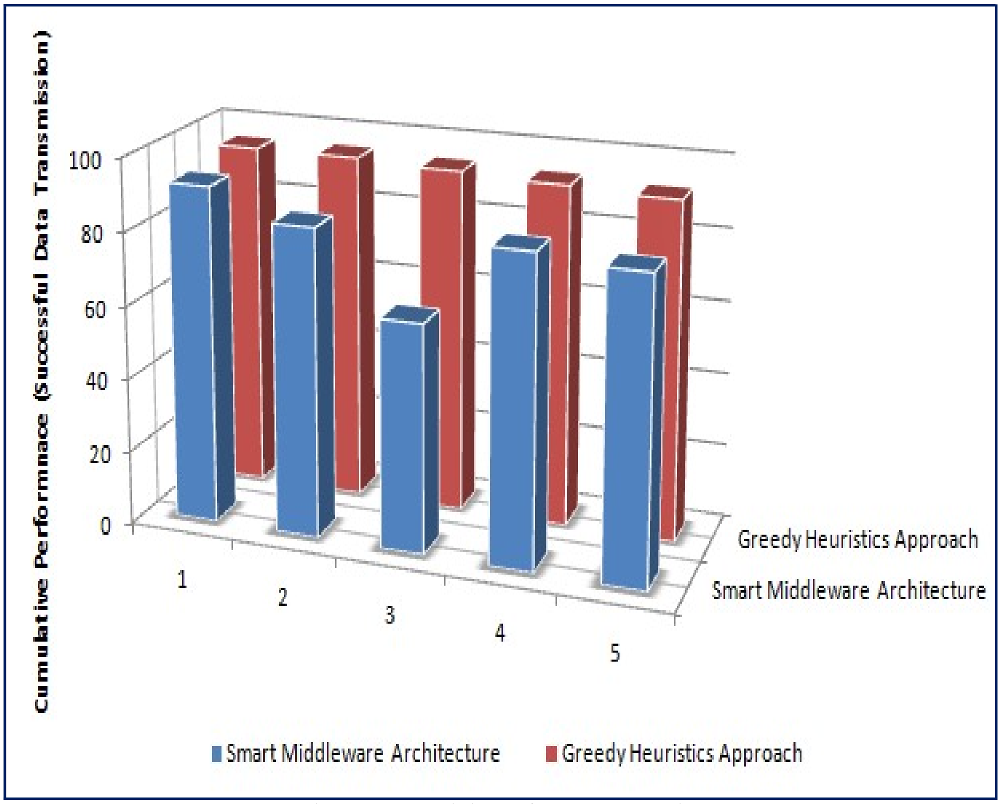

Figure 1.6: Cumulative Performance: 500 Nodes

II. CONCLUSION

This paper evaluates the performance of VANET middleware architecture. The smart middleware architecture is compared with the greedy heuristic approach on diverse node values. Performance parameters are selected for this purpose are latency, power dissipation and throughput. These are standard performance metrics to Analysis of cumulative performance evaluated for smart middleware approach. In the former, network output calculation of data which can be transmitted within predefined time interval is determined by their throughput. In cumulative performance, delay, jitter shift and error rate are relevant measures.

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