**EMPERICAL SETUP**

Platform for performance results is a 1.66 GHz 32-bit Intel® Atom™ machine with 2 GB memory and running Windows 7 starter. The codes are compiled with the C++11 compiler. The average execution time of five independent runs for each experiment is reported.

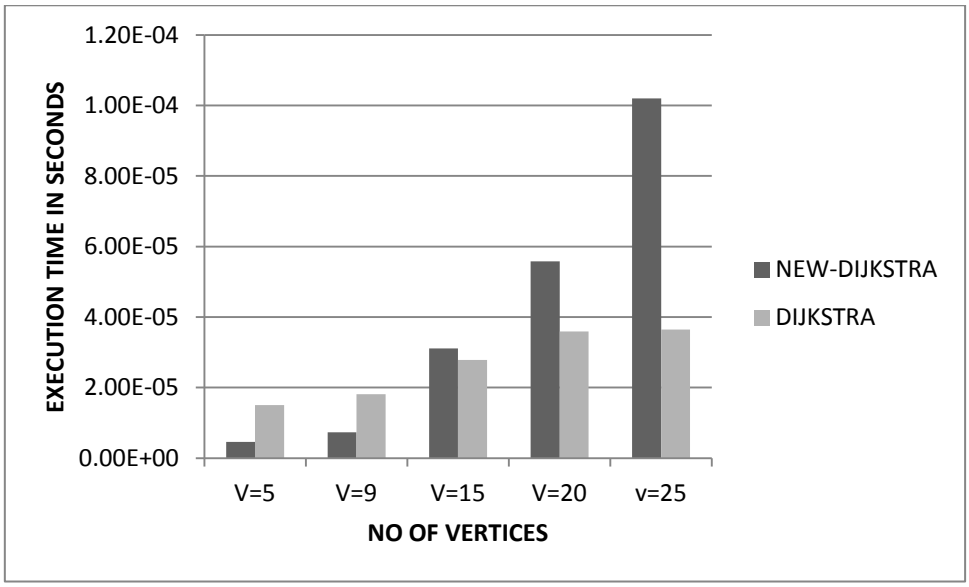
**ANALYSIS**

First, the dependence of execution time on the problem size is studied. Graphs corresponding to V=5 and V=9 are **sparse graphs** and the ones corresponding to V=15, V=20 and V=25 are **dense graphs**. It is observed that New-Dijkstra and New-Dijkstra1 outperforms Dijkstra for sparse graphs and for dense graphs Dijkstra is faster than New-Dijkstra and New-Dijkstra1.

Next the performance of the algorithm on sparse and dense graphs as the value of K, the number of distinct edge weights is varied is studied.

**Performance of New-Dijkstra and Dijkstra Single Source Shortest Path as the problem size is varied.**

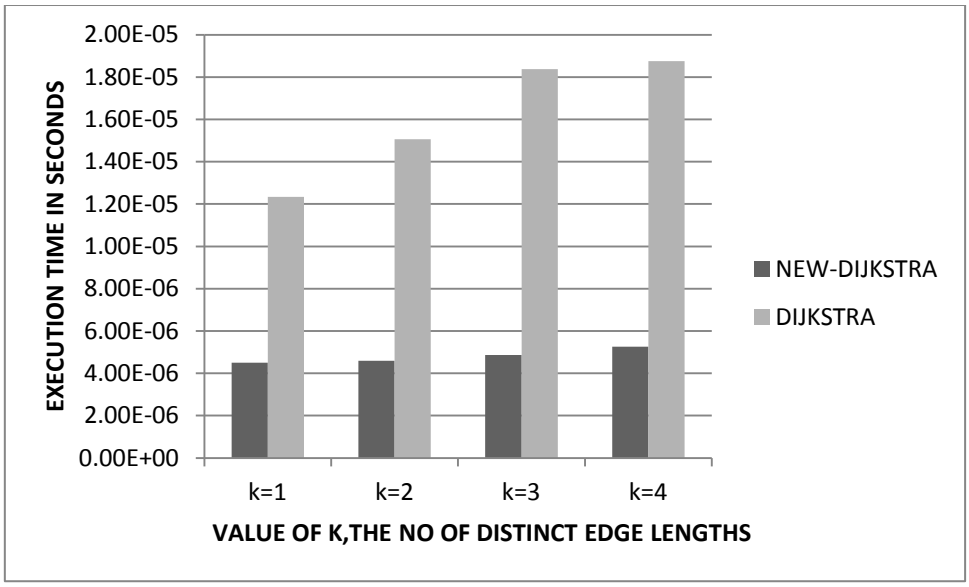
| NO OF VERTICES | NEW-DIJKSTRA | DIJKSTRA |
|---|---|---|
| V=5 | 4.60E-06 | 1.51E-05 |
| V=9 | 7.33E-06 | 1.81E-05 |
| V=15 | 3.11E-05 | 2.78E-05 |
| V=20 | 5.58E-05 | 3.59E-05 |
| v=25 | 0.000102026 | 3.65E-05 |




For both dense and sparse graphs, Speedup decreases with increase in problem size. Also, the performance is better for smaller graph instances compared to larger ones for the graphs studied.

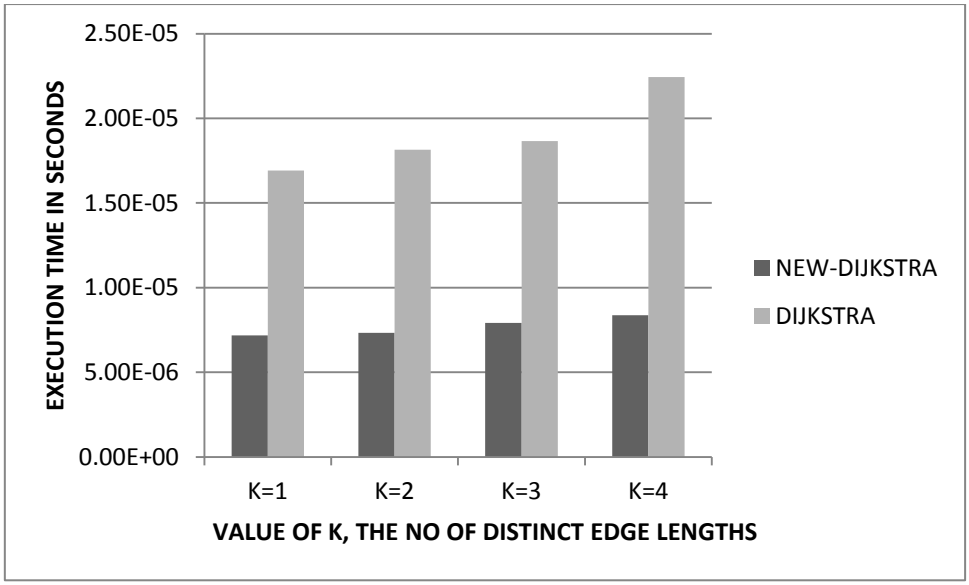
**Performance for a sparse graph (V=5) as the value of K is varied.**

| K | NEW-DIJKSTRA | DIJKSTRA |
|---|---|---|
| k=1 | 4.50E-06 | 1.23E-05 |
| k=2 | 4.60E-06 | 1.51E-05 |
| k=3 | 4.87E-06 | 1.84E-05 |
| k=4 | 5.27E-06 | 1.87E-05 |




**Performance for a sparse graph (V=9) as the value of K is varied.**

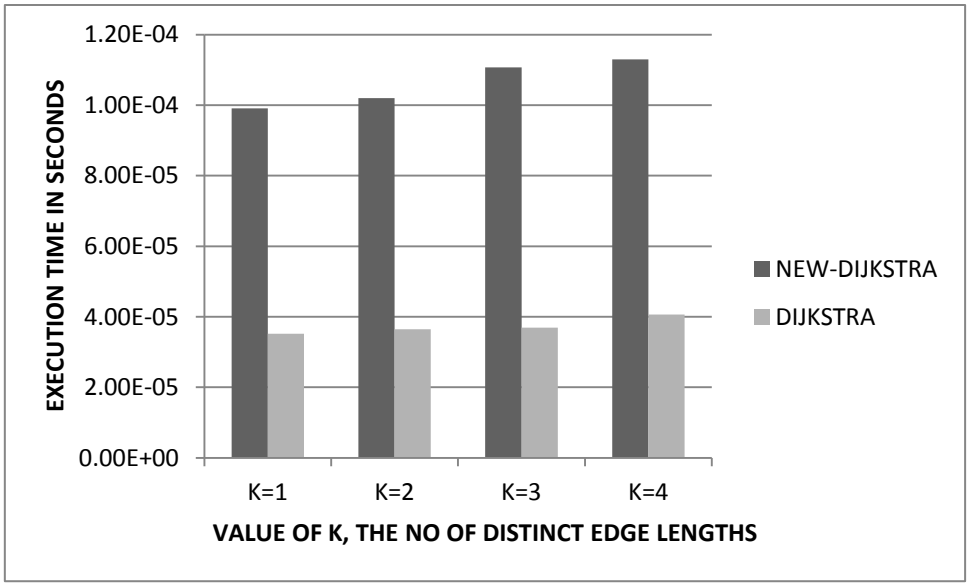
| K | NEW-DIJKSTRA | DIJKSTRA |
|---|---|---|
| K=1 | 7.17E-06 | 1.69E-05 |
| K=2 | 7.33E-06 | 1.81E-05 |
| K=3 | 7.92E-06 | 1.87E-05 |
| K=4 | 8.37E-06 | 2.24E-05 |




It is observed that New-Dijkstra is significantly faster than the Dijkstra but slower than Dijkstra with increase in K.

**Performance for a dense graph (V=25) as the value of K is varied.**

| K | NEW-DIJKSTRA | DIJKSTRA |
|---|---|---|
| K=1 | 9.91E-05 | 3.52E-05 |
| K=2 | 0.000102026 | 3.65E-05 |
| K=3 | 0.00011071 | 3.69E-05 |
| K=4 | 0.000112937 | 4.06E-05 |

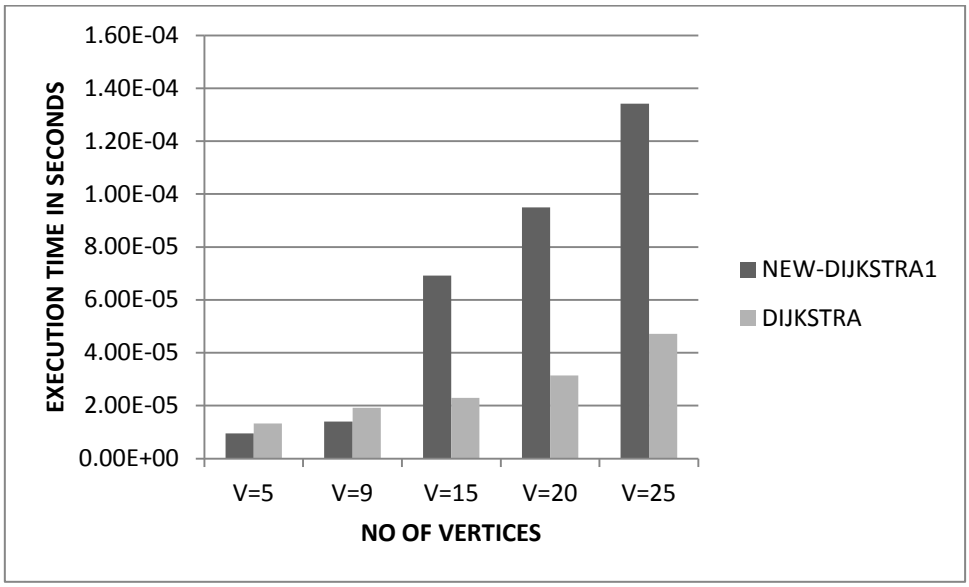



Dijkstra is faster than New-Dijkstra for dense graphs.

For both dense and random graphs, performance and speedup are better for smaller values of k and decreases with increase in K.

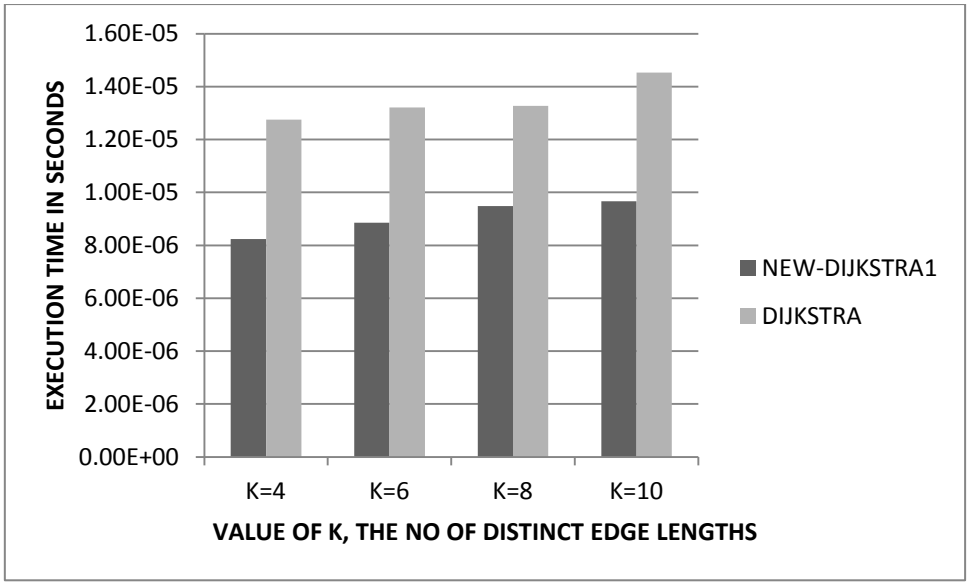
**Performance of A faster algorithm if K is permitted to grow with problem size (New-Dijkstra1) and Dijkstra Single Source Shortest Path as the problem size is varied.**

| NO OF VERTICES | NEW-DIJKSTRA1 | DIJKSTRA |
|---|---|---|
| V=5 | 9.49E-06 | 1.33E-05 |
| V=9 | 1.40E-05 | 1.92E-05 |
| V=15 | 6.92E-05 | 2.29E-05 |
| V=20 | 9.49E-05 | 3.15E-05 |
| V=25 | 0.000134111 | 4.71E-05 |



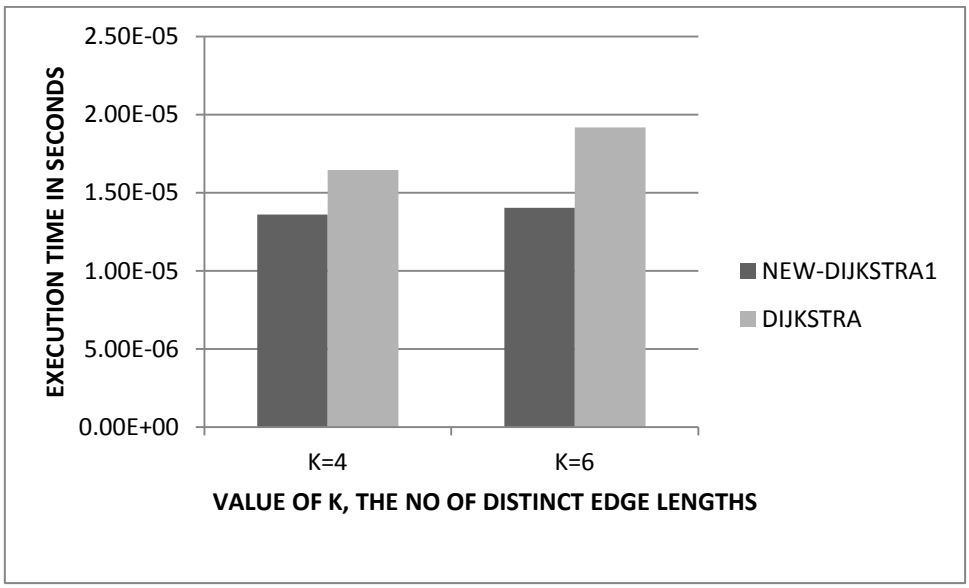

**Performance for a sparse graph (V=5) as the value of K is varied.**

| K | NEW-DIJKSTRA1 | DIJKSTRA |
|---|---|---|
| K=4 | 8.24E-06 | 1.28E-05 |
| K=6 | 8.85E-06 | 1.32E-05 |
| K=8 | 9.49E-06 | 1.33E-05 |
| K=10 | 9.66E-06 | 1.45E-05 |



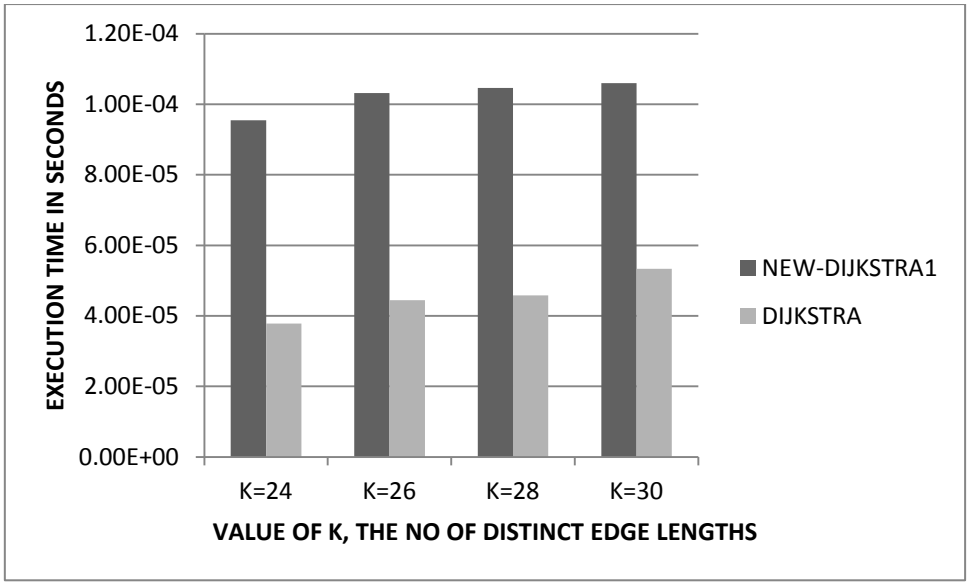

**Performance for a sparse graph (V=9) as the value of K is varied.**

| K | NEW-DIJKSTRA1 | DIJKSTRA |
|---|---|---|
| K=4 | 1.36E-05 | 1.65E-05 |
| K=6 | 1.40E-05 | 1.92E-05 |




**Performance for a dense graph (V=25) as the value of K is varied.**

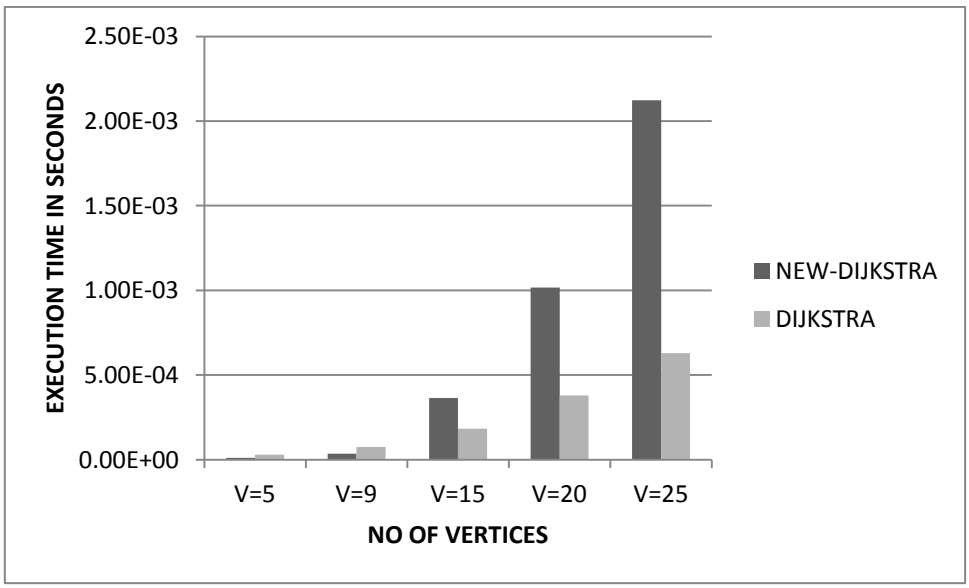
| K | NEW-DIJKSTRA1 | DIJKSTRA |
|---|---|---|
| K=24 | 9.55E-05 | 3.78E-05 |
| K=26 | 0.000103164 | 4.44E-05 |
| K=28 | 0.000104618 | 4.58E-05 |
| K=30 | 0.000105998 | 5.34E-05 |




New-Dijkstra and New-Dijkstra1 have similar characteristics except that New-Dijkstra1 is faster for even larger values of K.

**Performance of New-Dijkstra and Dijkstra All Pair Shortest Path as the problem size is varied.**

| NO OF VERTICES | NEW-DIJKSTRA | DIJKSTRA |
|---|---|---|
| V=5 | 1.11E-05 | 2.94E-05 |
| V=9 | 3.46E-05 | 7.52E-05 |
| V=15 | 0.000363858 | 0.00018277 |
| V=20 | 0.00101599 | 0.00037949 |
| V=25 | 0.00212274 | 0.00062808 |



**Performance of A faster algorithm if K is permitted to grow with problem size (New-Dijkstra1) and Dijkstra All Pair Shortest Path as the problem size is varied.**

| NO OF VERTICES | NEW-DIJKSTRA1 | DIJKSTRA |
|---|---|---|
| V=5 | 2.63E-05 | 3.09E-05 |
| V=9 | 7.07E-05 | 8.57E-05 |
| V=15 | 0.000743658 | 0.00020267 |
| V=20 | 0.00165824 | 0.00042299 |
| V=25 | 0.00304099 | 0.00067985 |