Tim Inzitari

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| --- | --- | --- | --- |
| n\* | Running time - within Circle | | |
| Graham Scan | Jarvis March | Quickhull |
| 10 | 0.021 | 0.02 | 0.018 |
| 1000 | 0.023 | 0.021 | 0.019 |
| 10,000 | 0.041 | 0.045 | 0.048 |
| 100,000 | 0.215 | 0.192 | 0.225 |
| 1mill | 1.138 | 2.232 | 1.201 |

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| --- | --- | --- | --- |
| n\* | Running time - ON Circle | | |
| Graham Scan | Jarvis March | Quickhull |
| 10 | 0.017 | 0.021 | 0.022 |
| 1000 | 0.024 | 0.025 | 0.03 |
| 10,000 | 0.037 | 0.125 | 0.07 |
| 100,000 | 0.237 | 0.303 | 0.502 |
| 1mill | 1.357 | 1.326 | 1.321 |

Algorithms Project Report:

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| n\* | Running time - Rectangle | | |
| Graham Scan | Jarvis March | Quickhull |
| 10 | 0.018 | 0.02 | 0.018 |
| 1000 | 0.024 | 0.023 | 0.021 |
| 10,000 | 0.047 | 0.036 | 0.035 |
| 100,000 | 0.239 | 0.172 | 0.202 |
| 1mil | 1.359 | 1.329 | 1.431 |

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| --- | --- | --- | --- |
| n\* | Running time - Triangle | | |
| Graham Scan | Jarvis March | Quickhull |
| 10 | 0.021 | 0.022 | 0.02 |
| 1000 | 0.023 | 0.024 | 0.086 |
| 10,000 | 0.036 | 0.036 | 0.035 |
| 100,000 | 0.226 | 0.158 | 0.165 |
| 1mil | 1.333 | 1.349 | 1.365 |

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| --- | --- | --- | --- |
|  | Running time complexity | | |
| Graham Scan | Jarvis March | Quickhull |
| Best case | Nlog N | N | Nlogn |
| Average case | NLogN | MN | NlogN |
| Worst case | NlogN | N^2 | n^2 |

1. Worst Case on Jarvis is when all points are on the Hull (m=N)  
   on Jarvis, N = number of input points, M is number of output or hull points.

Best on Quick Hull is when each part is balanced, unbalanced is worst case. Graham Scan is just based on the Sorting Algorithm used

1. The empirical analysis does match the theoretical data, for all cases Graham scan is around the same time each run. Jarvis March differs greatly when on the worst case of all points being within the circle. And Quick hull is around constant since we have balanced data.