Summary:

Comparison of results between Lagrange Interpolation method and Newton’ s Interpolation method.

I have selected the average temperatures daily in 2016 as data. I have set days as xs, AvgTemp as ys. (from <http://climod.unl.edu/> type **Daily Data Listing** area **68508**)

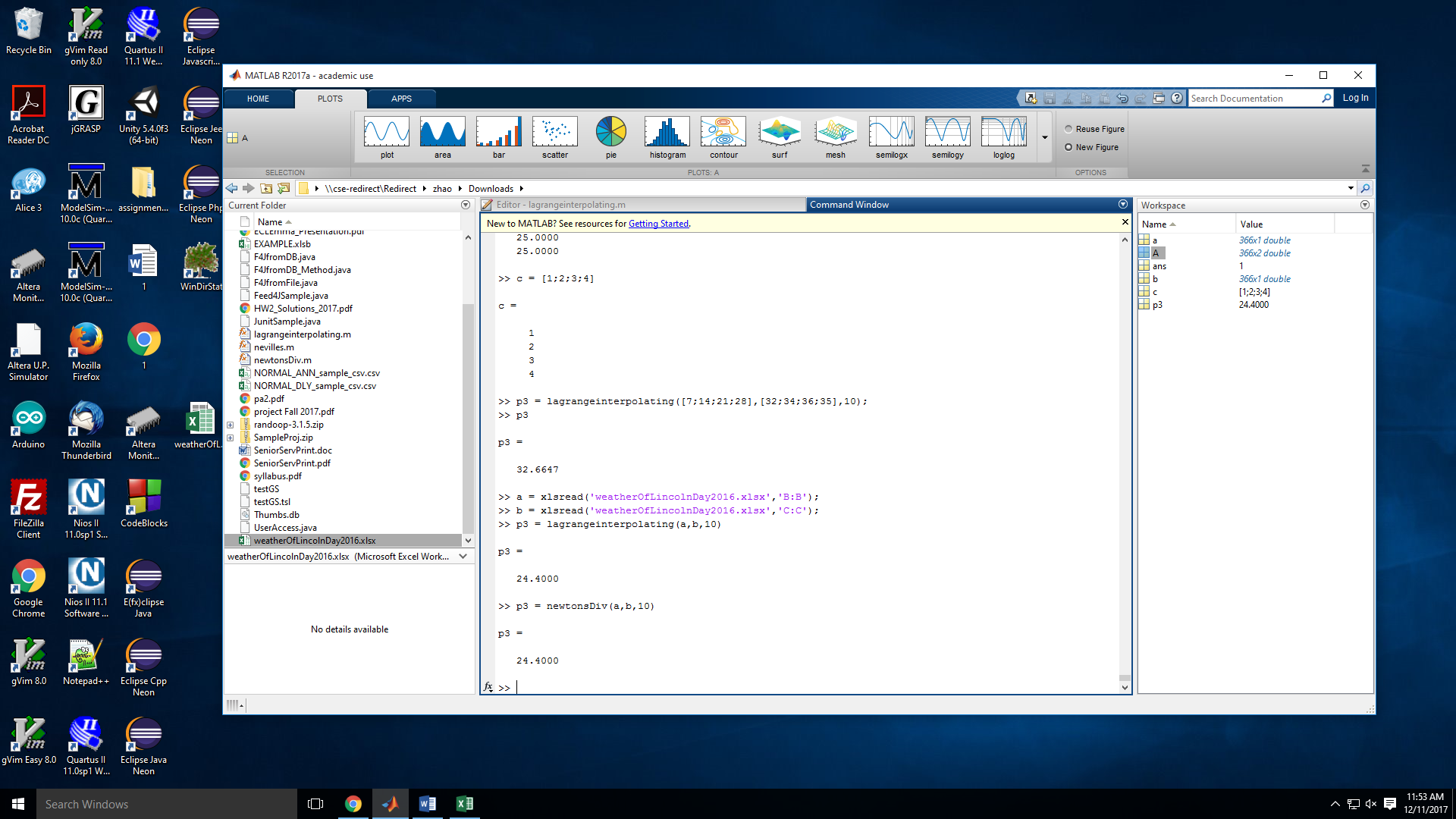
* Data chart

|  |  |  |
| --- | --- | --- |
| date | days | AvgTemp |
| 1/1/2016 | 1 | 24.9 |
| 1/2/2016 | 2 | 24.8 |
| 1/3/2016 | 3 | 24.8 |
| 1/4/2016 | 4 | 24.7 |
| 1/5/2016 | 5 | 24.7 |
| 1/6/2016 | 6 | 24.6 |
| 1/7/2016 | 7 | 24.5 |
| 1/8/2016 | 8 | 24.5 |
| 1/9/2016 | 9 | 24.4 |
| 1/10/2016 | 10 | 24.4 |
| 1/11/2016 | 11 | 24.3 |
| 1/12/2016 | 12 | 24.3 |
| 1/13/2016 | 13 | 24.2 |
| 1/14/2016 | 14 | 24.2 |
| 1/15/2016 | 15 | 24.2 |
| 1/16/2016 | 16 | 24.1 |
| 1/17/2016 | 17 | 24.1 |
| 1/18/2016 | 18 | 24.1 |
| 1/19/2016 | 19 | 24.1 |
| 1/20/2016 | 20 | 24.1 |
| 1/21/2016 | 21 | 24.1 |
| 1/22/2016 | 22 | 24.1 |
| 1/23/2016 | 23 | 24.2 |
| 1/24/2016 | 24 | 24.2 |
| 1/25/2016 | 25 | 24.3 |
| 1/26/2016 | 26 | 24.3 |
| 1/27/2016 | 27 | 24.4 |
| 1/28/2016 | 28 | 24.5 |
| 1/29/2016 | 29 | 24.6 |
| 1/30/2016 | 30 | 24.7 |
| 1/31/2016 | 31 | 24.9 |
| 2/1/2016 | 32 | 25 |
| 2/2/2016 | 33 | 25.2 |
| 2/3/2016 | 34 | 25.4 |
| 2/4/2016 | 35 | 25.6 |
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| 2/6/2016 | 37 | 26 |
| 2/7/2016 | 38 | 26.3 |
| 2/8/2016 | 39 | 26.6 |
| 2/9/2016 | 40 | 26.8 |
| 2/10/2016 | 41 | 27.1 |
| 2/11/2016 | 42 | 27.4 |
| 2/12/2016 | 43 | 27.8 |
| 2/13/2016 | 44 | 28.1 |
| 2/14/2016 | 45 | 28.4 |
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| 2/16/2016 | 47 | 29.1 |
| 2/17/2016 | 48 | 29.5 |
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| 2/22/2016 | 53 | 31.4 |
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| 2/24/2016 | 55 | 32.2 |
| 2/25/2016 | 56 | 32.6 |
| 2/26/2016 | 57 | 33 |
| 2/27/2016 | 58 | 33.4 |
| 2/28/2016 | 59 | 33.8 |
| 2/29/2016 | 60 | 34 |
| 3/1/2016 | 61 | 34.2 |
| 3/2/2016 | 62 | 34.6 |
| 3/3/2016 | 63 | 35 |
| 3/4/2016 | 64 | 35.4 |
| 3/5/2016 | 65 | 35.8 |
| 3/6/2016 | 66 | 36.1 |
| 3/7/2016 | 67 | 36.5 |
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| 3/9/2016 | 69 | 37.3 |
| 3/10/2016 | 70 | 37.6 |
| 3/11/2016 | 71 | 38 |
| 3/12/2016 | 72 | 38.3 |
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| 3/14/2016 | 74 | 39 |
| 3/15/2016 | 75 | 39.4 |
| 3/16/2016 | 76 | 39.7 |
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| 3/25/2016 | 85 | 42.8 |
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| 4/3/2016 | 94 | 46 |
| 4/4/2016 | 95 | 46.4 |
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| 12/27/2016 | 362 | 25.2 |
| 12/28/2016 | 363 | 25.2 |
| 12/29/2016 | 364 | 25.1 |
| 12/30/2016 | 365 | 25 |
| 12/31/2016 | 366 | 25 |

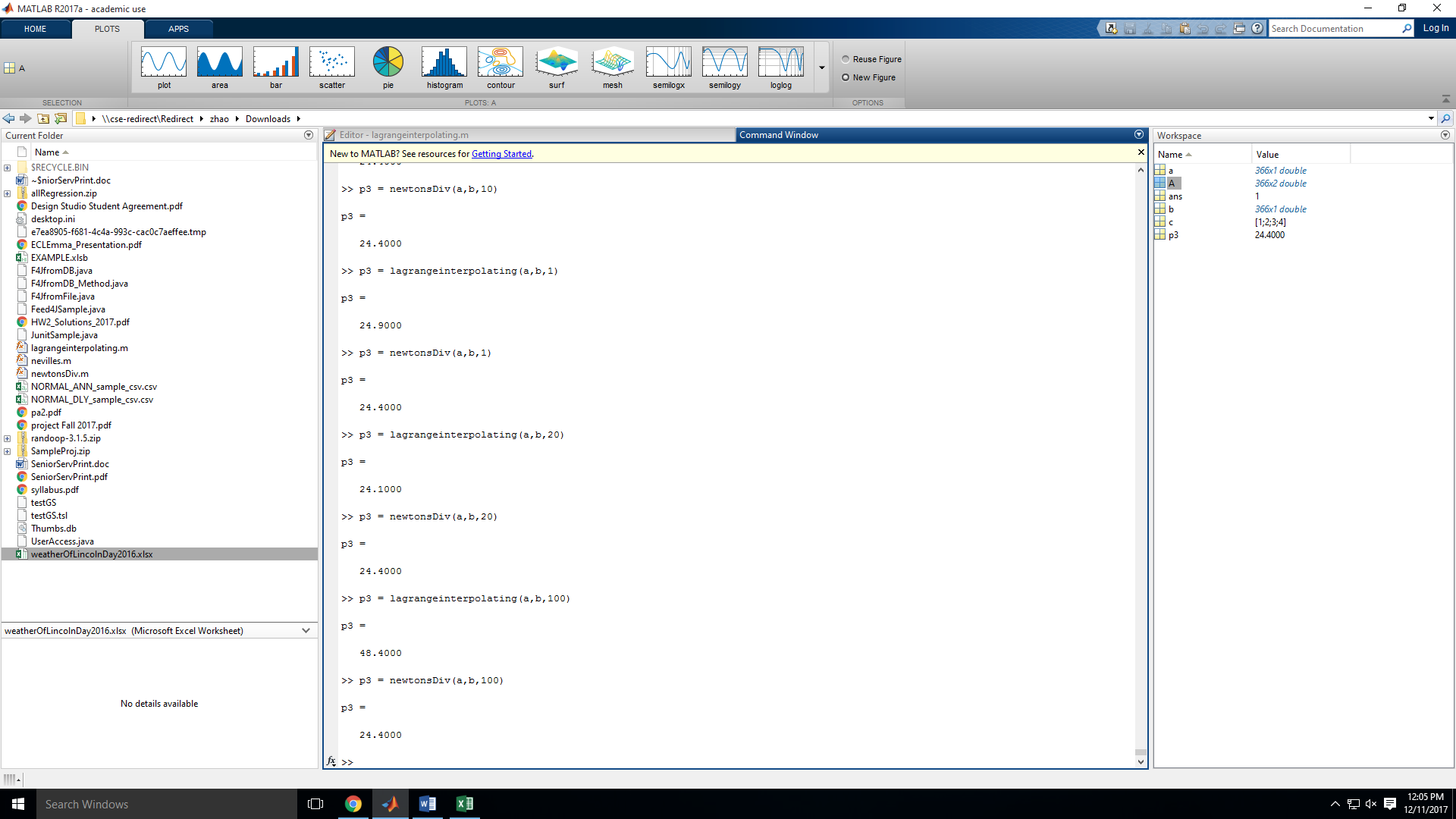
* Comparison in pictures

Overall year

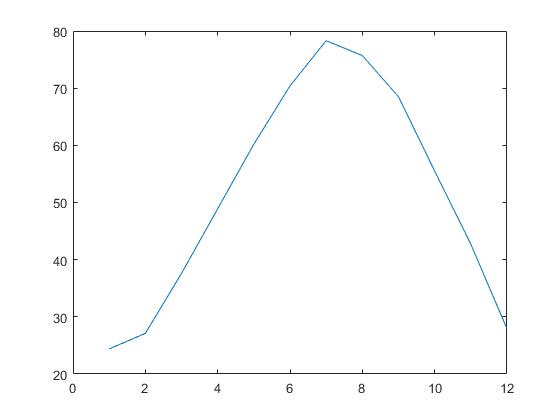
This is also the way I read the data and call the function.



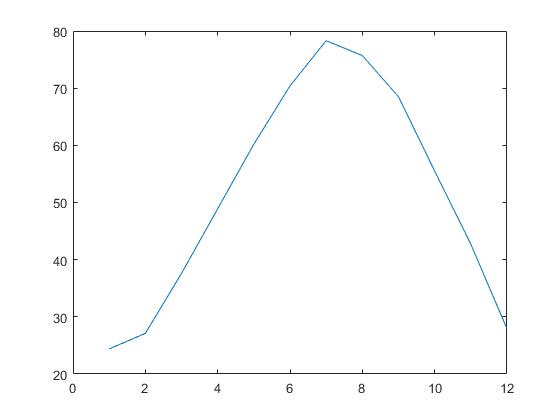
It has given the same number with T = 10;



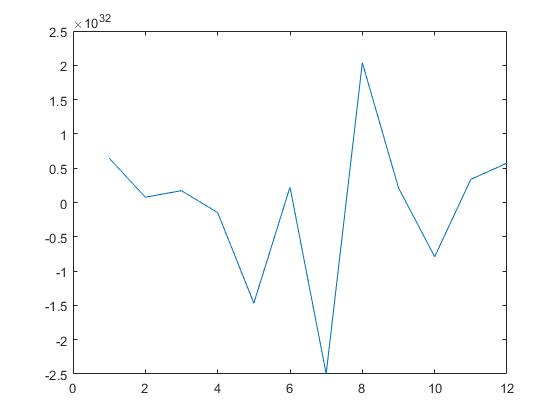
The differences start when T = 1, 20, 100. No big change with Newton’ s Interpolation method. Lagrange Interpolation method has changed a lot every time. I have tried it on our homework data, which gave the same issue. In this case, Newton’ s Interpolation method would support more accurate and stable data compare to Lagrange Interpolation method.



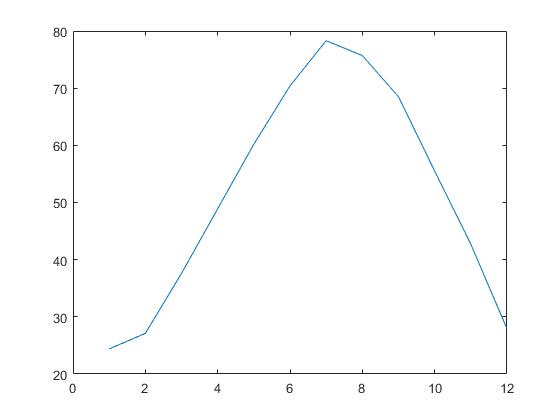
Month Interpolation graph of Lagrange Interpolation method. (T = 10)



Month Interpolation graph of Newton’ s Interpolation method. (T = 10)



Month Interpolation graph of Lagrange Interpolation method. (T = 100)



Month Interpolation graph of Newton’ s Interpolation method. (T = 100)

It shows that Lagrange Interpolation method is not accurate compare to Newton’ s Interpolation method with the increasing/changing of T’ s value.

According to the calculations have given from the class note, Newton’ s Interpolation method has more advantage in computational complexity.

No big difference with the data I have given on speed.

* Conclusion

Overall, the pictures I have shown supported that Newton’ s Interpolation method tends to have more accurate and constant results for relative large database analysis compare to Lagrange Interpolation method. According to some information I have researched online and our class notes. I would highly recommend to use the Newton’ s interpolation method.