ENGG233 Final Project

Calgary Weather Analyzer

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Lecture: Lecture #1

TA Group: Green.

Milestone 1:

1- Get Minimum Temperature of 1990-2019:

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1- Get Minimum Temperature of 1990-2019
2- Get Maximum Temperature of 1990-2019
3- Get Minimum Temperature of 1990-2019 Annually
4- Get Maximum Temperature of 1990-2019 Annually
5- Get Average Snowfall between 1990-2019 Annually
6- Get Average Temperature of 1990-2019 Annually
7- Show Linechart of Minimum Temperatures of 1990-2019 Annually
8- Show Linechart of Minimum Temperatures of 1990-2019 Annually
9- Show Barchart of Average Snowfall between 1990-2019 Annually

Please enter the number of the option you would like to see: 1

The lowest recorded temperature from the data was -15.9 degrees, in year 1992.0, month 1.0
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As seen in the output above, after the user chooses the first option, the program displays that the minimum monthly temperature throughout the entire span of 1990-2019 was -15.9^{o} Celsius. This temperature was in January 1992.

2- Get Maximum Temperature of 1990-2019:

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1- Get Minimum Temperature of 1990-2019
2- Get Maximum Temperature of 1990-2019
3- Get Minimum Temperature of 1990-2019 Annually
4- Get Maximum Temperature of 1990-2019 Annually
5- Get Average Snowfall between 1990-2019 Annually
6- Get Average Temperature of 1990-2019 Annually
7- Show Linechart of Minimum Temperatures of 1990-2019 Annually
8- Show Linechart of Minimum Temperatures of 1990-2019 Annually
9- Show Barchart of Average Snowfall between 1990-2019 Annually

Please enter the number of the option you would like to see: 2

The highest recorded temperature from the data was 23.5 degrees, in year 2019.0, month 7.0
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If the student chooses option 2, the above is displayed. It was determined that the maximum monthly temperature between 1990-2019 was 23.5 Degrees Celsius. This was the average temperature of July 2019.

3- Get Minimum Temperature of 1990-2019 Annually:

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Please enter the number of the option you would like to see: 3

In 1990.0, the lowest recorded temp was -15.84 degrees.
In 1991.0, the lowest recorded temp was -15.71 degrees.
In 1992.0, the lowest recorded temp was -15.9 degrees.
In 1993.0, the lowest recorded temp was -15.67 degrees.
In 1994.0, the lowest recorded temp was -15.66 degrees.
In 1995.0, the lowest recorded temp was -15.77 degrees.
In 1996.0, the lowest recorded temp was -15.63 degrees.
In 1997.0, the lowest recorded temp was -15.56 degrees.
In 1998.0, the lowest recorded temp was -15.61 degrees.
In 1999.0, the lowest recorded temp was -15.66 degrees.
In 2000.0, the lowest recorded temp was -15.14 degrees.
In 2001.0, the lowest recorded temp was -15.03 degrees.
In 2002.0, the lowest recorded temp was -14.62 degrees.
In 2003.0, the lowest recorded temp was -14.34 degrees.
In 2004.0, the lowest recorded temp was -14.32 degrees.
In 2005.0, the lowest recorded temp was -14.15 degrees.
In 2006.0, the lowest recorded temp was -14.19 degrees.
In 2007.0, the lowest recorded temp was -14.04 degrees.
In 2008.0, the lowest recorded temp was -13.91 degrees.
In 2009.0, the lowest recorded temp was -13.72 degrees.
In 2010.0, the lowest recorded temp was -13.49 degrees.
In 2011.0, the lowest recorded temp was -13.21 degrees.
In 2012.0, the lowest recorded temp was -13.41 degrees.
In 2013.0, the lowest recorded temp was -12.93 degrees.
In 2014.0, the lowest recorded temp was -12.92 degrees.
In 2015.0, the lowest recorded temp was -12.92 degrees.
In 2016.0, the lowest recorded temp was -12.81 degrees.
In 2017.0, the lowest recorded temp was -12.95 degrees.
In 2018.0, the lowest recorded temp was -13.08 degrees.
In 2019.0, the lowest recorded temp was -13.02 degrees.
```

If the user chooses option 3, the above is displayed, which is a list of the minimum temperatures of each year between 1990 to 2019. The list is in chronological order rather than sorted by temperature.

4- Get Maximum Temperature of 1990-2019 Annually:

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Please enter the number of the option you would like to see: 4

In 1990.0, the highest recorded temp was 23.36 degrees.
In 1991.0, the highest recorded temp was 23.21 degrees.
In 1992.0, the highest recorded temp was 23.2 degrees.
In 1993.0, the highest recorded temp was 23.09 degrees.
In 1994.0, the highest recorded temp was 22.93 degrees.
In 1995.0, the highest recorded temp was 22.92 degrees.
In 1996.0, the highest recorded temp was 22.85 degrees.
In 1997.0, the highest recorded temp was 22.9 degrees.
In 1998.0, the highest recorded temp was 22.86 degrees.
In 1999.0, the highest recorded temp was 22.9 degrees.
In 2000.0, the highest recorded temp was 22.86 degrees.
In 2001.0, the highest recorded temp was 22.85 degrees.
In 2002.0, the highest recorded temp was 22.88 degrees.
In 2003.0, the highest recorded temp was 23.08 degrees.
In 2004.0, the highest recorded temp was 23.12 degrees.
In 2005.0, the highest recorded temp was 23.12 degrees.
In 2006.0, the highest recorded temp was 23.05 degrees.
In 2007.0, the highest recorded temp was 23.11 degrees.
In 2008.0, the highest recorded temp was 23.26 degrees.
In 2009.0, the highest recorded temp was 23.25 degrees.
In 2010.0, the highest recorded temp was 23.18 degrees.
In 2011.0, the highest recorded temp was 23.15 degrees.
In 2012.0, the highest recorded temp was 23.21 degrees.
In 2013.0, the highest recorded temp was 23.28 degrees.
In 2014.0, the highest recorded temp was 23.24 degrees.
In 2015.0, the highest recorded temp was 23.24 degrees.
In 2016.0, the highest recorded temp was 23.22 degrees.
In 2017.0, the highest recorded temp was 23.29 degrees.
In 2018.0, the highest recorded temp was 23.45 degrees.
In 2019.0, the highest recorded temp was 23.5 degrees.
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Above is the output if the user selects option 4 This output also displays the data in chronological order. However, this output displays the maximum temperature of each year. The format of the output is “In (the year), the highest recorded temp was (temperature) degrees.”

5- Get Average Snowfall between 1990-2019 Annually:

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Please enter the number of the option you would like to see: 5

In 1990.0, the average recorded snowfall was 11.293333333333331 cm.
In 1991.0, the average recorded snowfall was 11.265 cm.
In 1992.0, the average recorded snowfall was 11.029166666666669 cm.
In 1993.0, the average recorded snowfall was 11.090833333333334 cm.
In 1994.0, the average recorded snowfall was 10.899166666666666 cm.
In 1995.0, the average recorded snowfall was 10.818333333333335 cm.
In 1996.0, the average recorded snowfall was 10.694166666666666 cm.
In 1997.0, the average recorded snowfall was 10.854166666666666 cm.
In 1998.0, the average recorded snowfall was 10.7575 cm.
In 1999.0, the average recorded snowfall was 10.748333333333335 cm.
In 2000.0, the average recorded snowfall was 10.65 cm.
In 2001.0, the average recorded snowfall was 10.559166666666668 cm.
In 2002.0, the average recorded snowfall was 10.444166666666666 cm.
In 2003.0, the average recorded snowfall was 10.313333333333334 cm.
In 2004.0, the average recorded snowfall was 10.565 cm.
In 2005.0, the average recorded snowfall was 10.5525 cm.
In 2006.0, the average recorded snowfall was 10.231666666666666 cm.
In 2007.0, the average recorded snowfall was 10.268333333333333 cm.
In 2008.0, the average recorded snowfall was 10.4975 cm.
In 2009.0, the average recorded snowfall was 10.6625 cm.
In 2010.0, the average recorded snowfall was 10.769166666666663 cm.
In 2011.0, the average recorded snowfall was 10.7275 cm.
In 2012.0, the average recorded snowfall was 10.88 cm.
In 2013.0, the average recorded snowfall was 10.851666666666667 cm.
In 2014.0, the average recorded snowfall was 10.9475 cm.
In 2015.0, the average recorded snowfall was 11.144166666666669 cm.
In 2016.0, the average recorded snowfall was 11.109166666666667 cm.
In 2017.0, the average recorded snowfall was 10.993333333333332 cm.
In 2018.0, the average recorded snowfall was 11.210833333333333 cm.
In 2019.0, the average recorded snowfall was 10.993636363636362 cm.
```

If the user chooses option 5, the program will output the average snowfall of each year between 1990-2019. The output is in centimeters. The format is “In (year), the average recorded snowfall was (snowfall) cm.”

Milestone 2:

6- Get Average Temperature between 1990-2019 Annually:

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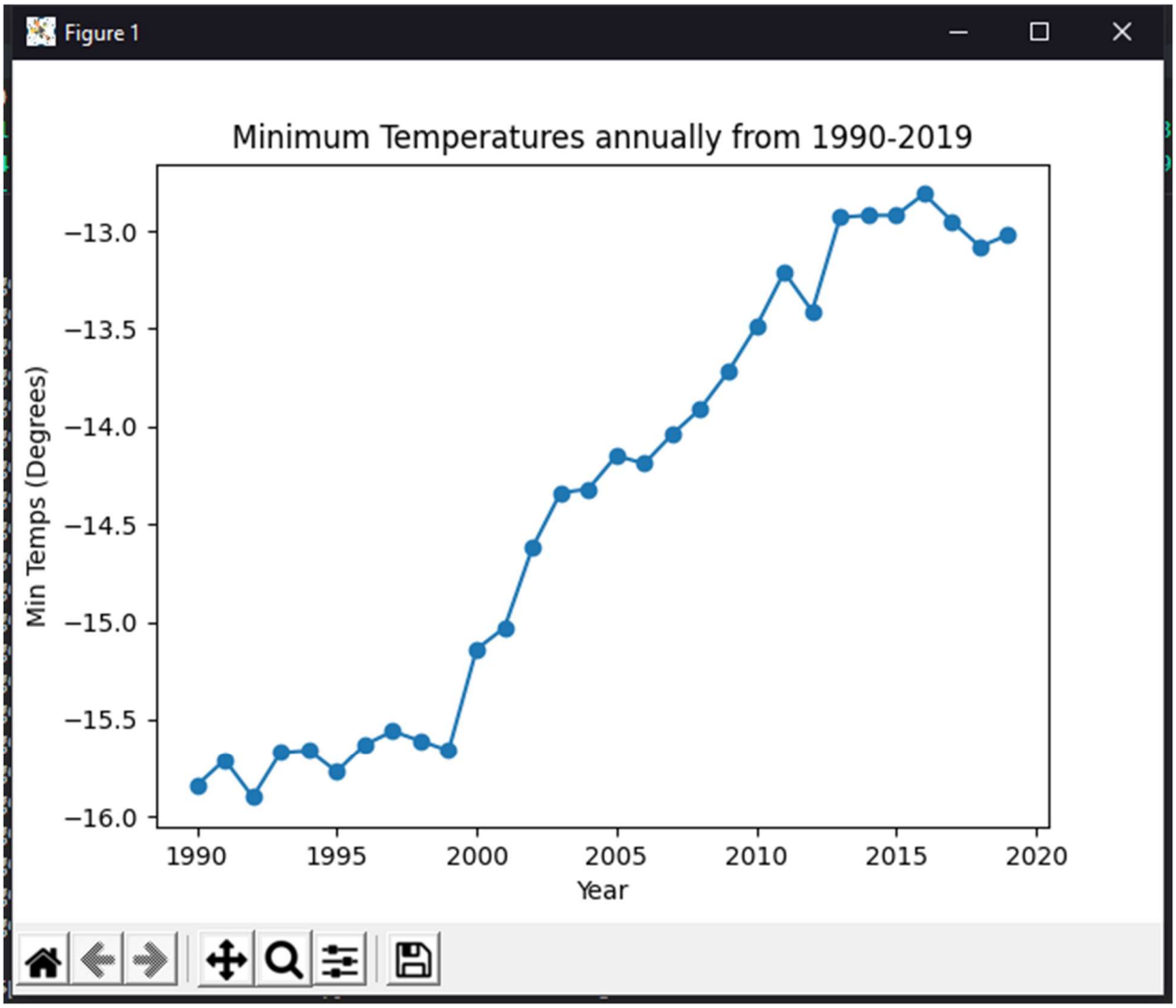
Please enter the number of the option you would like to see: 6

In 1990.0, the average recorded temperature was 3.823749999999999 degrees.
In 1991.0, the average recorded temperature was 3.8383333333333334 degrees.
In 1992.0, the average recorded temperature was 3.849583333333334 degrees.
In 1993.0, the average recorded temperature was 3.86875 degrees.
In 1994.0, the average recorded temperature was 3.8420833333333335 degrees.
In 1995.0, the average recorded temperature was 3.8658333333333332 degrees.
In 1996.0, the average recorded temperature was 3.9 degrees.
In 1997.0, the average recorded temperature was 3.875833333333333 degrees.
In 1998.0, the average recorded temperature was 3.9033333333333338 degrees.
In 1999.0, the average recorded temperature was 3.950833333333333 degrees.
In 2000.0, the average recorded temperature was 4.03875 degrees.
In 2001.0, the average recorded temperature was 4.05875 degrees.
In 2002.0, the average recorded temperature was 4.114583333333333 degrees.
In 2003.0, the average recorded temperature was 4.17 degrees.
In 2004.0, the average recorded temperature was 4.196666666666666 degrees.
In 2005.0, the average recorded temperature was 4.22375 degrees.
In 2006.0, the average recorded temperature was 4.295 degrees.
In 2007.0, the average recorded temperature was 4.296666666666667 degrees.
In 2008.0, the average recorded temperature was 4.320416666666667 degrees.
In 2009.0, the average recorded temperature was 4.380416666666667 degrees.
In 2010.0, the average recorded temperature was 4.402916666666666 degrees.
In 2011.0, the average recorded temperature was 4.420833333333333 degrees.
In 2012.0, the average recorded temperature was 4.364166666666667 degrees.
In 2013.0, the average recorded temperature was 4.4475 degrees.
In 2014.0, the average recorded temperature was 4.46875 degrees.
In 2015.0, the average recorded temperature was 4.472499999999999 degrees.
In 2016.0, the average recorded temperature was 4.555 degrees.
In 2017.0, the average recorded temperature was 4.586250000000001 degrees.
In 2018.0, the average recorded temperature was 4.531666666666666 degrees.
In 2019.0, the average recorded temperature was 5.500454545454546 degrees.
```

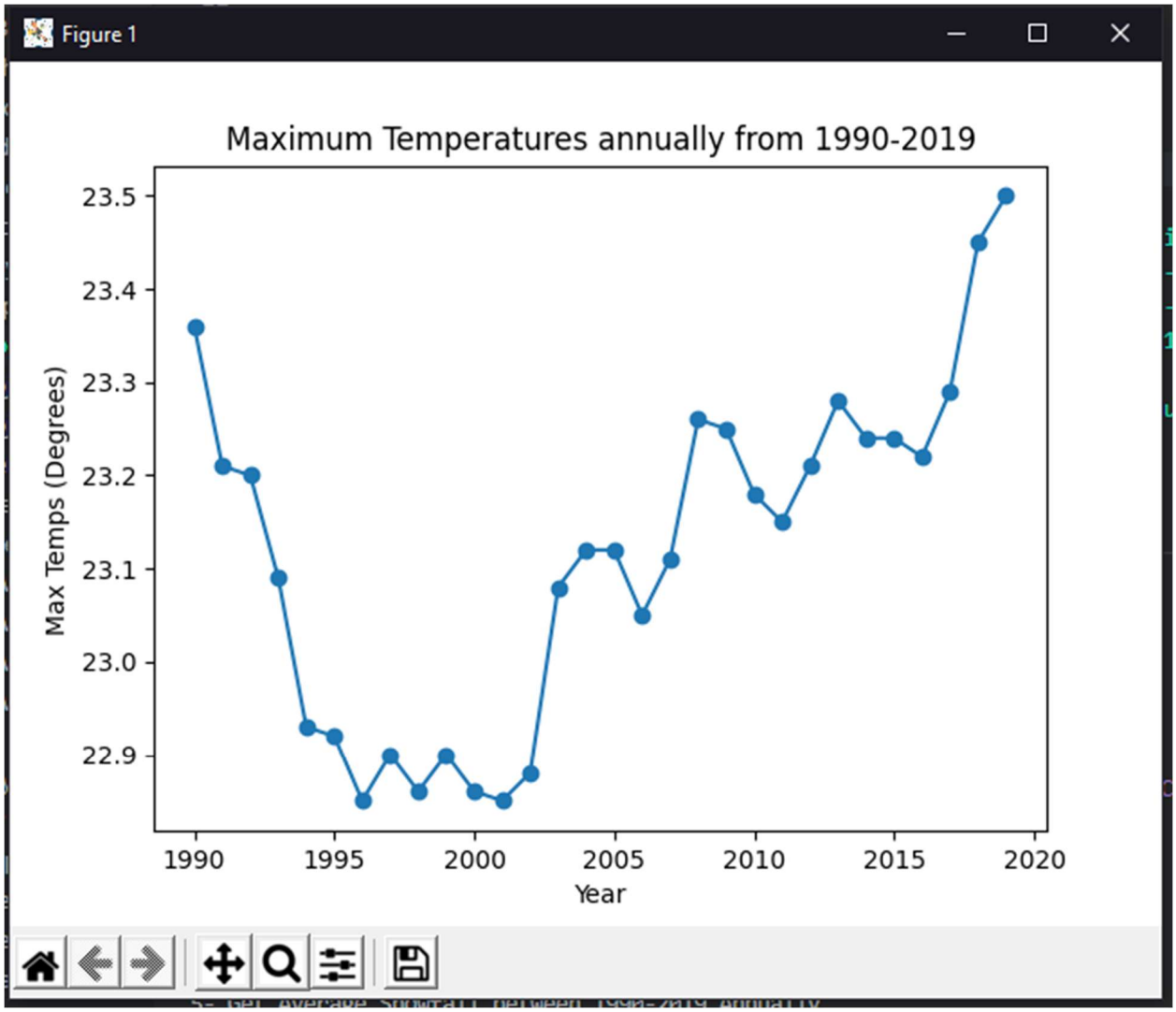
As seen in the output above, after the user chooses the 6th option, the program displays the average temperature of each year. As seen above, the average temperature ranges from little under 4^{o} to 5.5^{o}. However, one may notice that the temperature is constantly slightly rising by year. Being around 3.8-3.9 degrees between 1990 and 1999, with the temperature rising at a slightly faster rate from 2002-2019 where it peaks at 5.5 degrees.

7- Line Chart of Minimum Temperature of 1990-2019 Annually:



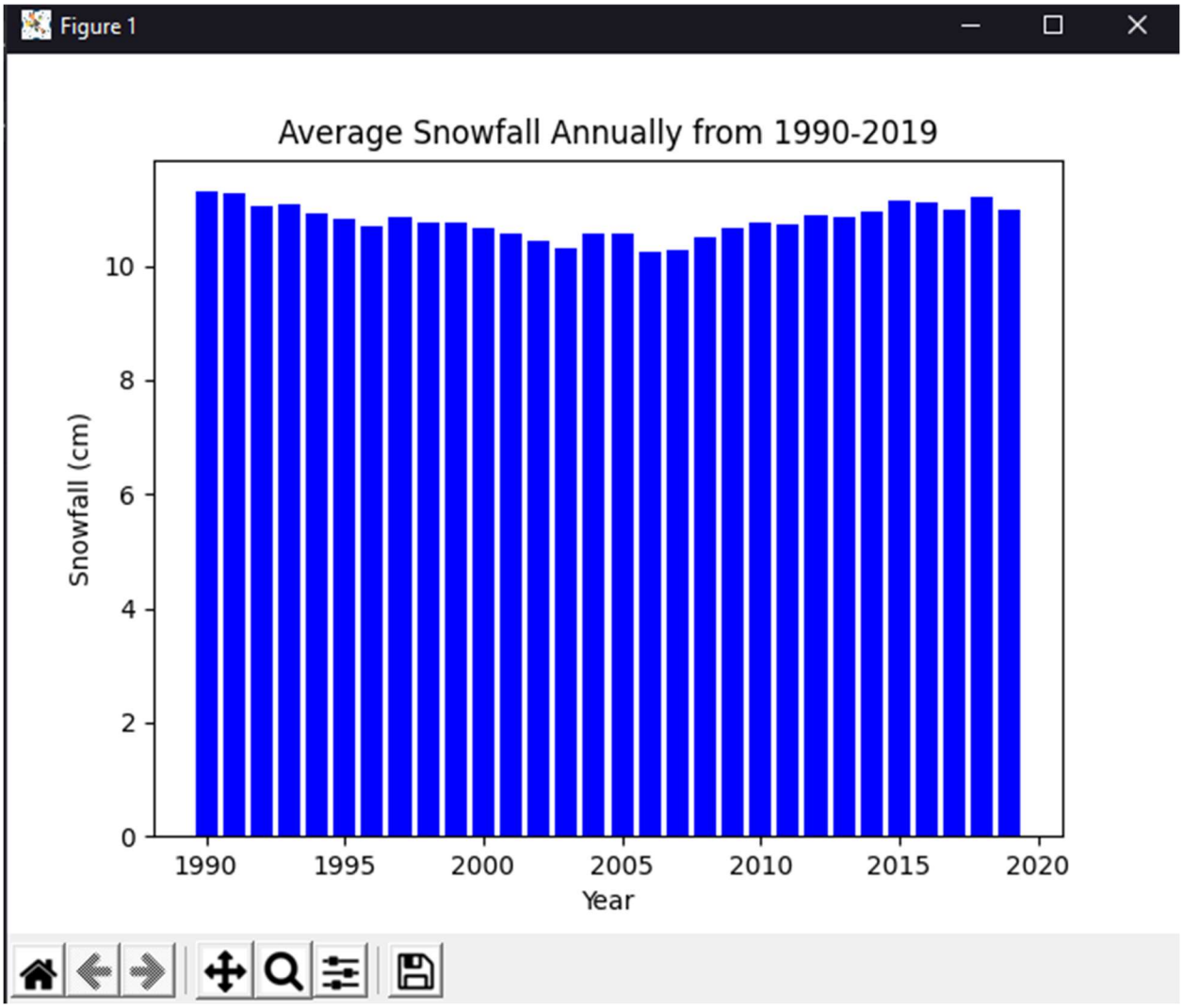
As seen in the visual above (based on the output of option 3) the minimum temperature of each year increases annually. With the first decade in question staying in between -16 and -15.5, followed by a rapid increase between 2000 and 2010 where the average increases to -13 degrees (increasing every year.) Between 2010 and 2019 the minimum temperature was more consistent, staying between -13 and -12.5. The highest minimum temperature was near 2015 or 2016 where the min temperature was possibly around -12.8 degrees.

8- Line Chart of Maximum Temperature of 1990-2019 Annually:



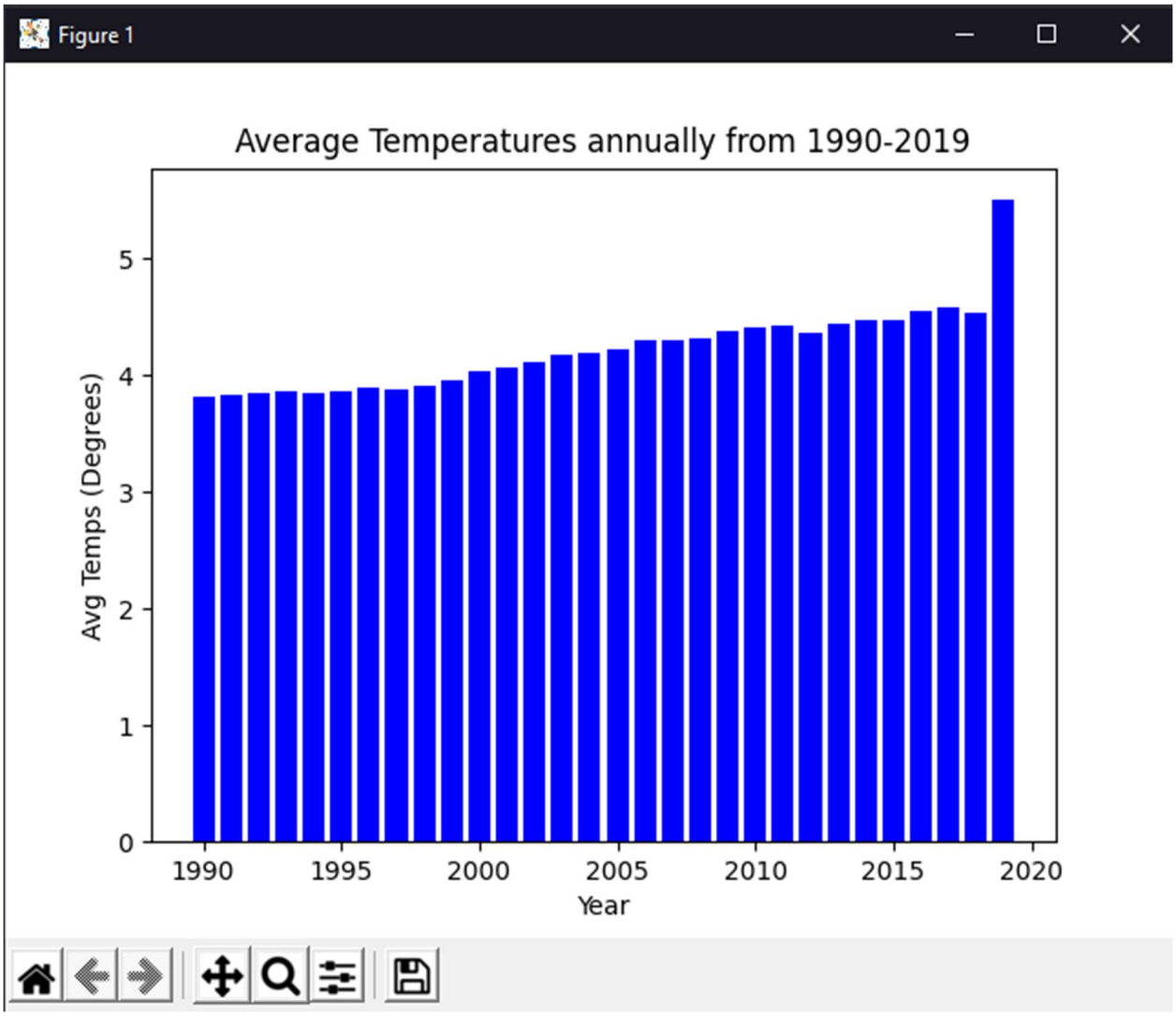
The above graph shows the result if the user selects option 8. The graph above ranges from 22.8 degrees to 23.5, showing that in that time period, the temperature stayed within that range of 0.7 degrees. Between 1990-1995, the max temperature dropped rapidly every year, until 1995 where it stayed consistently between 22.8 and 22.9 degrees until the year 2002, where the temperature began to spike upwards. From 2005-2019, the temperature, while fluctuating, generally increased to its peak which is about 23.5 degrees in 2019.

9- Bar Chart of Average Snowfall of 1990-2019 Annually:



This graph shows the average snowfall every year between 1990 - 2019 and is displayed if the user chooses option 9. The overall shape of the graph is slightly parabolic and has a U shape. However, the changes are very minimal from year to year and stay in the range of about 10-11.5 cm of snow. The lowest points seem to be 2003 and 2006 leaning very close to 10 cm. The highest snowfall years seemed to be in the very early 1990s and the same pattern is visible in the waning years of the 2010s.

10- Bar Chart of Average Temperature of 1990-2019 Annually:



Finally, if the user chooses option 10, the above graph is displayed. The average temperature of each year mostly lies within the range of about 3.8 to 4.5 degrees, except for 2019. The graph makes it evident that there is a general upwards slope, displaying that the average temperature increases each year. If this graph were a line plot, it would be nearly linear. The lowest average temperature was in the year 1990 lying around 3.8 degrees. The highest average temperature was 2019. This high spike in temperature however is abnormal and is most likely due to the exclusion of December 2019 in the given csv file, which happens to be one of the coldest months, thus distorting the calculated average temperature.