Polynomial Regression

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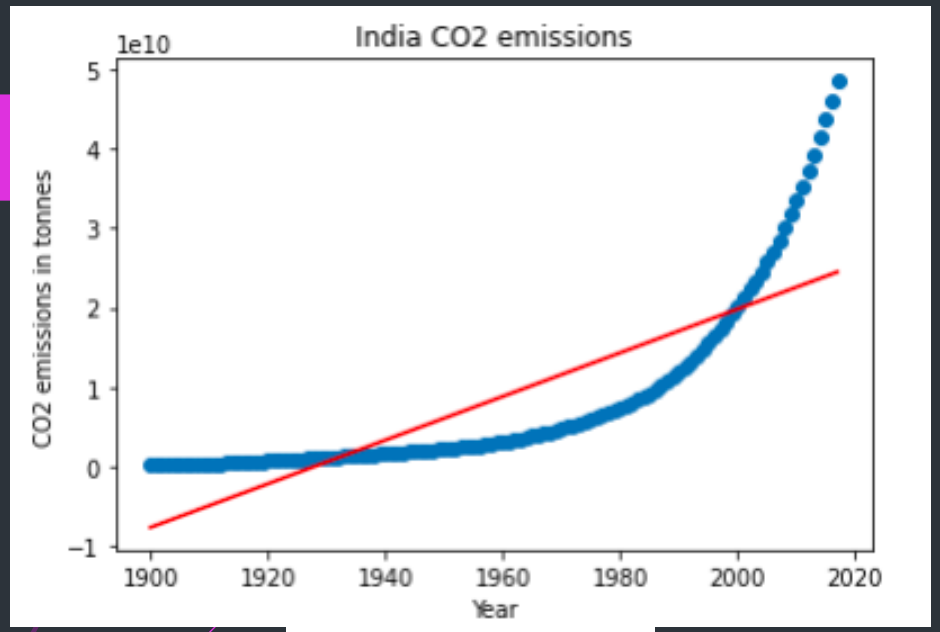
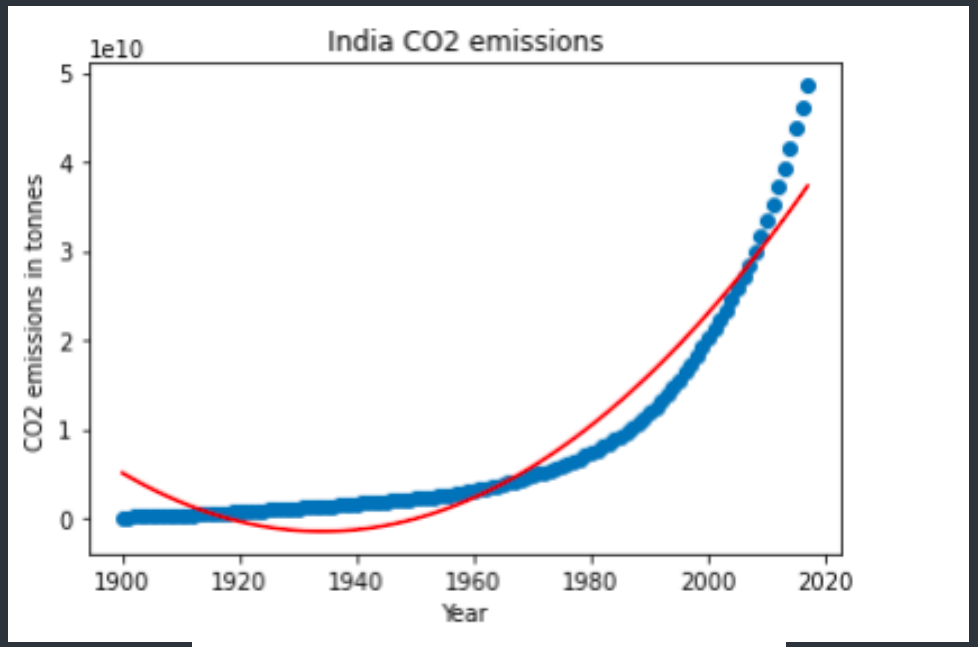
	Emission	Year
0	125697184	1900
1	140093040	1901
2	155969152	1902
3	172134720	1903
4	190201904	1904
..	...	...
113	39229708958	2013
114	41437242850	2014
115	43713650045	2015
116	46091097909	2016
117	48557863281	2017

[118 rows x 2 columns]

- Polynomial Regression is a nonlinear type of regression which helps to determine relationship and predict values when the dependent variable is related to the independent variable of nth degree.
- In this example we have plotted the CO_2 emission in India vs year.
- Further we are determining the CO_2 emission in a particular year using Polynomial Regression.

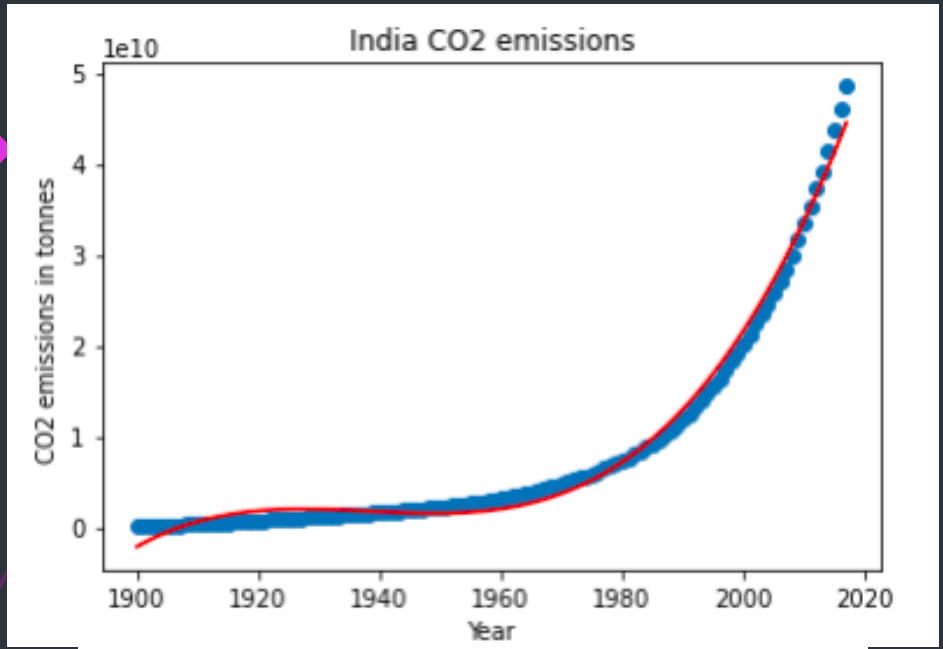


2.751e+08 x - 5.304e+11
R2 value is =
0.667661947152732



2
5.641e+06 x - 2.182e+10 x + 2.11e+13
R2 value is =
0.9281631770793184

This shows the plot of CO2 emissions vs Year fit according to linear regression and quadratic regression. As we can see there is a significant improve in the R2 score for the two.




```
          3             2
9.266e+04 x - 5.388e+08 x + 1.044e+12 x - 6.746e+14
R2 value is =
0.9910323231352595
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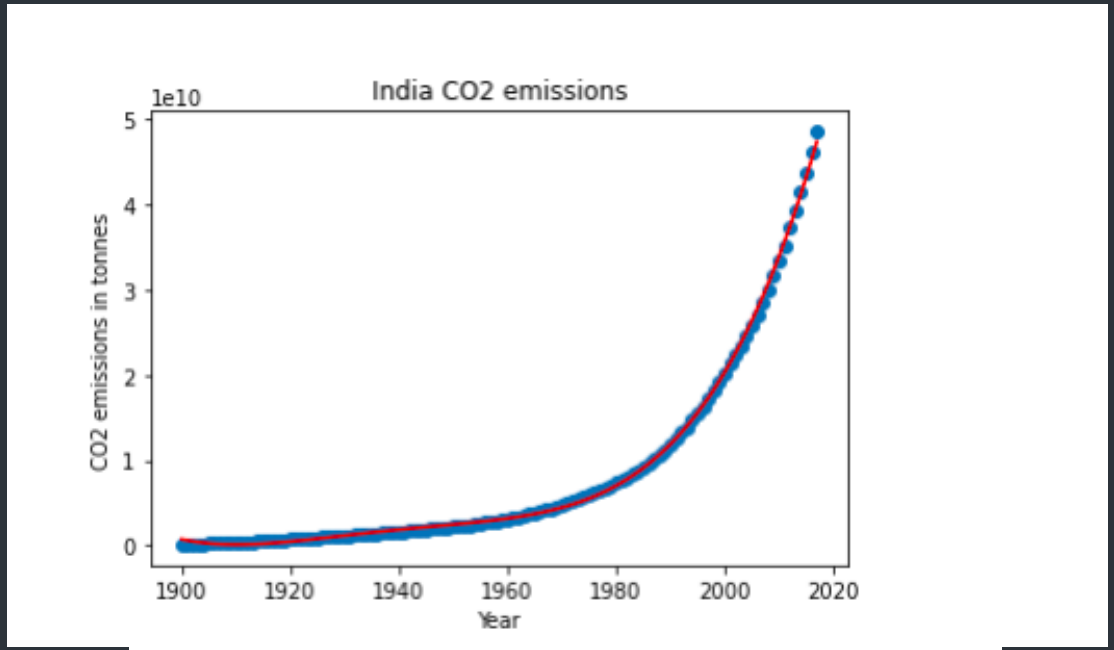
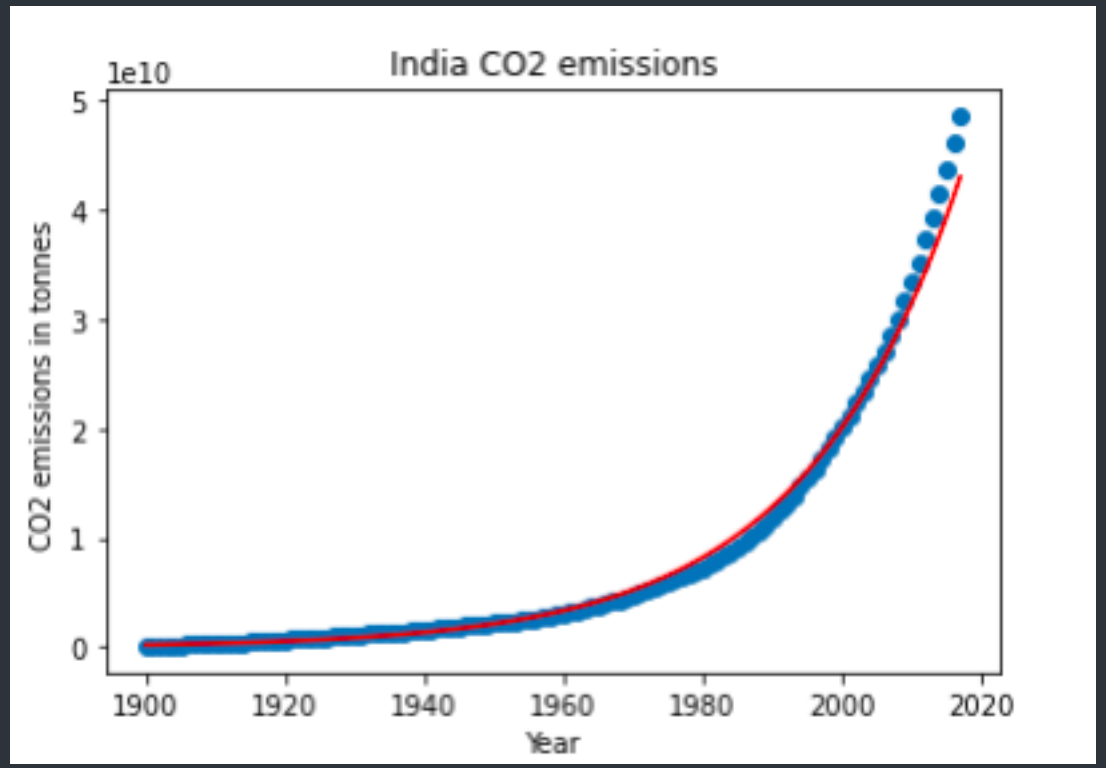



```
     4             3             2
1133 x - 8.785e+06 x + 2.554e+10 x - 3.299e+13 x + 1.598e+16
R2 value is =
0.9993356584298256
```

- CO2 emissions vs Year fit according to cubic regression and biquadratic regression which are examples of polynomial regression.
- This shows that as we increase the order of regression it fits the data better.

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R2 score =
0.9882962831308588
```
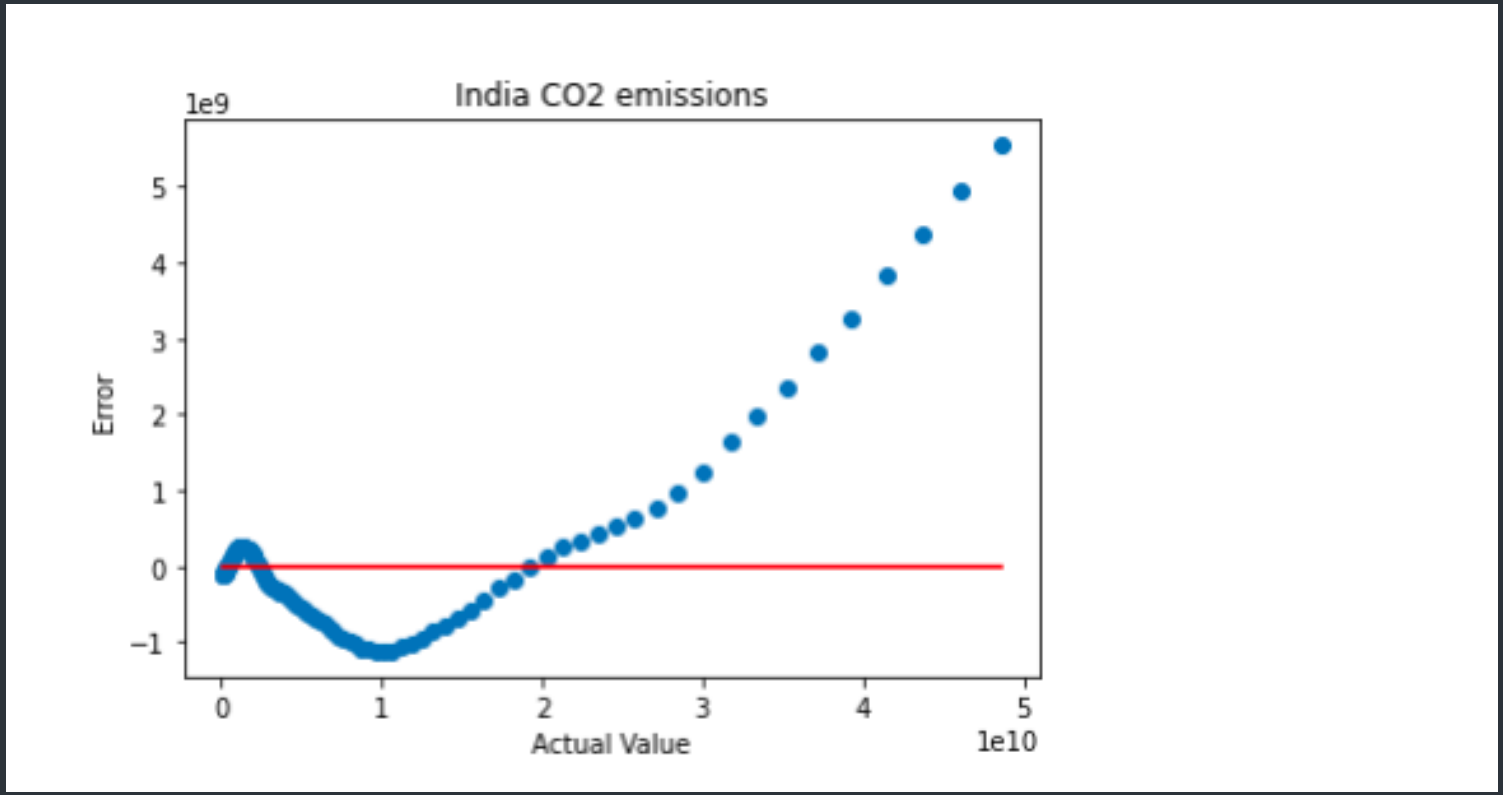

This shows the data fitted with an exponential function.

R2 score is 0.98.



Plot of error vs actual value when the data is fitted with an exponential function.

CONCLUSION

- CO_2 emission have risen continuously. The steep rise seems to be exponential in nature hence we tried fitting it with an exponential function in the final step.
- Polynomials of greater degree fit the data better, however extrapolation of polynomial functions might lead to unexpected results.
- The rise of CO_2 levels can be attributed to rising population, electrification and industrialization of the nation.
- It is a well established fact this trend can lead to global warming and climate change. Use of renewable alternatives and slowing down of population growth gives us hope that CO_2 levels wont follow such a steep trend in the coming years.