

# GDP per capita prediction using Greenhouse Gas Emissions

Background:

Due to increased industrialisation we have seen monetary gains which have been almost unparalled in history. However, this has also resulted in increased greenhouse emissions.

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# Data and Implementation

Data Source:

“Historical World Population, GDP Per Capita (1990 GK\$) and Greenhouse Gases Emissions (1800-2010)”, Mendeley Project

Visit - [data.mendeley.com](https://data.mendeley.com)

Data Set size-

From 1800 to 2010 for Nitrous, carbon dioxide, methane, and GDP per capita of the USA

Year	Nitrous	Carbon	Methane	Usa
1800	274.55	280.83	757.76	1295.92
1801	274.53	280.92	758.58	1319.59
1802	274.52	280.99	759.51	1341.21
1803	274.51	281.07	760.51	1318.56
1804	274.49	281.16	761.54	1317.53
1805	274.47	281.23	762.67	1345.33
1806	274.45	281.32	763.80	1370.03
1807	274.43	281.41	765.02	1383.41
1808	274.41	281.50	766.32	1285.63
1809	274.38	281.57	767.66	1349.44
1810	274.36	281.65	769.15	1387.53
1811	274.33	281.72	770.72	1415.32
1812	274.30	281.79	772.21	1390.62
1813	274.27	281.86	773.70	1406.06
1814	274.23	281.93	774.83	1432.82
1815	274.18	281.99	776.14	1426.64
1816	274.14	282.06	777.38	1369.00
1817	274.11	282.13	778.99	1367.97
1818	274.07	282.20	780.30	1372.09
1819	274.05	282.27	781.43	1369.00
1820	274.01	282.35	782.43	1360.77
1821	273.97	282.41	783.57	1382.38
1822	273.93	282.48	784.96	1420.47
1823	273.90	282.54	786.22	1405.03
1824	273.85	282.62	787.48	1443.11
1825	273.79	282.68	788.71	1475.02
1826	273.73	282.69	789.83	1485.31
1827	273.68	282.69	790.87	1491.49
1828	273.64	282.71	791.98	1491.49
1829	273.60	282.76	793.00	1442.08

# Implementation ( Continued)

- Used multivariate time series prediction with sliding window technique

	Nitrous	Carbon	Methane	Usa	Usa	Usa	Usa	Usa	Usa	Usa	Usa	Usa
191	309.23	355.35	1729.33	22832.79	23284.98	23640.11	24312.79	24637.33	25263.10	26074.24	26893.45	27869.81
192	309.73	356.23	1740.14	23284.98	23640.11	24312.79	24637.33	25263.10	26074.24	26893.45	27869.81	28701.93
193	310.10	356.92	1743.10	23640.11	24312.79	24637.33	25263.10	26074.24	26893.45	27869.81	28701.93	28726.09
194	310.81	358.25	1748.62	24312.79	24637.33	25263.10	26074.24	26893.45	27869.81	28701.93	28726.09	28976.93
195	311.28	360.24	1755.23	24637.33	25263.10	26074.24	26893.45	27869.81	28701.93	28726.09	28976.93	29458.92
196	312.30	362.00	1757.19	25263.10	26074.24	26893.45	27869.81	28701.93	28726.09	28976.93	29458.92	30199.80
197	313.18	363.25	1761.50	26074.24	26893.45	27869.81	28701.93	28726.09	28976.93	29458.92	30199.80	30841.65
198	313.91	365.93	1770.29	26893.45	27869.81	28701.93	28726.09	28976.93	29458.92	30199.80	30841.65	31357.54
199	314.71	367.84	1778.20	27869.81	28701.93	28726.09	28976.93	29458.92	30199.80	30841.65	31357.54	31654.93
200	315.76	369.12	1778.01	28701.93	28726.09	28976.93	29458.92	30199.80	30841.65	31357.54	31654.93	31251.27

# LSTM Architecture

Layer (type)	Output Shape	Param #
lstm_8 (LSTM)	(None, 50)	12600
dropout_7 (Dropout)	(None, 50)	0
dense_8 (Dense)	(None, 1)	51
activation_3 (Activation)	(None, 1)	0
Total params: 12,651		
Trainable params: 12,651		
Non-trainable params: 0		

# Result

- Is the same as before
- Model isn't training, the training loss is too high even after hundreds of epochs.
- Turns out, LSTM needs thousands of data points, anything in the hundreds won't seem to do the trick.