

# A PROBLEM WITH PRESIDENTS

Vaibhavi Hemant Deshpande  
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## 1. INTRODUCTION

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This problem deals with statistical analysis of the life expectancy of presidents of the United States. The analysis was done using Python Programming Language. Pandas and NumPy libraries have been used to ease data processing and analysis.

## 2. STATISTICAL ANALYSIS RESULTS

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As per the statistical analysis, the results are as follows:

- The **mean age** was found to be **72.23 years (26364.72 days)**.
- The **weighted mean age** was found to be **72.25 years (26273.84 days)**.
- The **median age** was found to be **71.58 years (26128.50 days)**.
- The **oldest living President** is **Jimmy Carter** who is **98 years old**.
- The **oldest deceased President** is **George Bush** who died at the age of **94 years**.
- The **president with the lowest lifespan** was **John F. Kennedy** who died at the age of **46 years**.
- The **standard deviation** observed in the life expectancy is **12.67 years (4624.54 days)**.

## 3. IMPLEMENTATION

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The implementation has been copied into 2 locations namely **naive.py** which provides native Python implementation and **notebook.ipynb** which is a jupyter notebook. Although naive.py has all the implementation required but lacks the features offered by the notebook which allows visualizing the details of the analysis.

The whole .csv dataset was converted into a dataframe (a programmable in-memory table) using Pandas. Using the same library, a new column has been introduced in the given dataset which stored the last known date when the president was alive. It stored the date of death for deceased presidents or the current date for others.

## 4. STATISTICS AND RESULTS

	PRESIDENT	BIRTH DATE	BIRTH PLACE	DEATH DATE	LOCATION OF DEATH	year_of_birth	last_known_alive_date	days_lived	months_lived	years_lived
0	George Washington	Feb 22, 1732	Westmoreland Co., Va.	Dec 14, 1799	Mount Vernon, Va.	1732	Dec 14, 1799	24767	799	68
1	John Adams	Oct 30, 1735	Quincy, Mass.	July 4, 1826	Quincy, Mass.	1735	July 4, 1826	33119	1068	91
2	Thomas Jefferson	Apr 13, 1743	Albemarle Co., Va.	July 4, 1826	Albemarle Co., Va.	1743	July 4, 1826	30397	981	83
3	James Madison	Mar 16, 1751	Port Conway, Va.	June 28, 1836	Orange Co., Va.	1751	June 28, 1836	31150	1005	85
4	James Monroe	Apr 28, 1758	Westmoreland Co., Va.	July 4, 1831	New York, New York	1758	July 4, 1831	26729	862	73
5	John Quincy Adams	July 11, 1767	Quincy, Mass.	Feb 23, 1848	Washington, D.C.	1767	Feb 23, 1848	29446	950	81
6	Andrew Jackson	Mar 15, 1767	Waxhaws, No/So Carolina	June 8, 1845	Nashville, Tennessee	1767	June 8, 1845	28574	922	78
7	Martin Van Buren	Dec 5, 1782	Kinderhook, New York	July 24, 1862	Kinderhook, New York	1782	July 24, 1862	29085	938	80
8	William Henry Harrison	Feb 9, 1773	Charles City Co., Va.	Apr 4, 1841	Washington, D.C.	1773	Apr 4, 1841	24890	803	68
9	John Tyler	Mar 29, 1790	Charles City Co., Va.	Jan 18, 1862	Richmond, Va.	1790	Jan 18, 1862	26227	846	72
10	James K. Polk	Nov 2, 1795	Mecklenburg Co., N.C.	June 15, 1849	Nashville, Tennessee	1795	June 15, 1849	19583	632	54
11	Zachary Taylor	Nov 24, 1784	Orange County, Va.	July 9, 1850	Washington, D.C.	1784	July 9, 1850	23967	773	66
12	Millard Fillmore	Jan 7, 1800	Cayuga Co., New York	Mar 8, 1874	Buffalo, New York	1800	Mar 8, 1874	27088	874	74
13	Franklin Pierce	Nov 23, 1804	Hillsborough, N.H.	Oct 8, 1869	Concord, New Hamp.	1804	Oct 8, 1869	23695	764	65
14	James Buchanan	Apr 23, 1791	Cove Gap, Pa.	June 1, 1868	Lancaster, Pa.	1791	June 1, 1868	28163	908	77
15	Abraham Lincoln	Feb 12, 1809	LaRue Co., Kentucky	Apr 15, 1865	Washington, D.C.	1809	Apr 15, 1865	20516	662	56
16	Andrew Johnson	Dec 29, 1808	Raleigh, North Carolina	July 31, 1875	Elizabethton, Tenn.	1808	July 31, 1875	24320	785	67
17	Ulysses S. Grant	Apr 27, 1822	Point Pleasant, Ohio	July 23, 1885	Wilton, New York	1822	July 23, 1885	23098	745	63
18	Rutherford B. Hayes	Oct 4, 1822	Delaware, Ohio	Jan 17, 1893	Fremont, Ohio	1822	Jan 17, 1893	25673	828	70
19	James A. Garfield	Nov 19, 1831	Cuyahoga Co., Ohio	Sep 19, 1881	Elberon, New Jersey	1831	Sep 19, 1881	18202	587	50
20	Chester Arthur	Oct 5, 1829	Fairfield, Vermont	Nov 18, 1886	New York, New York	1829	Nov 18, 1886	20863	673	57
21	Grover Cleveland	Mar 18, 1837	Caldwell, New Jersey	June 24, 1908	Princeton, New Jersey	1837	June 24, 1908	26030	840	71
22	Benjamin Harrison	Aug 20, 1833	North Bend, Ohio	Mar 13, 1901	Indianapolis, Indiana	1833	Mar 13, 1901	24676	796	68
23	William McKinley	Jan 29, 1843	Niles, Ohio	Sep 14, 1901	Buffalo, New York	1843	Sep 14, 1901	21412	691	59
24	Theodore Roosevelt	Oct 27, 1858	New York, New York	Jan 6, 1919	Oyster Bay, New York	1858	Jan 6, 1919	21985	709	60
25	William Howard Taft	Sep 15, 1857	Cincinnati, Ohio	Mar 8, 1930	Washington, D.C.	1857	Mar 8, 1930	26471	854	73
26	Woodrow Wilson	Dec 28, 1856	Staunton, Virginia	Feb 3, 1924	Washington, D.C.	1856	Feb 3, 1924	24507	791	67
27	Warren G. Harding	Nov 2, 1865	Morrow County, Ohio	Aug 2, 1923	San Francisco, Cal.	1865	Aug 2, 1923	21091	680	58
28	Calvin Coolidge	July 4, 1872	Plymouth, Vermont	Jan 5, 1933	Northampton, Mass.	1872	Jan 5, 1933	22099	713	61
29	Herbert Hoover	Aug 10, 1874	West Branch, Iowa	Oct 20, 1964	New York, New York	1874	Oct 20, 1964	32943	1063	90
30	Franklin Roosevelt	Jan 30, 1882	Hyde Park, New York	Apr 12, 1945	Warm Springs, Ga.	1882	Apr 12, 1945	23082	745	63
31	Harry S. Truman	May 8, 1884	Lamar, Missouri	Dec 26, 1972	Kansas City, Missouri	1884	Dec 26, 1972	32373	1044	89
32	Dwight Eisenhower	Oct 14, 1890	Denison, Texas	Mar 28, 1969	Washington, D.C.	1890	Mar 28, 1969	28654	924	79
33	John F. Kennedy	May 29, 1917	Brookline, Mass.	Nov 22, 1963	Dallas, Texas	1917	Nov 22, 1963	16978	548	47
34	Lyndon B. Johnson	Aug 27, 1908	Gillespie Co., Texas	Jan 22, 1973	Gillespie Co., Texas	1908	Jan 22, 1973	23524	759	64
35	Richard Nixon	Jan 9, 1913	Yorba Linda, Cal.	Apr 22, 1994	New York, New York	1913	Apr 22, 1994	29688	958	81
36	Gerald Ford	July 14, 1913	Omaha, Nebraska	Dec 26, 2006	Rancho Mirage, Cal.	1913	Dec 26, 2006	34133	1101	94
37	Jimmy Carter	Oct 1, 1924	Plains, Georgia	Alive	Alive	1924	May 23, 2023	36028	1162	99
38	Ronald Reagan	Feb 6, 1911	Tampico, Illinois	June 5, 2004	Los Angeles, Cal.	1911	June 5, 2004	34088	1100	93
39	George Bush	June 12, 1924	Milton, Mass.	Nov 30, 2018	Houston, Texas	1924	Nov 30, 2018	34504	1113	95
40	Bill Clinton	Aug 19, 1946	Hope, Arkansas	Alive	Alive	1946	May 23, 2023	28036	904	77
41	George W. Bush	July 6, 1946	New Haven, Conn.	Alive	Alive	1946	May 23, 2023	28080	906	77
42	Barack Obama	Aug 4, 1961	Honolulu, Hawaii	Alive	Alive	1961	May 23, 2023	22572	728	62
43	Donald Trump	June 14, 1946	New York, New York	Alive	Alive	1946	May 23, 2023	28102	907	77

Figure 1: US Presidents Data

### 1. TOP 10 OLDEST PRESIDENTS

As we can see in the table below which shows the top 10 oldest presidents sorted in descending order of their ages.

- The **oldest living President** is **Jimmy Carter** who is **98 years old**.
- The **oldest deceased President** is **George Bush** who died at the age of **94 years**.

Top 10 Presidents of the United States by age lived, oldest first

PRESIDENT	BIRTH DATE	BIRTH PLACE	DEATH DATE	LOCATION OF DEATH	AGE
Jimmy Carter	Oct 1, 1924	Plains, Georgia	Alive	Alive	98
George Bush	June 12, 1924	Milton, Mass.	Nov 30, 2018	Houston, Texas	94
Gerald Ford	July 14, 1913	Omaha, Nebraska	Dec 26, 2006	Rancho Mirage, Cal.	93
Ronald Reagan	Feb 6, 1911	Tampico, Illinois	June 5, 2004	Los Angeles, Cal.	93
John Adams	Oct 30, 1735	Quincy, Mass.	July 4, 1826	Quincy, Mass.	90
Herbert Hoover	Aug 10, 1874	West Branch, Iowa	Oct 20, 1964	New York, New York	90
Harry S. Truman	May 8, 1884	Lamar, Missouri	Dec 26, 1972	Kansas City, Missouri	88
James Madison	Mar 16, 1751	Port Conway, Va.	June 28, 1836	Orange Co., Va.	85
Thomas Jefferson	Apr 13, 1743	Albemarle Co., Va.	July 4, 1826	Albemarle Co., Va.	83
Richard Nixon	Jan 9, 1913	Yorba Linda, Cal.	Apr 22, 1994	New York, New York	81

Figure 2: Top 10 Oldest Presidents of the United States

## 2. TOP 10 YOUNGEST PRESIDENTS

As we can see in the table below which shows the top 10 youngest presidents sorted in ascending order of their ages.

- The **president with the lowest lifespan** was **John F. Kennedy** who died at the age of **46 years**.
- The **youngest living President** is **Barack Obama** who is **61 years old**.

Top 10 Presidents of the United States by age lived, youngest first

PRESIDENT	BIRTH DATE	BIRTH PLACE	DEATH DATE	LOCATION OF DEATH	AGE
John F. Kennedy	May 29, 1917	Brookline, Mass.	Nov 22, 1963	Dallas, Texas	46
James A. Garfield	Nov 19, 1831	Cuyahoga Co., Ohio	Sep 19, 1881	Elberon, New Jersey	49
James K. Polk	Nov 2, 1795	Mecklenburg Co., N.C.	June 15, 1849	Nashville, Tennessee	53
Abraham Lincoln	Feb 12, 1809	LaRue Co., Kentucky	Apr 15, 1865	Washington, D.C.	56
Chester Arthur	Oct 5, 1829	Fairfield, Vermont	Nov 18, 1886	New York, New York	57
Warren G. Harding	Nov 2, 1865	Morrow County, Ohio	Aug 2, 1923	San Francisco, Cal.	57
William McKinley	Jan 29, 1843	Niles, Ohio	Sep 14, 1901	Buffalo, New York	58
Theodore Roosevelt	Oct 27, 1858	New York, New York	Jan 6, 1919	Oyster Bay, New York	60
Calvin Coolidge	July 4, 1872	Plymouth, Vermont	Jan 5, 1933	Northampton, Mass.	60
Barack Obama	Aug 4, 1961	Honolulu, Hawaii	Alive	Alive	61

Figure 3: Top 10 Youngest Presidents of the United States

### 3. STATISTICS

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Statistic	Age (Days)	Age (Years)
Mean	26364.727273	72.232130
Weighted Mean	26373.847222	72.257116
Median	26128.500000	71.584932
Mode	[24455, 27740]	[67.0, 76.0]
Maximum	35916.000000	98.400000
Minimum	16978.000000	46.515068
Standard Deviation	4624.545797	12.669988

*Figure 4: Statistics*

- The **mean age** was found to be **72.23 years (26364.72 days)**.
- The **weighted mean age** was found to be **72.25 years (26273.84 days)**.
- The **median age** was found to be **71.58 years (26128.50 days)**.
- The maximum age is **98.40 years (35916 days)**.
- The minimum age is **46.15 years (16978 days)**.
- The **standard deviation** observed in the life expectancy is **12.67 years (4624.54 days)**.

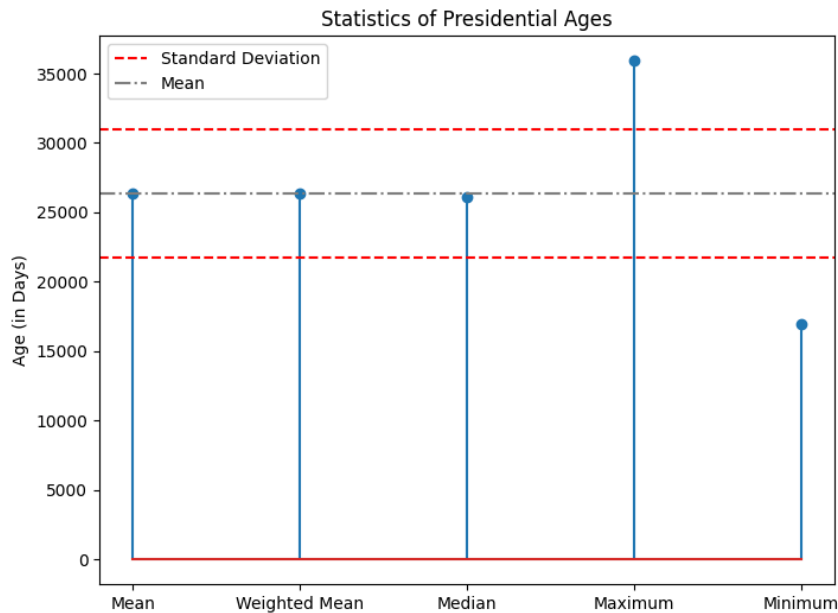


Figure 5: Statistics of Presidential Ages

- The most frequent ages were found to be **67, and 76 years**, counting for 3 presidents for each age.

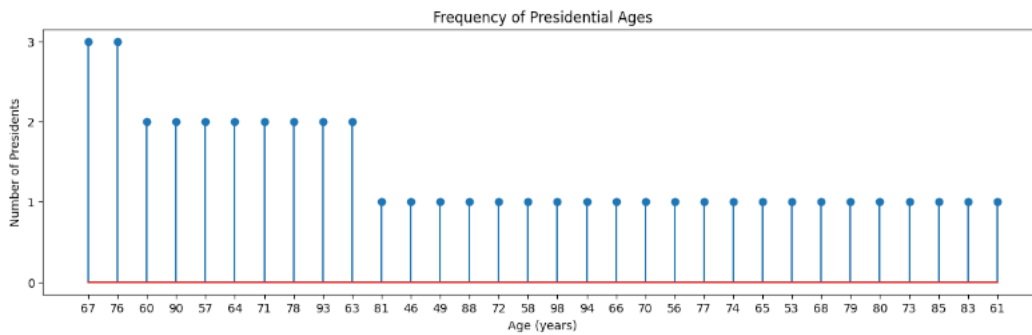


Figure 6: Frequency of Presidential Ages

## 5. CONCLUSION

As we examine the trends in the life expectancy of Presidents using the analysis of the provided data that was done above. The age range is wide, between 46 to 98 to be exact. The average life expectancy of a president is 72 years old, which is close to the current life expectancy for men in the United States, which was 75.1 years in 2020. Most Presidents have lived above the age of 60, and the median age closely reflects this tendency.

The assassination of four of the top eight youngest Presidents, which is an unnatural death, substantially impacts the metrics computed. When contrasted to the total data, John F. Kennedy, for instance, stands out as a noteworthy oddity because he was assassinated when healthcare was still advancing rapidly, and life expectancy was rising considerably, especially for those who had access to it. If the sad incident had never happened, perhaps these Presidents would have lived longer.

## 6. REFERENCES

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1. Provisional Life Expectancy Estimates for January through June 2020 - CDC, NVSS, NCSS.