
A PROBLEM WITH PRESIDENTS

Report

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Contents

1	Introduction	3
2	Summary	3
3	Implementation	3
3.1	Pre-requisites:	3
3.2	Execution:	3
3.3	Solutions.py	4
4	Requirements and Solutions	4
5	Conclusion	8
6	Future Scope	8

1 Introduction

The report describes the solution to the requirements provided for the problem ‘**A Problem with Presidents; a data to information challenge**’ (https://github.com/senrabc/a_problem_with_presidents).

We are given information about the 45 previous presidents of the United States of America. Each president’s name, birth year, death year, place of birth, and place of death are among the information provided. Given these specifics, our task is to generate more data for visualization, statistical analysis, and information to acquire deeper insights.

2 Summary

From analyzing and visualizing the data following key observations were found:

- President with maximum age: Jimmy Carter (98 years - alive)
- President with minimum age: John F. Kennedy (46 years - dead)
- Range of ages of all presidents: 46 to 98 years
- Average age: 71.9 years
- Median age: 71 years

3 Implementation

3.1 Pre-requisites:

1. Python and its packages:
 - (a) numpy =1.25.0
 - (b) pandas =2.0.2
 - (c) matplotlib =3.7.1
 - (d) dataframe-image =0.1.11
2. U.S. Presidents Birth and Death Information - Sheet1.csv: the file that contains the data

3.2 Execution:

The following steps are taken to execute the code:

1. Install all the requirements using the command: `pip install requirements.txt`.
2. Run the file "solutions.py" using the command: `python solutions.py`

3.3 Solutions.py

This file contains all the functions to process all the data and generate solutions.

- `__init__()`: This function reads the data file into dataframe.
- `pre_processing()`: This function processes the data and solves requirements 1 to 4 i.e. adding columns `year_of_birth`, `lived_years`, `lived_months` and `lived_days`.
- `oldest_to_youngest()`: This function solves requirement 5 which is ranking the top 10 Presidents from the longest-lived to the shortest-lived.
- `youngest_to_oldest()`: This function solves requirement 6 which is ranking the top 10 Presidents from the shortest-lived to the longest-lived.
- `calculate_measures()`: This function solves requirement 7 which is calculating the mean, weighted average, median, mode, max, min, and standard deviation of `lived_days`.
- `plot_distribution()`: This function solves requirement 8 which is creating a plot to show the distribution of the data.

4 Requirements and Solutions

1. **U.S. Presidents Birth and Death Information** (Requirement 1,2,3,4)

U.S. Presidents Birth and Death Information								
PRESIDENT	BIRTH DATE	BIRTH PLACE	DEATH DATE	LOCATION OF DEATH	year_of_birth	lived_years	lived_months	lived_days
George Washington	Feb 22, 1732	Westmoreland Co., Va.	Dec 14, 1799	Mount Vernon, Va.	1732	67	798	24767
John Adams	Oct 30, 1735	Quincy, Mass.	July 4, 1826	Quincy, Mass.	1735	90	1068	33119
Thomas Jefferson	Apr 13, 1743	Albemarle Co., Va.	July 4, 1826	Albemarle Co., Va.	1743	83	980	30397
James Madison	Mar 16, 1751	Port Conway, Va.	June 28, 1836	Orange Co., Va.	1751	85	1004	31150
James Monroe	Apr 28, 1758	Westmoreland Co., Va.	July 4, 1831	New York, New York	1758	73	862	26729
John Quincy Adams	July 11, 1767	Quincy, Mass.	Feb 23, 1848	Washington, D.C.	1767	80	949	29446
Andrew Jackson	Mar 15, 1767	Waxhaws, No/So Carolina	June 8, 1845	Nashville, Tennessee	1767	78	921	28574
Martin Van Buren	Dec 5, 1782	Kinderhook, New York	July 24, 1862	Kinderhook, New York	1782	79	938	29085
William Henry Harrison	Feb 9, 1773	Charles City Co., Va.	Apr 4, 1841	Washington, D.C.	1773	68	802	24890
John Tyler	Mar 29, 1790	Charles City Co., Va.	Jan 18, 1862	Richmond, Va.	1790	71	846	26227
James K. Polk	Nov 2, 1795	Mecklenburg Co., N.C.	June 15, 1849	Nashville, Tennessee	1795	53	631	19583
Zachary Taylor	Nov 24, 1784	Orange County, Va.	July 9, 1850	Washington, D.C	1784	65	773	23967
Millard Fillmore	Jan 7, 1800	Cayuga Co., New York	Mar 8, 1874	Buffalo, New York	1800	74	873	27088
Franklin Pierce	Nov 23, 1804	Hillsborough, N.H.	Oct 8, 1869	Concord, New Hamp.	1804	64	764	23695
James Buchanan	Apr 23, 1791	Cove Gap, Pa.	June 1, 1868	Lancaster, Pa.	1791	77	908	28163
Abraham Lincoln	Feb 12, 1809	LaRue Co., Kentucky	Apr 15, 1865	Washington, D.C.	1809	56	661	20516
Andrew Johnson	Dec 29, 1808	Raleigh, North Carolina	July 31, 1875	Elizabethton, Tenn.	1808	66	784	24320
Ulysses S. Grant	Apr 27, 1822	Point Pleasant, Ohio	July 23, 1885	Wilton, New York	1822	63	745	23098
Rutherford B. Hayes	Oct 4, 1822	Delaware, Ohio	Jan 17, 1893	Fremont, Ohio	1822	70	828	25673
James A. Garfield	Nov 19, 1831	Cuyahoga Co., Ohio	Sep 19, 1881	Elberon, New Jersey	1831	49	587	18202
Chester Arthur	Oct 5, 1829	Fairfield, Vermont	Nov 18, 1886	New York, New York	1829	57	673	20863
Grover Cleveland	Mar 18, 1837	Caldwell, New Jersey	June 24, 1908	Princeton, New Jersey	1837	71	839	26030
Benjamin Harrison	Aug 20, 1833	North Bend, Ohio	Mar 13, 1901	Indianapolis, Indiana	1833	67	796	24676
William McKinley	Jan 29, 1843	Niles, Ohio	Sep 14, 1901	Buffalo, New York	1843	58	690	21412
Theodore Roosevelt	Oct 27, 1858	New York, New York	Jan 6, 1919	Oyster Bay, New York	1858	60	709	21985
William Howard Taft	Sep 15, 1857	Cincinnati, Ohio	Mar 8, 1930	Washington, D.C.	1857	72	853	26471
Woodrow Wilson	Dec 28, 1856	Staunton, Virginia	Feb 3, 1924	Washington, D.C.	1856	67	790	24507
Warren G. Harding	Nov 2, 1865	Morrow County, Ohio	Aug 2, 1923	San Francisco, Cal.	1865	57	680	21091
Calvin Coolidge	July 4, 1872	Plymouth, Vermont	Jan 5, 1933	Northampton, Mass.	1872	60	712	22099
Herbert Hoover	Aug 10, 1874	West Branch, Iowa	Oct 20, 1964	New York, New York	1874	90	1062	32943
Franklin Roosevelt	Jan 30, 1882	Hyde Park, New York	Apr 12, 1945	Warm Springs, Ga.	1882	63	744	23082
Harry S. Truman	May 8, 1884	Lamar, Missouri	Dec 26, 1972	Kansas City, Missouri	1884	88	1044	32373
Dwight Eisenhower	Oct 14, 1890	Denison, Texas	Mar 28, 1969	Washington, D.C.	1890	78	924	28654
John F. Kennedy	May 29, 1917	Brookline, Mass.	Nov 22, 1963	Dallas, Texas	1917	46	547	16978
Lyndon B. Johnson	Aug 27, 1908	Gillespie Co., Texas	Jan 22, 1973	Gillespie Co., Texas	1908	64	758	23524
Richard Nixon	Jan 9, 1913	Yorba Linda, Cal.	Apr 22, 1994	New York, New York	1913	81	957	29688
Gerald Ford	July 14, 1913	Omaha, Nebraska	Dec 26, 2006	Rancho Mirage, Cal.	1913	93	1101	34133
Jimmy Carter	Oct 1, 1924	Plains, Georgia	ALIVE	ALIVE	1924	98	1163	36061
Ronald Reagan	Feb 6, 1911	Tampico, Illinois	June 5, 2004	Los Angeles, Cal.	1911	93	1099	34088
George Bush	June 12, 1924	Milton, Mass.	Nov 30, 2018	Houston, Texas	1924	94	1113	34504
Bill Clinton	Aug 19, 1946	Hope, Arkansas	ALIVE	ALIVE	1946	76	905	28069
George W. Bush	July 6, 1946	New Haven, Conn.	ALIVE	ALIVE	1946	77	906	28113
Barack Obama	Aug 4, 1961	Honolulu, Hawaii	ALIVE	ALIVE	1961	61	729	22605
Donald Trump	June 14, 1946	New York, New York	ALIVE	ALIVE	1946	77	907	28135
Joe Biden	Nov 20, 1942	Scranton, Pa.	ALIVE	ALIVE	1942	80	949	29437

2. Ranking the top 10 Presidents from the longest-lived to the shortest-lived (Requirement 5)

This information is illustrated here, showing that President Jimmy Carter is the president with the longest life expectancy. George Bush, who was president for the longest time but is no longer with us, passed away in 2018. He was 94 years old.

Top 10 Presidents from the longest lived to the shortest lived			
PRESIDENT	BIRTH DATE	DEATH DATE	AGE (years)
Jimmy Carter	Oct 1, 1924	ALIVE	98
George Bush	June 12, 1924	Nov 30, 2018	94
Gerald Ford	July 14, 1913	Dec 26, 2006	93
Ronald Reagan	Feb 6, 1911	June 5, 2004	93
John Adams	Oct 30, 1735	July 4, 1826	90
Herbert Hoover	Aug 10, 1874	Oct 20, 1964	90
Harry S. Truman	May 8, 1884	Dec 26, 1972	88
James Madison	Mar 16, 1751	June 28, 1836	85
Thomas Jefferson	Apr 13, 1743	July 4, 1826	83
Richard Nixon	Jan 9, 1913	Apr 22, 1994	81

3. **Ranking the top 10 Presidents from the shortest-lived to the longest-lived** (Requirement 6)

This information is illustrated here, showing that President John F. Kennedy (dead) had the shortest life span. The youngest president currently in office is Barack Obama, who will be 61.

Top 10 Presidents from the shortest lived to the longest lived			
PRESIDENT	BIRTH DATE	DEATH DATE	AGE (years)
John F. Kennedy	May 29, 1917	Nov 22, 1963	46
James A. Garfield	Nov 19, 1831	Sep 19, 1881	49
James K. Polk	Nov 2, 1795	June 15, 1849	53
Abraham Lincoln	Feb 12, 1809	Apr 15, 1865	56
Chester Arthur	Oct 5, 1829	Nov 18, 1886	57
Warren G. Harding	Nov 2, 1865	Aug 2, 1923	57
William McKinley	Jan 29, 1843	Sep 14, 1901	58
Theodore Roosevelt	Oct 27, 1858	Jan 6, 1919	60
Calvin Coolidge	July 4, 1872	Jan 5, 1933	60
Barack Obama	Aug 4, 1961	ALIVE	61

4. **Calculating the mean, weighted average, median, mode, max, min, and standard deviation of lived_days** (Requirement 7)

- The mean age of all the presidents in days is 26449.1.
- The weighted average of ages of all the presidents in days is 26449.1. The weighted average will remain the same as we have just one sample of data.
- The median age of all the presidents in days is 26227.1.
- The mode of all the presidents is 24455 and 28105.

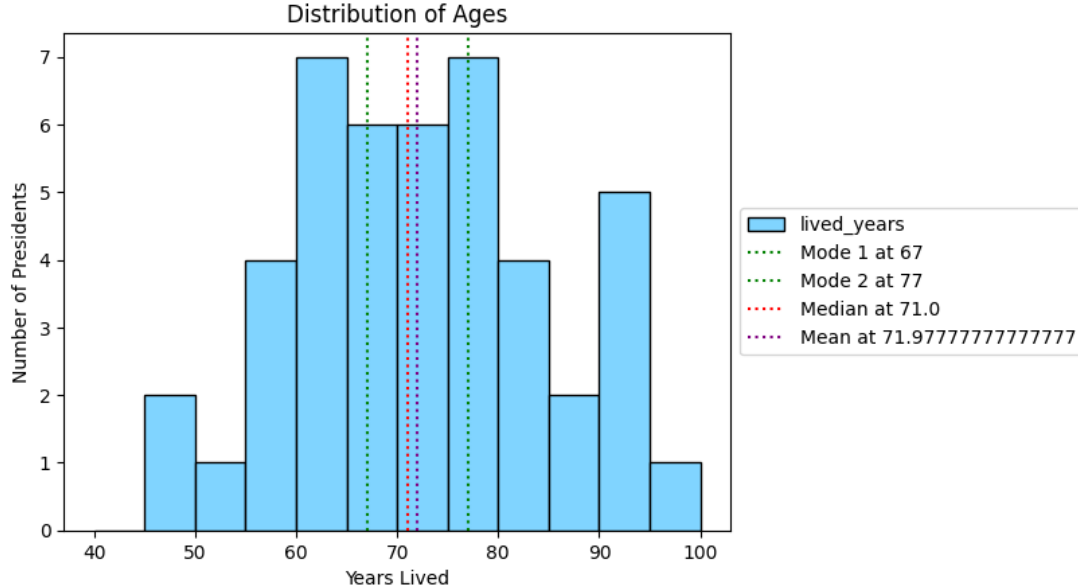
- (e) The maximum age from all the presidents in days is 36061.
- (f) The minimum age from all the presidents in days is 16978.
- (g) The standard deviation of age from all the presidents in days is 4602.039.

The mean, weighted average, median,
mode, max, min and standard deviation
of lived_days

Lived Days	
Mean	26449.111111
Weighted average	26449.111111
Median	26227.000000
Mode	[24455, 28105]
Max	36061
Min	16978
Standard Deviation	4602.039435

5. Creating a plot to show the distribution of the data (Requirement 8)

- (a) To accommodate all ages, the ages are divided into multiple bins ranging from 40 to 100.
- (b) The median age of presidents, expressed in years, is 71.9. In years, the median age is 71.0.
- (c) In contrast, the most common ages when employing the supplied mode are 67 and 76.
- (d) Jimmy Carter is the only president who is between 95 and 100 years old whereas the average number of 7 presidents have been between the ages of 65 and 70 and 75 and 80.



5 Conclusion

- We learn more about the presidents' life expectancy after looking at the statistics. We see that the average age of the presidents is 71.9 years old.
- The oldest living president is President Jimmy Carter, 98 who is still alive and the youngest president is President John F. Kennedy who died at the age of 46.
- The range of age of presidents is 46 to 98.
- The median age is 71 which indicates that most presidents have lived over the age of 60.
- The frequency distribution of presidential ages shows a definite tendency toward normal distribution, but there are also increasing numbers of presidents who have long lifetimes.

6 Future Scope

- This analysis was conducted solely on the basis of the numerical data, without taking into account any other variables that might have had an impact on the data.
- The data is skewed and the computation of many metrics is hampered by the fact that a small number of presidents have passed away owing to untimely deaths linked to unnatural circumstances.
- We can gain greater insights by separating the data for presidents who are still alive from those who have passed away. The age range of presidential statistics is impacted by events like the assassination of the president who served the shortest term.