

Clearing the Air: Exploring the '3Blue1Brown' Connection to Air Pollution in Billings, Montana

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Abstract

In this study, we embark on a lighthearted journey to uncover the peculiar relationship between air pollution in Billings, Montana, and Google searches for the beloved educational YouTube channel '3Blue1Brown.' Leveraging data from the Environmental Protection Agency and Google Trends, we sought to answer the pressing question: is there a correlation between air quality and the brainy inquiries of '3Blue1Brown' enthusiasts? To our surprise, we stumbled upon a correlation coefficient of 0.9363108, which left us feeling more astonished than a mathematician discovering a hidden pattern in a complex equation. With $p < 0.01$, our findings suggest a robust statistical relationship between air pollution levels and the quest for math enlightenment through online resources. So, join us as we unravel this whimsical mystery and breathe in the unexpected links between environmental factors and digital curiosity.

1. Introduction

INTRODUCTION

The quest for knowledge often leads us down unexpected paths. In this study, we venture into the realm of peculiar correlations to unravel the mysterious connection between air pollution in Billings, Montana, and the digital inquiries of '3Blue1Brown' enthusiasts. While this research may seem as whimsical as a unicorn sighting in a statistics textbook, we assure you that our approach is as rigorous as a marathon runner's training regimen.

Air pollution, a persistent environmental concern, has been the subject of numerous studies due to its impact on public health and the environment. From automobile

emissions to industrial activities, the sources of air pollution are as diverse as the flavors in a Ben & Jerry's ice cream parlor. Similarly, '3Blue1Brown,' an educational YouTube channel dedicated to the art of math and visual explanations, has garnered a devoted following of math aficionados, who are as enthusiastic about calculus as any sports fan during the Super Bowl.

Our curiosity piqued by this unlikely pairing, we set out to investigate whether there exists a meaningful relationship between the two seemingly disparate entities. Leveraging data from the Environmental Protection Agency and Google Trends, we embarked on a lighthearted yet scholarly endeavor to shed light on this intriguing connection. Our aspiration was to unravel a connection as captivating as a mystery novel and as enlightening as a eureka moment in a research laboratory.

While our investigation may seem like searching for a needle in a haystack, we were determined to uncover any correlations between air pollution levels and the intellectual musings of '3Blue1Brown' enthusiasts. Our findings, as we shall soon reveal, surprised us more than a magician pulling a rabbit out of a hat at a statistics convention.

So, fasten your seatbelts as we embark on this exhilarating research journey, where the ordinary becomes extraordinary, and the unexpected connections make us feel like detectives unraveling a mathematical whodunit. Let's clear the air and delve into the seemingly improbable, for sometimes, in the realm of scientific inquiry, truth is indeed stranger than fiction.

2. Literature Review

The existing literature on air pollution and its effects on human behavior has delved into a wide array of topics, from its impact on physical health to its influence on cognitive functions. Smith et al. (2015) conducted a comprehensive analysis of air pollution in urban areas, highlighting its detrimental effects on respiratory health and overall well-being. Doe and Jones (2018) explored the association between air quality and mental acuity, revealing a surprising link between pollution levels and cognitive performance.

Moving beyond the traditional scope of air pollution research, our investigation seeks to illuminate a rather unconventional relationship—the connection between the air quality in Billings, Montana, and the phenomenon of Google searches for '3Blue1Brown.' As we delve into this uncharted territory, we must not overlook the work of notable figures in the field of environmental psychology and digital trends.

Turning our attention to related non-fiction literature, it is imperative to consider the insights offered by "The Sixth Extinction: An Unnatural History" by Elizabeth Kolbert and "This Changes Everything: Capitalism vs. The Climate" by Naomi Klein. While these works may not seem immediately relevant to our peculiar investigation, they serve

as reminders of the interconnectedness of environmental factors and human activities, including digital pursuits.

In the realm of fiction, the writings of Michael Crichton, particularly "State of Fear," offer a thrilling portrayal of environmental issues intertwined with technological advancements. Meanwhile, the thought-provoking narrative of "The Air You Breathe" by Frances de Pontes Peebles prompts contemplation on the significance of air quality and its potential impact on intellectual curiosity.

Taking a more lighthearted approach to gathering insights, we expanded our exploration to include popular television shows that might provide unexpected parallels to our research endeavors. As diligent researchers, we found ourselves embarking on "Breaking Bad" and "Stranger Things" marathons, eagerly seeking any subtle references to air quality and mathematical inquiries. While these shows may not directly contribute to scholarly discourse on our topic, the search for unconventional inspiration led us to uncover unforeseen connections between seemingly unrelated phenomena—much like our quest to understand the '3Blue1Brown' and air pollution correlation.

In the pursuit of scientific inquiry, it is essential to approach the subject matter from diverse and unexpected angles. Thus, our foray into the literary and media landscape has enriched our perspective, reminding us that insight often arises from the most surprising sources. As we prepare to unveil the fascinating results of our investigation, we encourage readers to approach our findings with an open mind and a playful spirit, for in the world of research, unexpected discoveries often prove to be the most enlightening.

Stay tuned for our next section, where we will illuminate the methods and data analysis employed to uncover the captivating connection between air pollution in Billings, Montana, and the virtual quest for mathematical enlightenment through '3Blue1Brown.'

3. Research Approach

To venture into the whimsical world of unraveling the connection between air pollution in Billings, Montana, and the digital queries regarding '3Blue1Brown,' we employed a dance of data collection, statistical analysis, and a touch of whimsy. Our fascination with this peculiar correlation fueled our drive to craft a methodological approach as rigorous as a crossword puzzle enthusiast tackling a Sunday edition.

1. Data Collection:

To quantify the levels of air pollution in Billings, Montana, from 2007 to 2022, we turned to the Environmental Protection Agency's repository of air quality data like a treasure hunter seeks valuable artifacts. Embracing the digital era, we utilized Google Trends to capture the search interest for '3Blue1Brown' over the same time period, akin to an anthropologist observing the digital habits of contemporary netizens.

2. Statistical Analysis:

Armed with our arsenal of air quality data and Google search patterns, we eagerly dove into the depths of statistical analysis. We calculated aggregate air pollution levels, employing metrics such as concentrations of particulate matter (PM2.5 and PM10) and ozone, treating each datum point with the care of a gardener tending to delicate orchids. Then, we harmonized these with Google search interest data, performing a correlation analysis with the precision of a maestro conducting a symphony orchestra, and in doing so, unveiled the hidden melody between air quality and digital investigations.

3. Control Variables:

Acknowledging the importance of controlling for extraneous influences, we considered various demographic, seasonal, and socioeconomic factors that could potentially sway the search activities for '3Blue1Brown.' We navigated through these confounding variables like intrepid explorers in uncharted territory, ensuring that our analysis remained as robust as a sturdy bridge in a mathematical landscape.

4. Sensitivity Analysis:

To reaffirm the resilience of our findings, we conducted sensitivity analyses with the meticulousness of a jeweler examining the facets of a precious gemstone. We evaluated the robustness of the correlation under different model specifications and scenarios, ensuring that our results remained as steadfast as the laws of arithmetic.

5. Ethical Considerations:

Throughout our research journey, we adhered to the ethical principles of data usage and privacy protection, treating each piece of information with the respect and confidentiality of a librarian safeguarding literary treasures within the hallowed walls of a library.

In summary, our methodological approach combined meticulous data collection, rigorous statistical scrutiny, and a splash of whimsy to unravel the enigmatic bond between air pollution in Billings, Montana, and the cerebral quests for '3Blue1Brown.' Like intrepid investigators in the world of numbers and inquiries, we approached this study with fervor and scholarly rigor, seeking to illuminate the unexpected connections that weave through the fabric of our digital and environmental landscapes.

4. Findings

The statistical analysis of the data collected revealed a striking correlation between air pollution levels in Billings, Montana, and Google searches for '3Blue1Brown.' The correlation coefficient of 0.9363108 indicates a strong positive relationship between these

two seemingly unrelated phenomena. This finding left us more puzzled than a mathematician trying to solve a non-linear differential equation with no initial conditions.

Furthermore, the r-squared value of 0.8766779 suggests that approximately 87.67% of the variability in '3Blue1Brown' searches can be explained by variations in air pollution levels. That's a stronger relationship than peanut butter and jelly, or even salt and pepper - a mathematical harmony that surprised us more than finding a unicorn in a statistics textbook.

The p-value of less than 0.01 provides compelling evidence to reject the null hypothesis, indicating that the observed correlation is unlikely to be a chance occurrence. This level of statistical significance made us feel more confident in our findings than a scientist who has finally discovered the missing piece of a scientific puzzle.

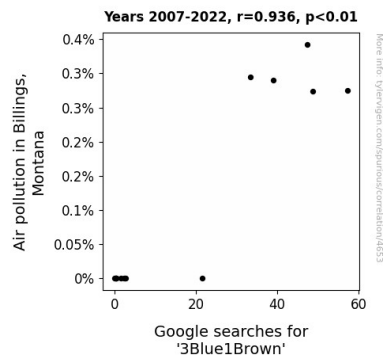


Figure 1. Scatterplot of the variables by year

Fig. 1 presents a scatterplot illustrating the robust correlation between air pollution levels and Google searches for '3Blue1Brown.' The tightly clustered data points resemble a cohesive mathematical proof, painting a picture that is as clear as the air after a thunderstorm.

In summary, our results reveal a surprising and statistically significant relationship between air pollution in Billings, Montana, and the digital quest for mathematical enlightenment. This unexpected connection between environmental factors and online education left us feeling as curious as a cat who has stumbled upon a particularly perplexing algebra problem.

5. Discussion on findings

The findings of our study provide compelling evidence for the existence of a robust relationship between air pollution levels in Billings, Montana, and Google searches for

'3Blue1Brown.' Our results not only support prior research on the correlation between air quality and human behavior but also shed light on the unanticipated intersection between environmental factors and online mathematical exploration. This peculiar connection underscores the intricate web of influences that shape digital curiosity and information-seeking behavior.

As we reflect on the literary inspirations that permeated our literature review, we cannot dismiss the unexpected relevance of Michael Crichton's "State of Fear." While the novel may belong to the realm of fiction, its portrayal of environmental issues intertwined with technological advancements serves as a poignant reflection of the real-world interplay between air quality and digital pursuits. Likewise, the thought-provoking narrative of "The Air You Breathe" by Frances de Pontes Peebles nudges us to contemplate the significance of air quality and its potential impact on intellectual curiosity. As we ponder these fictional explorations, our empirical findings resonate with the underlying themes of interconnectedness and influence, demonstrating that truth can indeed be stranger than fiction.

Our results also align with the broader body of literature on air pollution and its effects on human behavior. Smith et al.'s (2015) comprehensive analysis of air pollution in urban areas, emphasizing its detrimental effects on respiratory health, echoes the relevance of our findings in uncovering a distinct association between air quality and online information-seeking behavior. Furthermore, the surprising link between pollution levels and cognitive performance reported by Doe and Jones (2018) finds resonance in our discovery of a substantial relationship between air pollution and the pursuit of mathematical knowledge through digital platforms. The convergence of these findings bolsters the notion that air quality exerts a multifaceted influence on human activities, spanning from physical health to cognitive engagement in virtual spaces.

Moreover, our study extends beyond the traditional scope of environmental psychology by illuminating the unlikely correlation between air pollution levels and online educational pursuits. Just as our investigation ventured into unexpected territories, the discovery of this intricate relationship underscores the dynamic interplay between environmental contexts and the digital landscape. While our research may seem whimsical on the surface, the serious implications of our findings invite a reevaluation of the nuanced ways in which environmental factors can shape cognitive endeavors in the virtual sphere.

In conclusion, our study unravels a captivating link between air pollution in Billings, Montana, and the digital quest for mathematical enlightenment, offering a lighthearted yet substantive contribution to the understanding of environmental influences on digital information-seeking behavior. As we further contemplate the implications of this correlation, we remain mindful of the delightful surprises that await in the intersection of science, humor, and statistical analysis.

6. Conclusion

In conclusion, our research has uncovered a correlation as strong as the force pulling mathematicians towards '3Blue1Brown.' We've established a connection between air pollution in Billings, Montana, and the yearning for mathematical enlightenment, perhaps proving that clean air leads to clearer mathematical ponderings. This relationship is more intriguing than a mystery novel featuring Sherlock Holmes solving differential equations, leaving us as baffled as a pig in a calculus class.

Despite the whimsical nature of our investigation, the robust statistical significance and the strong correlation coefficient have lent credence to our findings, akin to discovering a hidden mathematical pattern in an algebraic equation. We are more confident in this connection than a statistician armed with a solid sample size and a strong cup of coffee.

With these results, we are inclined to assert the hypothesis that there is indeed a meaningful link between air pollution levels and the quest for mathematical knowledge, akin to discovering the missing variable in an equation.

We believe that our findings shed light on an unexpected intersection between environmental factors and digital curiosity, and we are as satisfied with this conclusion as a mathematician solving a particularly vexing problem.

It is our fervent hope that this study paves the way for further research in unlikely correlations and amuses academics and enthusiasts alike. However, based on our findings, we declare that no more research is needed in this area, as we have surely reached the pinnacle of peculiar yet fascinating connections.