

Night Moves

Navigating Post-Party Mobility
Challenges in New York City

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Abstract

Navigating New York City after dark presents a challenge, especially for the city's vibrant youth who revel in its nightlife. As nightlife hotspots and affordable residential areas diverge from the city center, relying on central public transit like the subway becomes impractical. Nighttime taxi rides emerge as the primary alternative for post-party journeys. This thesis proposes a navigational tool to analyze night taxi ridership, mapping routes from nightlife clusters to young residential areas. By assessing demand, cost, and time, this tool aids the NYC Office of Nightlife in prioritizing transit improvements. It empowers the younger generation to navigate nocturnal limitations, easing nighttime mobility struggles in the city.

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Introduction

This thesis explores the complexities of nighttime mobility in New York City, focusing primarily on the challenges faced by the city's vibrant youth in navigating their way to and from nightlife hotspots. Despite being known as "the city that never sleeps," New York City's nightlife navigation presents a unique set of challenges, particularly due to the divergence of affordable residential areas and nightlife hotspots from the city center. Nightlife, an essential aspect of urban life, serves as a crucial social hub for the younger generation. However, socio-economic factors and the effects of gentrification have led to displacement and social fragmentation, complicating access to nightlife venues.

The role of night mayors has gained prominence in addressing these issues and improving nocturnal infrastructure. Their responsibilities include enhancing the built environment, improving laws and regulations, and mediating among various stakeholders involved in nighttime governance. However, despite these efforts, significant challenges remain, particularly concerning transportation. Young residents often face difficulties accessing nightlife venues due to inadequate and costly transportation options during late hours.

To address these issues, this thesis proposes the development and implementation of a sophisticated digital tool designed to map taxi routes and analyze residential and nightlife displacement trends. This tool aims to provide the NYC Office of Nightlife with detailed insights, enabling them to prioritize transit improvements effectively. By enhancing our understanding of the geographic and temporal patterns of nightlife attendance, this digital tool not only seeks to improve the accessibility of nightlife venues but also to enrich the overall urban experience, making New York City's nightlife more inclusive and accessible for all its residents.

Background & Literature Review

The literature review focuses on three main areas: youth socialization in nightlife, the effects of gentrification on nightlife and youth living spaces, and the role of night mayors in nighttime governance. Nightlife is crucial for youth socialization, offering opportunities for self-expression and interaction, yet socioeconomic factors can limit access. These venues cater to diverse needs, but their cultural practices are often not considered in policy-making. Gentrification impacts nightlife and youth residential patterns, leading to displacement and social fragmentation. The commercialization of urban spaces often marginalizes low-income residents, resulting in an unequal nightlife landscape. Night mayors, serving as key intermediaries between nightlife establishments, citizens, and local governments, are responsible for improving nocturnal infrastructure, refining regulations, and promoting stakeholder dialogue.

Nightlife as a Social Connection for the Younger Generation

Urban nightlife is more than just entertainment; it serves as a crucial social hub for young people. As Chatterton and Hollands (2003) observe, cities at night become stages where social and economic inequalities come to life, influencing who gets to participate in nightlife and how. Factors such as educational background, family income, ethnicity, and residential location can determine access to city-center nightlife, often marginalizing groups due to costs, geographic isolation, discrimination, or simply feeling out of place.

Nightlife is described by Chatterton and Hollands (2003) as a vibrant backdrop for the younger generation to express themselves through a mix of styles, cultures, and lifestyles. The night offers liminal spaces—almost carnival-like—ripe for experimentation and identity play. Supporting this, Featherstone (1991) notes that postmodern cities are crammed with diverse signs and themes, turning every corner into a potential stage for youth subcultures to thrive.

Nightlife venues vary greatly. Mainstream spaces like popular bars and clubs often cater to the affluent, using branding and themes to attract specific crowds such as professionals and

students. In contrast, traditional pubs and community-focused venues, once central to many communities, are fading. Smaller, independent venues serve as havens for specific groups, celebrating unique identities tied to ethnicity, sexuality, or specific music and fashion styles (Chatterton & Hollands, 2003).

Research highlights that nightlife venues are pivotal for young people, particularly women, in creating 'mini-communities' where socializing with friends is a primary motivator for going out. These spaces offer a sense of belonging and identity, allowing young individuals to express themselves and build relationships outside traditional structures like work or school. For many, weekends and evenings provide a much-needed break from the pressures of daily life, manifested in vibrant interactions where the focus is on enjoying the moment with peers who share similar lifestyles and aspirations (Chatterton & Hollands, 2003).

Rowe and Bavinton (2011) expand on this by discussing the cultural complexities of the nighttime economy, emphasizing that nightlife is not just about consuming alcohol and leisure but also about creating and sustaining diverse social interactions. They argue that nighttime economy policies often overlook the nuanced cultural practices that occur after dark, focusing instead on controlling and regulating behavior. Recognizing these complexities allows for a more inclusive and comprehensive understanding of how nightlife functions as a social connector for the younger generation.

Gentrification and Nightlife Displacement

Gentrification significantly impacts nightlife and the residential patterns of young people, leading to displacement and social fragmentation. The commercialization and upgrading of urban spaces make them more attractive to affluent populations while marginalizing lower-income residents and traditional communities. This transformation of nightlife venues, which increasingly cater to middle-class tastes and preferences, results in the exclusion of less affluent individuals and groups (Chatterton & Hollands, 2003).

As gentrification progresses, the spatial and social landscapes of nightlife change, often leading to the displacement of older, established users and the rise of new, more exclusive

leisure spaces. This shift not only affects the availability and accessibility of nightlife options for different social groups but also transforms the cultural fabric of urban areas. The influx of wealthier residents and the corresponding rise in property values can displace long-standing communities, forcing younger and less affluent individuals to relocate to more affordable, but often less connected, areas (Chatterton & Hollands, 2003).

Nightlife establishments often play a foundational role in revitalizing derelict neighborhoods by generating lively urban sociality. However, as gentrification sets in, these businesses can be pushed out of the areas they helped transform. This phenomenon, described as 'gentrification with and against nightlife,' highlights the contradictory process where nightlife catalyzes gentrification but is then marginalized by it (Hae, 2011). In New York City, for instance, nightlife venues in the Lower East Side initially attracted hip, counter-cultural crowds, facilitating gentrification. Yet, as property values rose and new affluent residents moved in, many venues faced increased pressure and eventual displacement (Hae, 2011).

The consequences of these changes are profound, disrupting the social networks and support systems that many young people rely on. The commodification of nightlife and its integration into broader economic strategies by city planners and developers exacerbate these trends, prioritizing profit over social inclusivity and community cohesion. This results in a nightlife landscape that is increasingly segmented and stratified, reflecting broader patterns of urban inequality and exclusion (Chatterton & Hollands, 2003).

Moreover, the aesthetic and cultural identities promoted by gentrified nightlife are often tailored to attract young professionals in post-industrial sectors. These areas, marketed for their "authentic" sub-cultural spaces, draw in the "creative class" who demand infrastructure for quality cultural consumption (Florida, 2004). However, this often leads to the marginalization of original cultural spaces and communities, replacing them with upmarket or corporate establishments that lack the diversity and experimental edge of the previous venues (Hae, 2011).

In sum, while nightlife can serve as a crucial social outlet for young people, gentrification and displacement pose significant challenges to its inclusivity and accessibility. There is a pressing need for more equitable urban planning and policy interventions to support diverse

and vibrant nightlife cultures. Protecting nightlife as a form of culture and creating inclusive spaces after dark should be key considerations for city planners and policymakers.

Night Mayor and Night Governance

Night mayors, also referred to as "managers" or "czars," are individuals selected by cities to act as liaisons between nightlife establishments, citizens, and local governments. Their responsibilities can be categorized into three main areas: enhancing nocturnal "hardware," improving nocturnal "software," and mediating and promoting consensus among various stakeholders involved in nighttime governance (Seijas & Gelders, 2021).

The enhancement of nocturnal "hardware" involves improving the built environment to support a vibrant and safe nightlife. This includes expanding nighttime transportation services, enhancing lighting, and ensuring the availability of basic services like public toilets that are open at night. These infrastructural improvements are crucial for creating a conducive environment for nighttime activities (Seijas & Gelders, 2021).

Improving nocturnal "software" refers to updating and refining laws and regulations to facilitate nightlife while minimizing nuisances. This includes setting curfews, establishing hours of operation for businesses, and managing public spaces to balance activity with residents' quality of life. Effective regulation helps maintain order and ensures that nightlife can coexist with other urban functions (Seijas & Gelders, 2021).

The third responsibility of night mayors is to mediate and promote consensus among the diverse actors involved in nighttime governance. This involves fostering dialogue and cooperation between nightlife operators, residents, and government agencies. Night mayors act as mediators or translators between nightlife and city government, helping to navigate the complexities and contradictions of urban life after dark (Seijas & Gelders, 2021).

Case Study of Night Mayors in Different Cities

Dutch Cities: Amsterdam and Rotterdam

In Dutch cities like Amsterdam and Rotterdam, night mayors have played significant roles in enhancing nightlife governance. One notable initiative in Amsterdam is the creation of the 24-hour license, an innovative pilot scheme that allows nightlife venues on the city's outskirts to extend their operating hours. This initiative, which started in 2013, became a permanent policy in 2017 (Seijas & Gelders, 2021).

Another successful project in Amsterdam is the Rembrandtplein Gastvrij (Hospitable Rembrandt Square) project, launched in 2015 to reduce alcohol-related violence and improve the quality of nightlife. This public-private partnership involved hiring hosts to patrol the district, creating a safer and more relaxed atmosphere. By the end of the pilot, reports of nuisance and violence had significantly decreased (Seijas & Gelders, 2021).

London: Losing Nightlife

London faced a rapid decline in nightlife venues, losing 58% of its LGBTQ+ venues and numerous nightclubs within a decade. The appointment of a night czar was instrumental in addressing these challenges. One of the night czar's key achievements was negotiating to keep the iconic nightclub Fabric open, highlighting the role's importance in preserving nightlife spaces (Seijas & Gelders, 2021).

New York

The emergence of the night mayor in New York is rooted in pro-nightlife activism. After a period of strict enforcement and nightlife crackdowns during the Giuliani administration, activists began advocating for the rights of night shift workers and those in the hospitality and creative industries. This advocacy led to the establishment of a Nightlife Advisory Board and an Office of Nightlife in 2018, aimed at evaluating laws, handling complaints, and providing policy recommendations. Unlike Amsterdam, New York's night mayor position is fully funded by the administration and overseen by the mayor, reflecting a different approach to nighttime governance (Seijas & Gelders, 2021).

Night Transportation and Urban Infrastructure

Night mayors have been instrumental in enhancing urban infrastructure to support a thriving nighttime economy. For instance, expanding nighttime transportation services is a critical aspect of their role. Effective and reliable transportation options are essential for ensuring that people can safely and conveniently travel to and from nightlife venues. In cities like Amsterdam, the night mayor has worked to expand public transport services to operate throughout the night, making it easier for residents and visitors to enjoy the city's nightlife without worrying about how to get home (Seijas & Gelders, 2021).

Improving urban infrastructure also includes enhancing street lighting and ensuring the availability of essential services like public toilets that remain open at night. Better lighting increases safety and encourages more people to participate in nighttime activities, while accessible public toilets help accommodate the needs of nighttime revelers. These measures collectively contribute to creating a safer and more inviting environment for nightlife (Seijas & Gelders, 2021).

The role of night mayors in urban infrastructure extends to innovative projects that address specific challenges faced by nightlife districts. For example, the Rembrandtplein Gastvrij project in Amsterdam aimed to reduce violence and improve the overall nightlife experience by introducing hosts to patrol the area, creating a more relaxed and safe atmosphere. Such initiatives demonstrate the proactive and collaborative approach that night mayors bring to urban governance, focusing on both immediate safety concerns and long-term urban planning (Seijas & Gelders, 2021).

Nightlife in New York City

Nightlife is a quintessential aspect of New York City's identity, characterized by its vibrancy, transience, and nocturnal allure. NYC's nightlife is deeply rooted in its long immigrant history, drawing from cultures across the world, and serves as an epicenter for artists and creatives seeking to develop their craft and be discovered. The city's cultural appetite values history alongside the new, innovative, and unusual, making its nightlife both diverse and dynamic (NYC Nightlife Economic Impact Report, 2019).

Throughout its long history, NYC's nightlife has incubated cultural and social trends with impacts well beyond its five boroughs. From beat poetry and pop art to disco, hip-hop, punk rock, and jazz, New York City's nightlife has been at the forefront of numerous cultural movements. This vibrant nightlife scene continues to attract and nurture artists across all genres, who draw inspiration from the city's numerous nightlife venues, ranging from world-famous concert halls like Harlem's Apollo Theater to underground venues at the cutting edge of culture (NYC Nightlife Economic Impact Report, 2019).

A significant portion of the nightlife patrons in NYC are young adults. According to the report "NYC's Nightlife Economy—Impact, Assets, and Opportunities," two-thirds of nightlife customers are between the ages of 21 and 40. This demographic actively participates in a variety of nighttime activities, including dining, dancing, and attending live performances. The younger age of the consumers plays a crucial role in shaping the nightlife culture, with preferences for unique and innovative experiences that reflect their diverse backgrounds and interests (NYC Nightlife Economic Impact Report, 2019).

Transportation is a critical component of NYC's nightlife, with significant reliance on taxis and for-hire vehicles (FHV) to navigate the city during late hours. Data from the NYC Taxi and Limousine Commission (TLC) shows that approximately 32% of all taxi and FHV trips are nightlife related. The growth of FHV has enabled greater access to nightlife destinations, particularly in neighborhoods outside of Manhattan like Bushwick and Williamsburg in Brooklyn, and Jackson Heights and Astoria in Queens. However, the reliance on FHV highlights the challenges of public transportation during nighttime hours, which often struggles to meet the demands of nightlife-goers, leading to longer and more costly commutes (NYC Nightlife Economic Impact Report, 2019).

Recognizing the significance of nightlife, the establishment of the Office of Nightlife in 2018 marks a pivotal step towards proactive management and support of this essential sector. This office not only addresses complaints and violations but also provides policy recommendations to improve the nightlife ecosystem. It aims to ensure that NYC's nightlife continues to be economically and culturally vibrant, recognizing its significant contribution to the city's identity and global reputation (NYC Nightlife Economic Impact Report, 2019).

Summary

The literature review highlights the multifaceted nature of nightlife and its critical role in urban environments, particularly for young people. Urban nightlife functions as a dynamic social hub, offering spaces for expression, identity formation, and community building while reflecting broader social and economic inequalities. Chatterton and Hollands (2003) emphasize that nightlife in postmodern cities provides a vibrant backdrop for cultural and social interactions, though access to these spaces can be influenced by various socio-economic factors, leading to the exclusion of marginalized groups.

Gentrification and its impact on nightlife underscore the contradictory nature of urban development. As nightlife venues help to revitalize neighborhoods, they also become susceptible to the very gentrification they catalyze, resulting in the displacement of the original communities and the venues themselves (Hae, 2011). This process transforms the cultural fabric of urban areas, often marginalizing original cultural spaces and communities in favor of more affluent and homogenized leisure spaces.

Night mayors have emerged as key figures in managing and promoting nightlife. Their roles in enhancing urban infrastructure, updating regulations, and mediating between stakeholders are crucial in fostering a vibrant and safe nightlife environment (Seijas & Gelders, 2021). Case studies from cities like Amsterdam, London, and New York illustrate the potential of night mayors to implement innovative policies that enhance the nightlife experience while addressing challenges such as safety, transportation, and inclusivity.

New York City's nightlife, with its deep-rooted cultural history and significant economic impact, exemplifies these dynamics. The establishment of the Office of Nightlife represents a proactive step in recognizing and managing the importance of nightlife. However, challenges remain, particularly in addressing transportation issues and ensuring that nightlife is accessible and inclusive for all residents and visitors.

In summary, the literature underscores the importance of nightlife as a critical component of urban life. The interplay between nightlife, gentrification, and urban governance highlights the need for comprehensive and inclusive policies that support diverse nightlife cultures. By

addressing these challenges and leveraging the role of night mayors, cities can foster vibrant, safe, and inclusive nightlife environments that enrich the urban experience for everyone.

Objective

This thesis aims to investigate the inefficiencies of public transportation in New York City, particularly in connecting the younger generation with popular nightlife hubs. Despite the city's reputation as "the city that never sleeps," young residents often face significant challenges in accessing nightlife venues due to inadequate and costly transportation options during late hours.

By analyzing patterns of displacement and changes in both nightlife hubs and young residential areas, this research seeks to identify the most popular nightlife hubs that are difficult to reach from these residential neighborhoods. Understanding these patterns is crucial for addressing the transportation barriers that young people face, which in turn affects their social lives and the vibrancy of the city's nightlife economy.

The ultimate goal of this thesis is to develop a comprehensive data visualization tool designed for public sector use. This tool will provide valuable insights into transportation demand based on weekend night taxi ridership, highlighting the most urgent nightlife neighborhoods in need of alternative transportation options. By presenting clear and actionable data, the tool aims to assist policymakers, urban planners, and transportation authorities in making informed decisions to enhance connectivity and accessibility, fostering a more vibrant, safe, and inclusive nightlife for all residents and visitors of New York City.

Data Analysis

Taxi Ridership Analysis

Data Source

The primary data source for this thesis is NYC Open Data, which provides extensive records of taxi ridership from 2012 to 2022. Given the vast amount of data available annually, a sampling approach was adopted. For analysis, data from the month of July was selected for three specific years: 2012, 2017, and 2022. This five-year interval provides a comprehensive overview of trends and changes over a decade.

Dataset

The dataset includes trip records for yellow taxis, green taxis, and For-Hire Vehicles (FHV) such as Uber and Lyft. Each type of vehicle has distinct data characteristics and coverage, reflecting the evolving landscape of NYC's transportation services:

- **2012:** Only yellow taxi data is available, consisting of 14,379,307 rows.
- **2017:** Includes yellow taxis (8,588,486 rows), FHVs (15,672,674 rows), and green taxis (914,783 rows).
- **2022:** Includes yellow taxis (3,174,394 rows), High Volume FHVs (17,464,619 rows), and green taxis (64,192 rows).

Over the years, the dataset quality has varied, particularly with the introduction and rise of FHVs, leading to significant shifts in ridership patterns. Notably, yellow and green taxi ridership has decreased as FHV options became more prevalent, indicating a consistent trend towards FHV preference. This trend underscores the significant impact that the rise of FHVs has had on the transportation landscape in NYC.

Metadata

The trip data includes various fields essential for detailed analysis:

- **Taxi Zone:** Each trip is associated with a TLC Taxi Zone, providing a granular level of neighborhood indexing while maintaining anonymity. Trips originating or ending outside NYC are not traceable, except for those involving Newark Airport.
- **PULocationID and DOLocationID:** These fields indicate the pickUp and dropOff locations, respectively, based on the taxi zones.
- **PickUp and DropOff Time:** These timestamps allow for the calculation of trip durations.
- **Fare Data:** Only the 2022 dataset includes detailed fare information, which provides insights into the cost dynamics of taxi services.

Data Cleaning

To ensure the dataset is suitable for analyzing night ridership patterns, several cleaning steps were undertaken to refine the data, focusing on relevant times, locations, and demographic indicators.

Firstly, datasets from 2012, 2017, and 2022 were aggregated into a consistent year-by-year format. This aggregation enabled a comparative analysis across these years, facilitating the identification of trends and changes over time.

The dataset was then filtered to include only data from Friday, Saturday, and Sunday. To accurately capture nightlife-related trips, hours between midnight and 4 am on weekdays were reassigned to the previous night's data. For example, trips recorded on Saturday from 12 am to 4 am were considered part of Friday night's events. This adjustment ensured an accurate representation of post-nightlife travel patterns.

To focus on the relevant timeframe for nightlife activities, only trips occurring between 11 pm and 4 am were included in the analysis. This window is critical for understanding how people travel home after nightlife activities, highlighting the demand for transportation during these hours.

Trips involving airports or destinations outside NYC taxi zones were excluded. Airport trips, which dominate taxi ridership at all times, are not relevant to nightlife analysis and would

introduce noise into the data. Additionally, trips outside NYC, while interesting, fall outside the scope of this study, which aims to understand night mobility needs within NYC.

The duration of each trip was calculated by subtracting the pickup time from the dropoff time and converting the result into minutes. This calculation provided insights into the length of nighttime trips, essential for understanding travel patterns and transportation needs.

Finally, the taxi data was joined with the taxi zone shapefile to obtain detailed information about each taxi zone, including borough and neighborhood names. The original dataset only provided index numbers for the taxi zones, so this step was necessary to contextualize the data geographically and understand the specific areas involved in night ridership.

Identifying Nightlife Hubs

Pattern of Changes in Night Taxi Ridership

The analysis focused on identifying changes in ridership patterns across different pick-up locations over the selected years: 2012, 2017, and 2022. By summing the ridership numbers for each pick-up location zone, the study aimed to identify regions with high nightlife event density and observe trends over time.

The data revealed significant insights into the shifting patterns of nightlife-related transportation. Firstly, the overall ridership numbers indicated that Lower Manhattan and areas in Brooklyn closer to Manhattan, such as Williamsburg, consistently had higher ridership. These regions have long been known for their vibrant nightlife scenes, attracting significant numbers of patrons.

The Shift of Nightlife Hubs in Past Decade

When analyzing the changes between 2012 and 2017, as well as between 2012 and 2022, a clear trend emerged. While Manhattan continued to have high ridership, there was a notable decline in most of its areas, with the exception of the Lower East Side and Harlem. These two neighborhoods maintained or even increased their ridership, likely due to their enduring popularity and cultural significance.

Conversely, Brooklyn and Queens showed an increasing trend in ridership over the same periods. This rise can be attributed to the gentrification of nightlife hubs in these boroughs. Neighborhoods in Brooklyn, such as Bushwick and Greenpoint, and areas in Queens, like Astoria and Long Island City, have become increasingly popular nightlife destinations, drawing more patrons and consequently increasing ridership numbers. The gentrification process often leads to higher rent prices and increased development value, transforming large, affordable venues and previously cheap locations into gentrified brand shops and luxury apartments. This economic pressure forces nightlife hubs to relocate to more affordable neighborhoods, typically those that were previously industrial or underdeveloped but still accessible via subway lines.

The trend of shifting nightlife activity towards Brooklyn and Queens became even more pronounced after the pandemic. The pandemic-induced changes in urban mobility and social behavior appear to have accelerated the decentralization of nightlife from Manhattan to the outer boroughs. As these areas undergo gentrification, they attract nightlife investments and developments, reshaping their cultural identity. The influx of upscale venues and luxury developments in traditional nightlife neighborhoods pushes nightlife activities to less expensive, yet still accessible, neighborhoods. These new nightlife hubs often emerge in areas with available large square footage that can accommodate nightlife venues, previously characterized by industrial or underdeveloped land use.

By understanding these ridership patterns and their changes over time, this analysis provides valuable insights into the evolving landscape of NYC's nightlife. It highlights the impact of gentrification on nightlife clusters, with emerging areas in Brooklyn and Queens seeing increased activity and ridership. These nightlife clusters, defined by both high increases in night ridership and consistently high amounts of ridership, underscore the need for targeted transportation solutions to better connect these burgeoning nightlife hubs with other parts of the city. Ensuring that all residents have safe and convenient access to nightlife activities is essential for maintaining the vibrancy and inclusivity of NYC's nightlife culture.

Young Residential Area Analysis

Data Source & Data Cleaning for Young Population

The data for analyzing young residential areas was sourced from the American Community Survey (ACS) for the years 2012, 2017, and 2022. This timeframe aligns with the taxi ridership data, allowing for a comprehensive comparison of trends over a decade.

The ACS data provides detailed demographic information, including age distributions. For this analysis, the focus was on the population aged 18 to 35 years, as this demographic is most likely to participate in nightlife activities. The total number of individuals within this age range was extracted for each census year.

To facilitate easier comparison with taxi zones, the census tract data was aggregated into Neighborhood Tabulation Areas (NTAs), which offer a similar level of geographic resolution. This aggregation step ensured that the demographic data could be effectively compared with the taxi ridership data, which is organized by taxi zones.

The population density was calculated by dividing the young population by the area in acres for each NTA. This metric provided a clear picture of where young people are concentrated within NYC. Additionally, changes in young population density were analyzed by calculating the delta between 2012 and 2017, and between 2017 and 2022. These deltas highlighted areas where the young population is increasing or decreasing, offering insights into shifting residential patterns.

Identifying Young Residential Areas

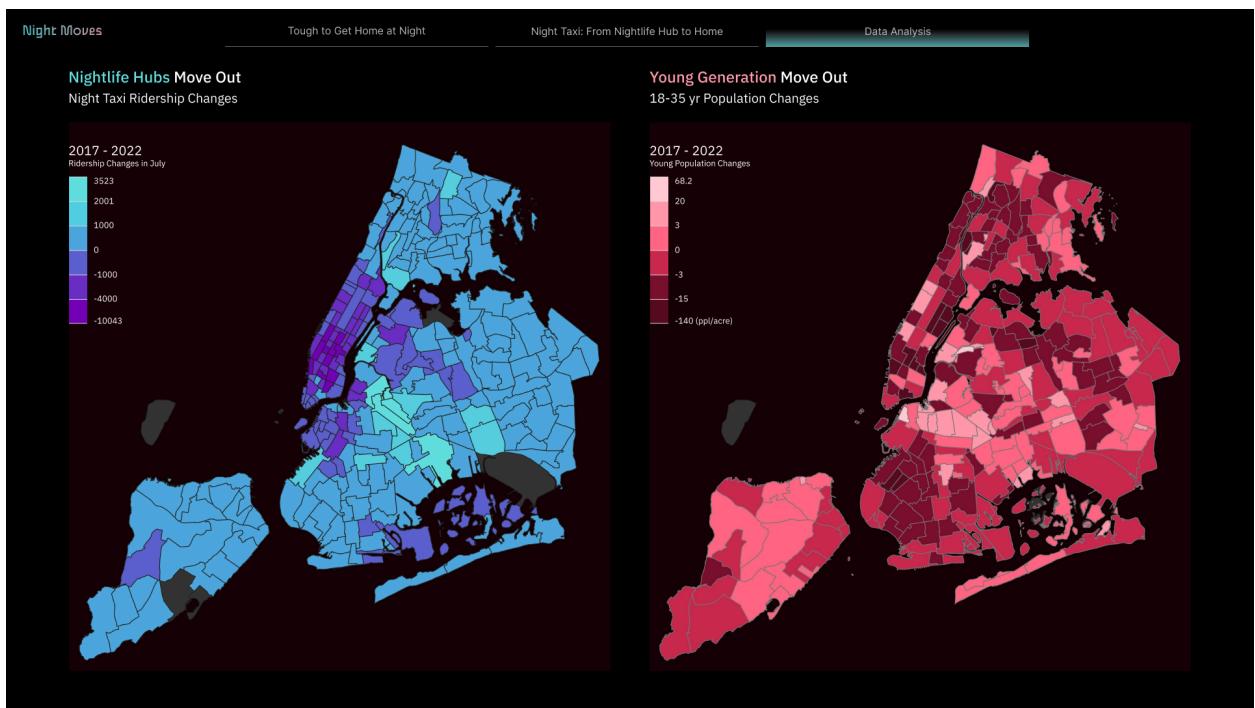
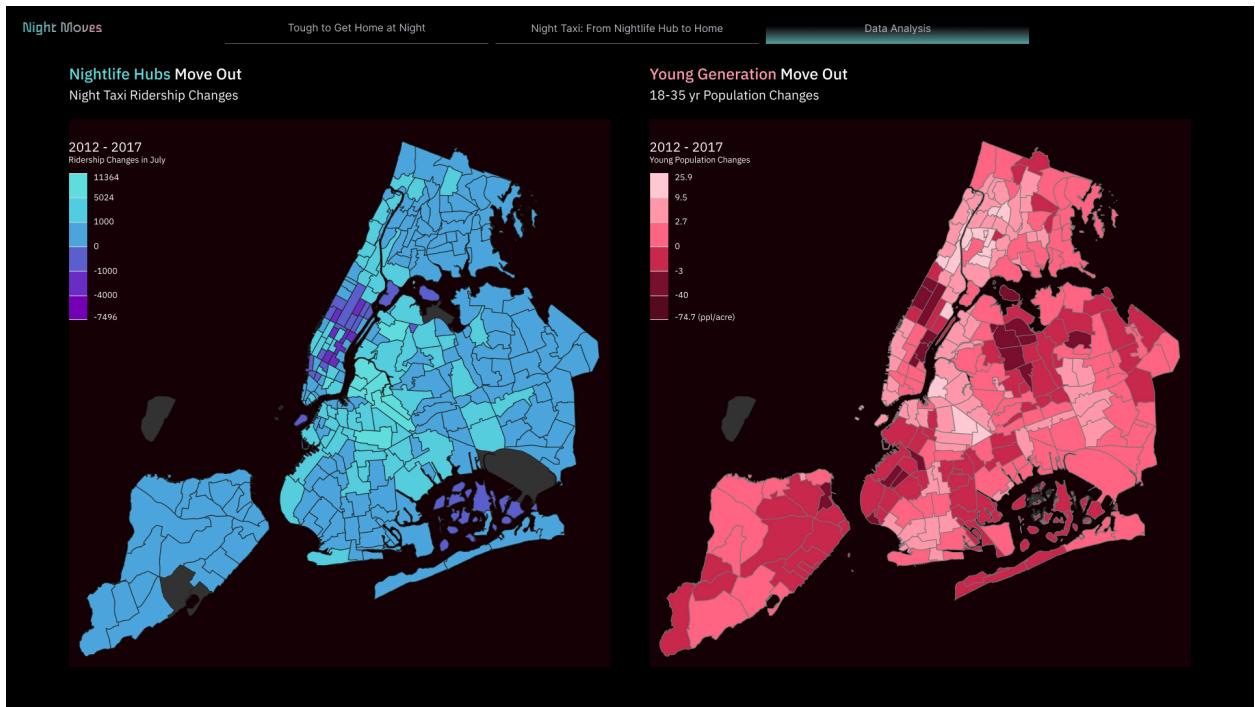
The analysis of young residential areas in New York City was conducted using census data from the American Community Survey (ACS) for the years 2012, 2017, and 2022. By focusing on the population aged 18 to 35 years, the study aimed to identify neighborhoods with high densities of young residents and observe how these patterns have shifted over the past decade.

The map visualization of young population density reveals notable trends. In Manhattan, there has been a significant reduction in young residential density, with only a few areas such as Hell's Kitchen, the Upper West Side, the Lower East Side, and Harlem showing an increase. This indicates that the younger population is moving out of the city center, likely driven by rising living costs and gentrification pressures.

In contrast, both Brooklyn and Queens have seen an increase in young residential density. Young people are relocating to neighborhoods in these boroughs, seeking more affordable living arrangements while still having access to the city's amenities and nightlife. In Brooklyn, areas such as Fort Greene, Bedford-Stuyvesant (Bed-Stuy), Bushwick, Williamsburg, Flatbush, and Crown Heights have experienced significant increases in young population density. These neighborhoods are known for their vibrant cultural scenes, relatively lower rents compared to Manhattan, and accessibility via public transportation.

Similarly, in Queens, neighborhoods like Long Island City (LIC), Ridgewood, Astoria, Rego Park, Richmond Hill, and Jamaica have become popular among young residents. These areas offer a mix of affordable housing options, cultural diversity, and convenient subway access, making them attractive alternatives to the more expensive parts of Manhattan.

The observed shifts in young residential density highlight the ongoing decentralization of young populations from Manhattan to the outer boroughs. This trend underscores the impact of gentrification and rising living costs in central areas, pushing younger residents to seek more affordable and culturally vibrant neighborhoods in Brooklyn and Queens.



Transit Gaps Between Nightlife Hubs and Young Residents

The comprehensive analysis of both night ridership and young population density maps reveals a significant trend: both nightlife hubs and young residential areas are shifting away from the city center. This decentralization is primarily driven by rising living costs and gentrification pressures in central Manhattan, pushing younger residents and nightlife venues to more affordable neighborhoods in Brooklyn and Queens.

One of the critical issues identified is the centralization of subway lines in Manhattan. Despite the Euclidean proximity of many start and end locations within the outer boroughs, the subway system often requires riders to travel into Manhattan and then out again to reach their destinations. This inefficiency is particularly problematic for travel between boroughs, or even within large boroughs like Brooklyn.

The inadequacy of the subway system at night forces young people to rely heavily on night taxis for transportation. The subway's limited functionality during late hours, combined with the risks associated with biking after consuming alcohol, makes taxis the dominant mode of night mobility for young residents.

By matching the ridership data of drop-off locations with the young population density in various neighborhoods, we can identify the destination neighborhoods with high demand for taxi services. These areas represent the key residential zones where young people live and which require better transportation connections to nightlife hubs.

This analysis provides valuable insights for public sector entities such as the Metropolitan Transportation Authority (MTA) and the New York City Office of Nightlife. Understanding which nightlife areas have the highest demand for new night mobility options can help these organizations prioritize interventions. The goal is to ensure that young people can travel home safely, affordably, and efficiently without the need for lengthy detours or excessively long rides.

In conclusion, addressing the identified transportation challenges is crucial for maintaining the vibrancy and inclusivity of NYC's nightlife. By improving public transit options and enhancing connectivity between young residential areas and nightlife hubs, the city can

better support the dynamic lifestyles of its younger population and ensure a thriving nighttime economy.



Design Tool for Navigating Night Ridership

Data Visualization Case Study

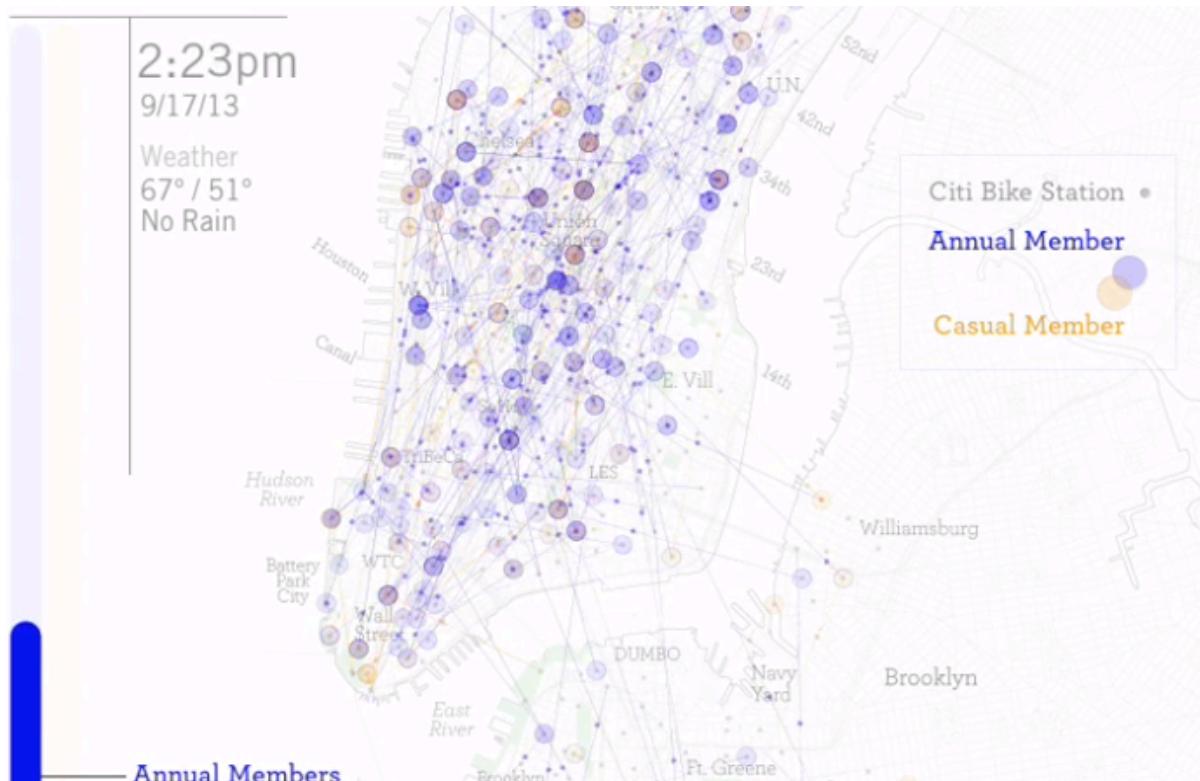
Visualize Ridership Motion

One illustrative example of visualizing ridership patterns is Jeff Ferzoco's "**Citi Bike Rides: September 17th & 18th, 2013.**" This visualization uses moving dots to represent individual bike rides, with different colors indicating the type of membership. Lines link the start and end points of each ride, providing clear visual guidance and helping viewers understand the routes taken by cyclists.

Pros: One of the primary strengths of this visualization is its ability to mimic real-time movement, effectively capturing the dynamic nature of bike ridership in New York City. The use of color to differentiate membership types adds another layer of information, allowing viewers to discern patterns based on user demographics. This approach serves as an excellent inspiration for visualizing real-time movement and understanding travel behaviors in urban environments.

Cons: However, the visualization's complexity can also be its downfall. The simultaneous movement of all ridership dots creates a chaotic scene, making it challenging to follow individual rides or discern specific patterns. This visual clutter can overwhelm viewers, reducing the overall effectiveness of the visualization in conveying clear and actionable insights.

In the context of this thesis, Ferzoco's work highlights both the potential and limitations of using dynamic visualizations to represent real-time travel data. While the moving dots and route lines provide an engaging way to depict ridership, careful consideration must be given to managing visual complexity to ensure the clarity and usability of the information presented. This balance is crucial for developing effective data visualizations that support the goals of understanding and improving urban transportation systems.



"Citi Bike Rides: September 17th & 18th, 2013" by Jeff Ferzoco

Showing Difference with Orientation

In the pursuit of comparing different pickup-dropoff night taxi routes within the same neighborhoods, the goal is to identify which routes experience the longest delays when opting for the subway instead of a taxi. This requires a visualization that maintains the routes' orientation while effectively conveying the difference in delay times.

To achieve this, I explored various radial chart designs to visualize the quantitative differences while preserving the geographic relationships of the routes. A radial chart can help in showing comparative data in a manner that retains the spatial orientation of the routes, which is crucial for understanding the geolocation context.

One example that inspired this approach is Valentina D'Efilippo's project for the course "Information Design: Storytelling with Data in Illustrator." In this project, she investigated clean water accessibility across countries and regions, revealing the disparity between wealthy countries and the rest of the world. D'Efilippo utilized a radial chart to effectively

display all the countries' names around the perimeter of the circle while illustrating the differences in access to clean water through grey circle lines as unit guides.

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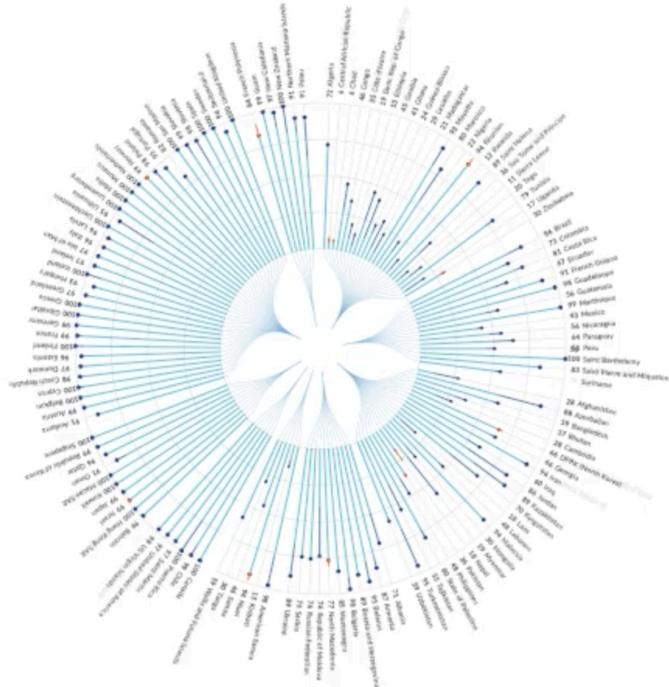
CATEGORY

COUNTRY

Findings

133

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Valentina D'Efilippo's project for the course "Information Design: Storytelling with Data in Illustrator."

Digital Tool Design

The Purpose of Dashboard

The design of this dashboard serves a critical function in empowering public sector officials and nightlife facilitators by providing them with a deeper understanding of the challenges associated with night transit. The intent is to bridge the gap between complex open-source data and actionable insights that can be readily utilized by city governors, community leaders, and urban planners without requiring extensive technical expertise.

The primary goal of this tool is to illuminate the night travel needs based on current night taxi ridership data and the excessive costs borne by nightlife participants due to limited

transportation options. Such insights are essential for city officials and local communities as they can use this information to prioritize interventions in the most urgent nightlife hubs. By addressing these challenges, the dashboard aims to enhance the quality of nocturnal travel experiences, ensuring that residents can return home safely and efficiently after participating in nightlife activities.

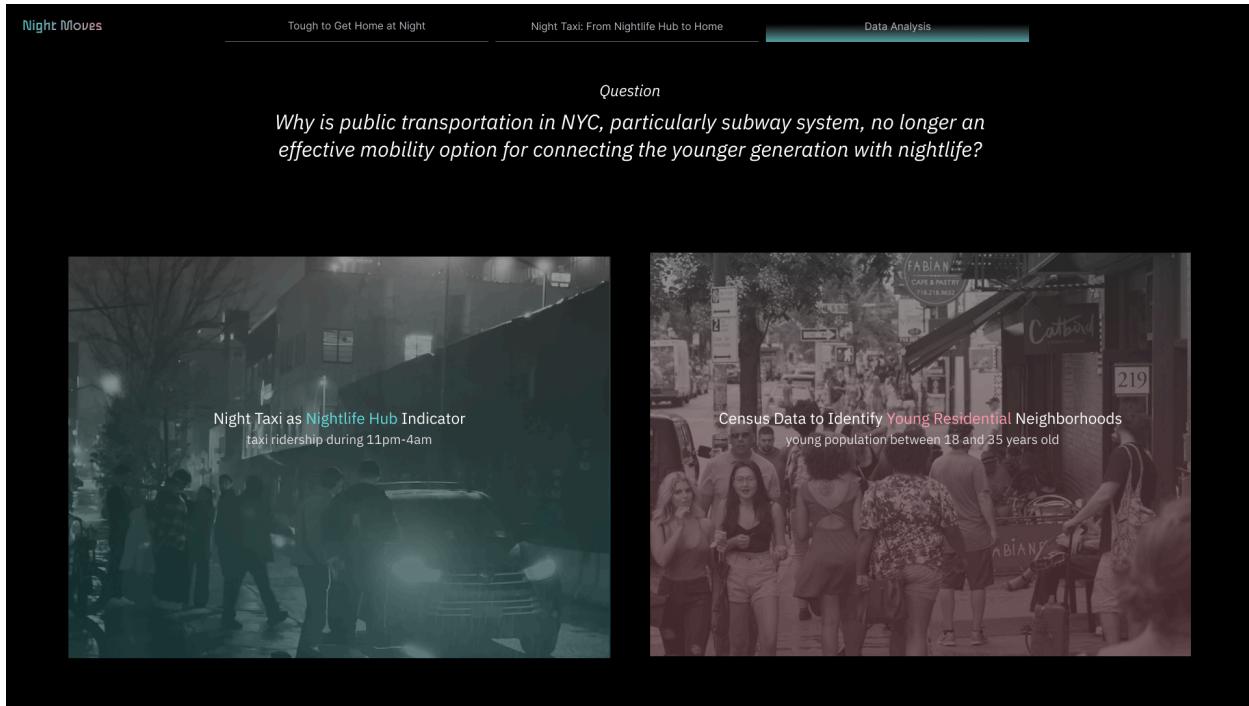
At present, the dashboard is built upon a dataset spanning one month. However, the vision extends far beyond this initial scope. In the long term, there is a plan to develop a more robust backend system that will integrate data continuously from 2022 onwards. This enhancement will ensure that the dashboard remains relevant and valuable, providing up-to-date insights that reflect the latest trends and changes in night mobility. Through these improvements, the dashboard will continue to serve as a vital tool for shaping urban nightlife policies and transportation planning, ultimately leading to a more vibrant and accessible night-time environment for all city dwellers.

Main Feature: Color Choice

The color scheme of the dashboard is a crucial element that enhances the user experience and readability of the data. The choice of colors is strategic and intentional to aid in distinguishing between different elements and enhancing the overall visual appeal.

- **Nightlife Hubs Color:** Blue has been chosen to represent nightlife hubs. Blue is often associated with trust, dependability, and stability, which aligns with the established and frequented locations that form the core of the city's nightlife. This color helps users quickly identify areas known for nightlife activities on the map.
- **Young Residential Areas Color:** Pink is used to mark young residential areas. Pink, often seen as vibrant and youthful, aptly represents areas predominantly inhabited by younger demographics. The color stands out on the map, making it easy for users to spot regions where young populations reside.
- **Taxi Ridership Color:** The connection between nightlife hubs and young residential areas, represented by taxi ridership, utilizes a gradient color transition from blue to pink. This gradient not only visually signifies movement but also intuitively indicates the flow of taxi rides from nightlife areas to residential zones. The choice of a

gradient effectively illustrates the dynamic interaction between these areas, helping stakeholders understand the travel patterns and dependencies of night-time commuters.



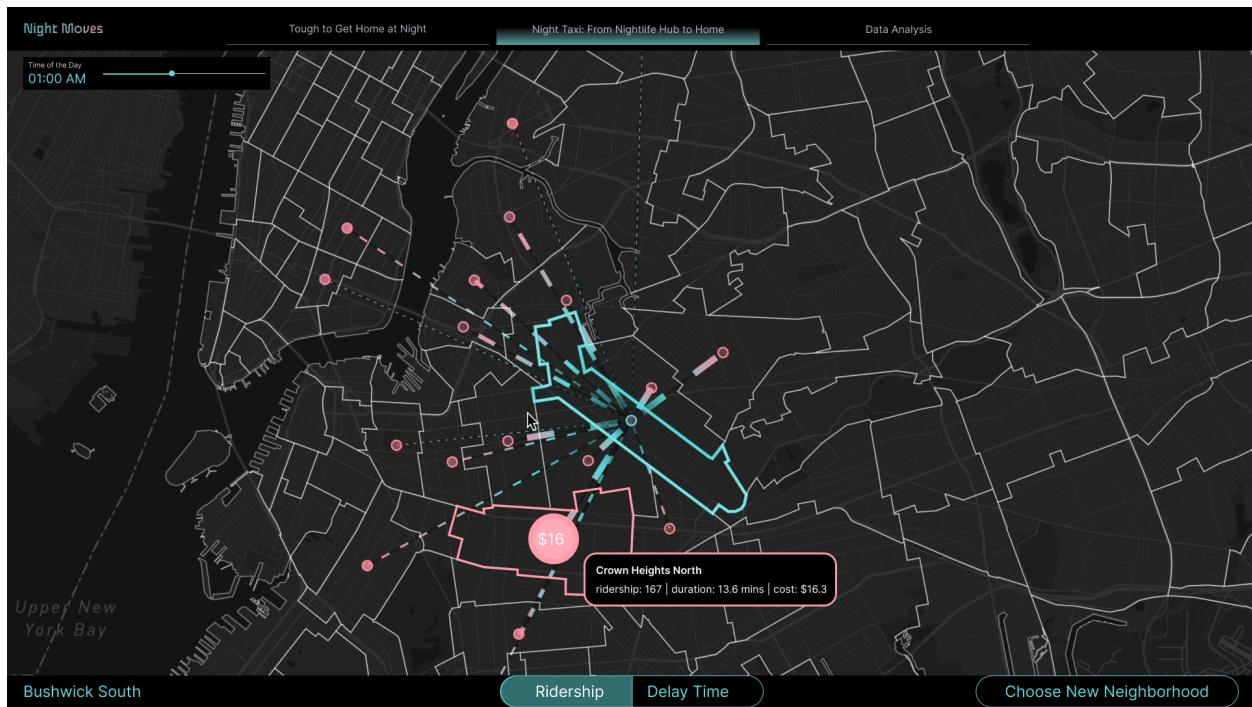
Main Feature: Ridership Visualization

The dashboard's ridership visualization is designed to offer an intuitive and dynamic representation of night taxi ridership, providing stakeholders with a clear view of travel patterns between nightlife hubs and residential areas.

- **Time-Animated Dashed Lines:** To depict the movement of taxis during the night, I have implemented time-animated dashed lines. These lines not only illustrate the paths taken by taxis but also animate in a way that reflects the average duration of each route from start to end. The speed of the animation correlates with the duration of the trip, offering a visual representation of travel time.
- **Gradient Color in Circles:** The visualization utilizes different gradients of pink to fill circles that are placed at the centroid of each young residential area. This gradient scale represents the average cost of taxi rides originating from each area, providing

an immediate visual cue about fare levels. The intensity of the pink color increases with higher average costs, allowing users to quickly assess the economic aspects of traveling from specific neighborhoods.

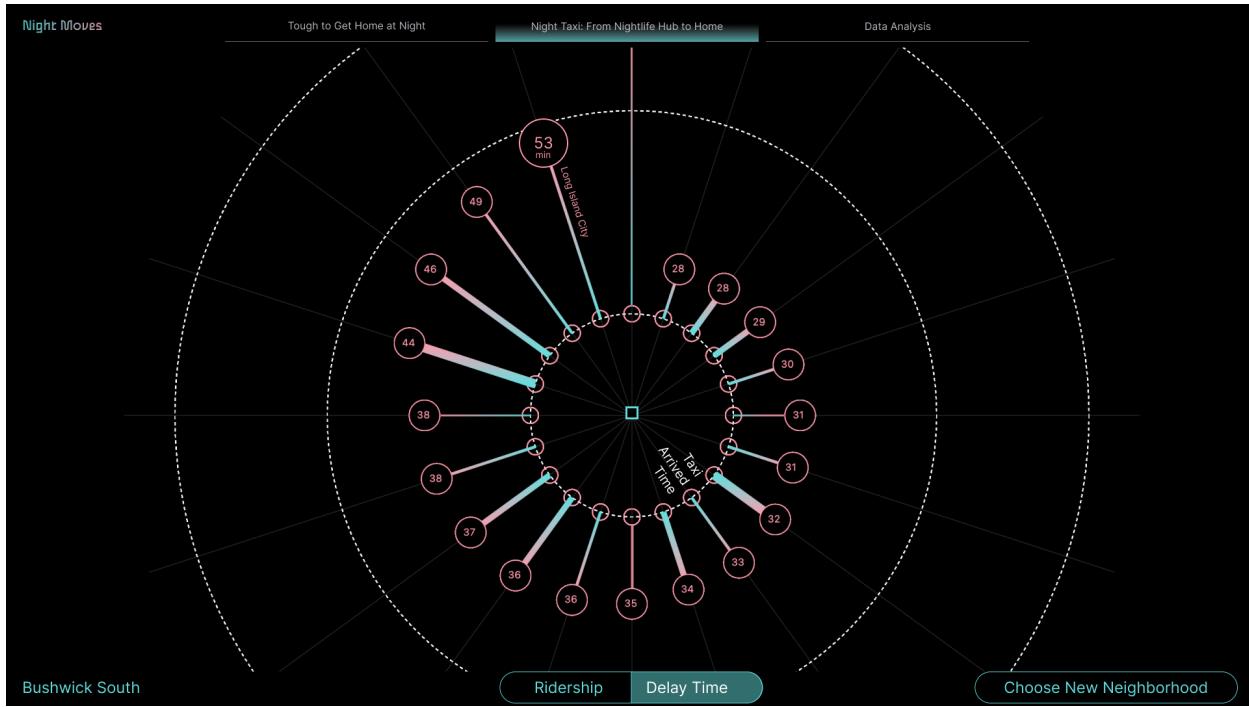
- **Blue Highlights for Nightlife Hubs:** Nightlife hubs are distinctly marked in blue and positioned centrally within the visualization. This placement and color coding draw the viewer's attention to these hubs as focal points of the analysis, facilitating an understanding of how all navigational elements relate to these key areas.
- **Interactive Tooltips:** When a user hovers over any pink circle on the map, a tooltip appears, providing detailed information about the neighborhood, such as Crown Heights North. The tooltip also includes data on ridership amounts, average costs, and average trip durations. This interactivity enhances the user experience by allowing for on-demand access to detailed data, helping users make informed decisions based on specific areas of interest.



Main Feature: Radial Chart

The radial chart is a critical component of the dashboard designed to offer a detailed comparative analysis of travel times between using taxis and the subway for night-time routes. This feature becomes accessible through a user-friendly interaction:

- **Activation via Control Bar:** Users can switch to the radial chart view by clicking on a "delay time" switch button located in the bottom center of the control bar. This action transitions the visualization from the map view with animated dashed lines to a radial chart layout.
- **Visualization of Delay Times:** The radial chart displays the average delay time that a rider would experience if they chose the subway over a taxi for various start-to-end routes. This delay is visualized as the length of each line in the chart, directly representing the time lost by choosing a slower mode of transport.
- **Consistent Orientation with Interactive Enhancements:** Maintaining the geographic orientation similar to the map version, the radial chart ensures that each route is easily recognizable and comparable to its representation on the map. However, unlike the map, the length of each line in the radial chart varies based on the associated delay time, making it straightforward for viewers to compare delays across different routes. Dashed lines around the circle represent time intervals, such as 15 minutes or 30 minutes, aiding in quick understanding of the delay extents.
- **Detailed Information on Interaction:** At the end of each radial line, a circle displays the exact delay time. When a user hovers over this circle, the name of the neighborhood associated with that route is shown. This feature enhances the interactivity of the dashboard, providing detailed insights into each specific route's delay while maintaining an organized and informative display

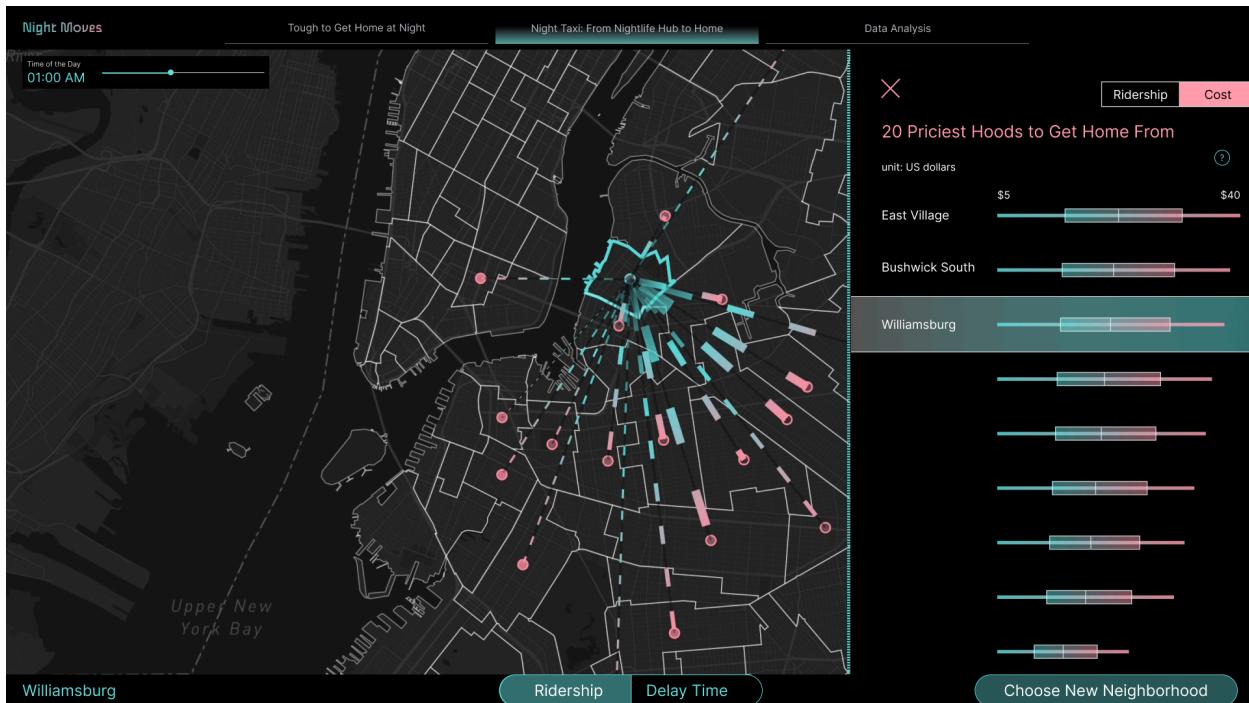


Main Feature: Cross Nightlife Hub Comparison

The Cross Nightlife Hub Comparison feature enhances the dashboard's analytical capabilities by allowing stakeholders to evaluate and compare the economic aspects of night mobility across different nightlife hubs. This component is designed to provide a macro-level view of the costs associated with night-time travel, aiding in strategic decision-making.

- Activation via Control Bar:** Users can access this feature by clicking a dedicated button located on the right bottom of the control bar. This action shifts the visualization from the detailed animated map to a box plot format, which displays the financial metrics associated with traveling from various nightlife hubs.
- Box Plot Visualization:** The box plot format is utilized to present a statistical summary of the costs involved in taxi ridership from each nightlife hub. This includes displaying the average, maximum, and minimum costs, providing a clear picture of the financial burden on nightlife participants. Additionally, the total ridership amount for each hub is also displayed, offering insights into the volume of demand at each location.

- **Focus on Quantitative Analysis:** This comparison tool is designed to shift the audience's focus from the granular details of individual routes (as seen in the animated map) to a broader comparative analysis of costs and ridership volumes across nightlife hubs. It highlights which nightlife areas have the highest mobility demand and where participants bear the greatest cost, facilitating targeted interventions to alleviate financial pressures.
- **Interactive Navigation:** By clicking on a specific box plot, users can toggle between different nightlife hubs to explore detailed night ridership patterns for each area directly on the map. For example, selecting the Williamsburg box plot would refocus the map to display all ridership routes originating from Williamsburg, illustrating the specific travel behaviors and costs associated with this popular nightlife destination.



Recommendation

This thesis serves as a strategic proposal to the NYC Office of Nightlife and the Metropolitan Transportation Authority (MTA), urging the enhancement of nightlife transportation to adapt to the evolving needs of nightlife hubs and the residential patterns of young New Yorkers. Introducing night shuttle services and refining subway schedules during late hours could significantly improve accessibility and efficiency, ensuring safe and convenient travel for nightlife participants. Leveraging the data visualization tool developed in this thesis allows stakeholders to precisely target neighborhoods with urgent mobility needs, optimizing resource allocation and intervention impacts.

As gentrification pushes nightlife and residential areas further from the city center, the disconnection between subway stations and these key neighborhoods grows, posing challenges in maintaining robust connections between nightlife venues and their patrons. Innovative solutions are necessary to bridge the last-mile transit gap, enhancing safety and inclusiveness throughout the night mobility experience. By integrating safety measures, such as improved lighting at subway stations and enhanced security on late-night routes, into a comprehensive approach to nightlife transportation, the NYC Office of Nightlife and the MTA can ensure that the vibrant cultural nightlife of New York City remains accessible, safe, and welcoming for all residents. This holistic strategy not only supports the dynamic cultural life of the city but also promotes an equitable and sustainable nightlife environment.

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