

QUADRANT
an  appen company

The Big Book of Mobile Location Data Use Cases

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INTRODUCTION

Mobile location data and location intelligence – insights built on this data – have a wide variety of uses across several industries. Knowledge of movement patterns enables businesses to discern people's activities and interests, which, in turn, can be used to construct detailed customer profiles that facilitate tailored marketing campaigns with a higher ROI. Another practical application of location intelligence is competitive analysis. Retail companies can utilize such data to analyse foot-traffic at competitor outlets. This approach, combined with information on when customers are likely to shop, allows businesses to send personalised offers to prospects at just the right time.

Insurance providers employ mobile location data – in conjunction with property, POI, and meteorological data – to make their risk assessments on residential and commercial properties more robust. These assessments are then used to adjust policies and related insurance premiums. Investment firms utilise location intelligence to determine the footfall at various retail outlets. When combined with financial information, such data can serve to gauge business performance well in advance of yearly or quarterly reports. This information has a significant impact on how investment companies allocate their capital.

Healthcare facilities can also harness human mobility data to improve operations. By combining it with Point-of-Interest (POI) data that illustrates the distribution of healthcare providers throughout a city, businesses can identify areas that are underserved. This information can then be utilised to plan expansion or to allocate more emergency services.

The applications of anonymised mobile location data briefly discussed above are not exhaustive but are meant to give insight on how such data is used in making key businesses decisions and enhancing profitability. This eBook underscores how Quadrant's mobile location data has helped our clients, as well as cover some third party examples of how location data has helped other businesses achieve favourable results.

MARKETING

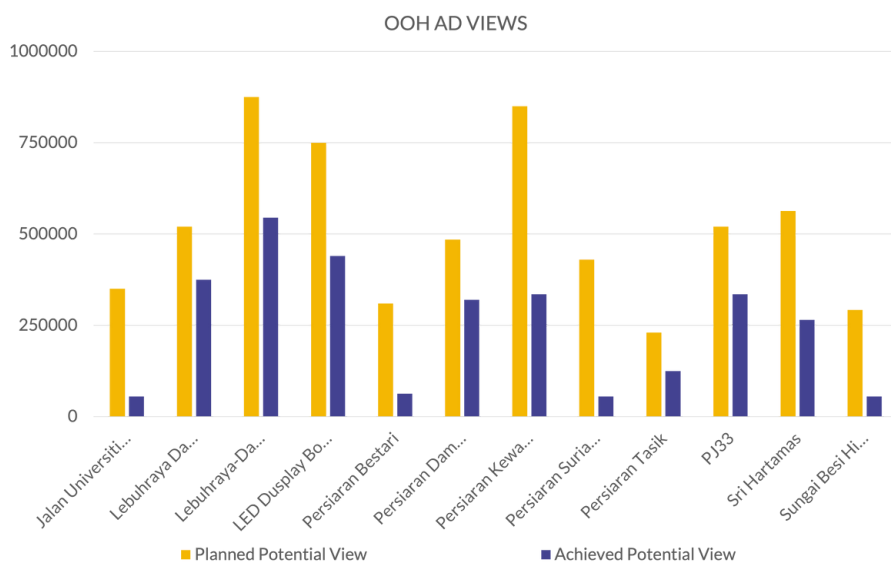
TARGETED OOH CAMPAIGNS

The COVID-19 pandemic forced governments around the world to implement travel restrictions to curb the spread of the virus. As such, people’s movement patterns changed drastically as compared to the pre-pandemic era. This raised significant challenges for firms that utilise Out-of-Home (OOH) advertising, as they can no longer rely on historic mobility information.

Due to various travel restrictions across Malaysia, Foodpanda – a dominant food delivery service – knew it would have to tweak its OOH advertising strategy to address the changes in human mobility.

By leveraging Moving Audiences, a mobile location intelligence platform developed by Moving Walls, Foodpanda was able to schedule and place OOH advertisements at locations that received more traffic in the post-pandemic era.

As a result of changing their OOH advertising placement, Foodpanda was able to **improve impressions** delivery by 11% after experiencing a 16% dip once the lockdown measures came into effect.



Source: [Moving Walls Case Study](#)



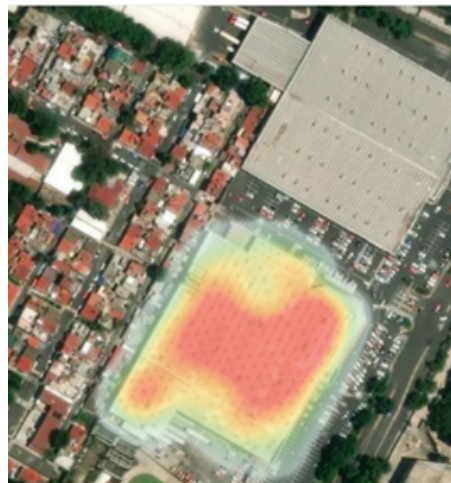
COMPETITIVE ANALYSIS

Mobile location data provides retail businesses with insights on human mobility, which can be utilised to gauge store performance and execute competitive analyses. Such data can also potentially reveal ways to optimise the usage of store space and identify consumer preferences for targeted marketing.

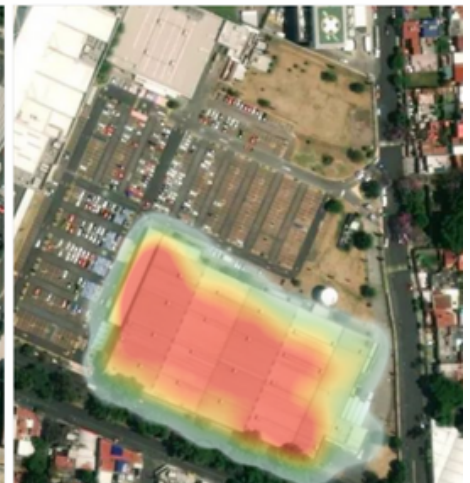
PREDIK Data-Driven executed a comprehensive footfall analysis of two competing wholesale warehouses (Costco and Sam's Club) in Mexico City.

The first question the data science team wanted to answer was: How are visits distributed across both warehouses? By complementing mobility data with Point-of-Interest (POI) information, the team was able to develop a heat map that detailed the distribution of visitors in both facilities.

Costco Wholesale density distribution heatmap



Sam's Club density distribution heatmap



[Source: Predik Data-Driven Blog](#)

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Case Study: Predik Data-Driven uses Quadrant's mobile location data to help retail, FMCG, and logistics businesses improve operational and supply chain efficiency.

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By harnessing location intelligence, PREDIK Data-Driven was able to gather several critical insights. They found that 61% of shoppers went to Costco while 39% went to Sam's Club. Another finding was that Costco shared 76% of its customers with Sam's Club, while Sam's Club shared 81% of its customers with Costco.

The footfall analysis also provided granular information on the distribution of visits across the week (as shown in the figure on the following page). The analysis also revealed peak hours, dwell time, the footfall distribution in the surrounding commercial area, and customer preferences based on movement patterns before and after visiting the stores under examination.

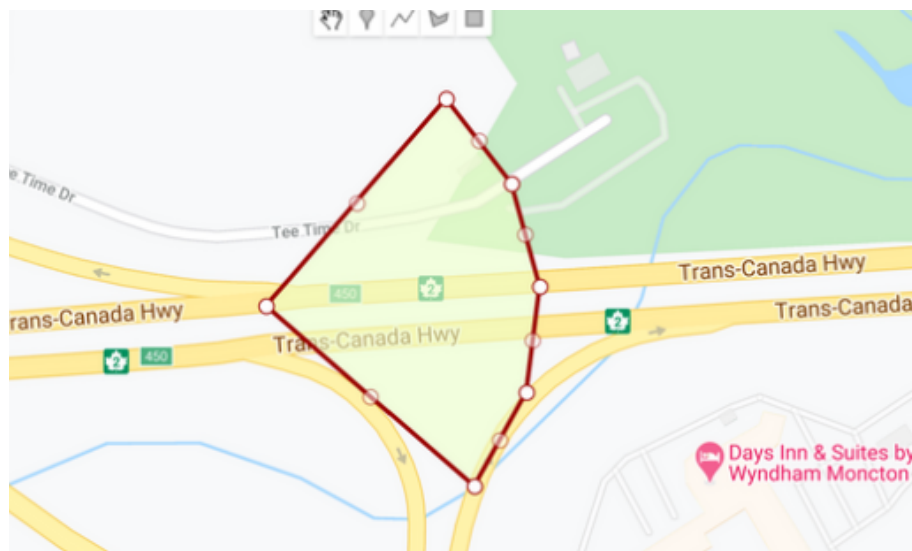
MEASURING OOH CAMPAIGN PERFORMANCE

Digital marketing attribution is easy to measure because the customer journey – from finding the relevant website to pages visited before a purchase is made – is documented in digital analytics platforms. However, measuring the effectiveness of Out-of-Home (OOH) advertising campaigns is not as straightforward.

Traditionally, companies measure sales numbers before and after OOH campaigns to determine their impact, which is not an accurate indicator of ROI from an actual campaign. Another way to gauge OOH performance is through causal impact analysis. In such an analysis, one compares a few control markets to an experimental market (the one which is being promoted through an OOH campaign). The uptick in revenue of the experimental market is compared to the control markets, which can be fed into a model which calculates the proportion of the uptick that can be attributed to the OOH advertising.

Mobile location data, offers a much more sophisticated measurement. One of our clients, Applied Post, harnessed our mobile location datasets to analyse the OOH marketing campaigns of a liquor distributor in Canada. To execute this analysis, they created geofences (view cones) around billboards and the nearby stores whose products these advertisements were promoting. By doing so, they were able to establish a statistically significant correlation between store visitors and nearby advertisements.

By monitoring the footfall data around the billboards and retail outlets over several weeks, Applied Post successfully determined the conversion rate of their offline campaigns.



Graphic showing a viewcone built around a billboard on a highway to capture the potential of visibility for an ad.



Applied Post improves marketing ROI and supports data driven business expansion for retailers using Quadrant's mobile location data. Learn more about how they determine the ROI of an OOH campaign by geofencing a billboard's view cone and correlating with actual traffic at the retail outlets to assume conversion rates.

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SYNCHRONISING MOBILE MARKETING WITH DIGITAL OOH (DOOH) ADVERTISING

Research conducted by Nielsen (a leading advertising and market research firm) and similar organisations have concluded that OOH advertising – maybe counterintuitively – is a very effective marketing mechanism for fueling growth in online engagement. Such engagement includes website visits, mentions or tags on social media, and traffic generated on search engines. Traditionally, OOH advertising is carried out separately from digital initiatives. However, mobile location data has emerged as a concrete means of enabling these two distinct mechanisms to complement each other.

In Malaysia, Foodpanda utilised the intelligence platform of Moving Walls to segment groups by cuisine preferences, based on visitation patterns to restaurants and other food outlets. Additionally, Foodpanda followed up with individuals who encountered the DOOH advertisements by promoting special offers of their preferred cuisines to them via mobile advertisements.

As a result, Foodpanda managed to re-engage approximately 977,000 individuals – which represents 55% of total exposure achieved during the campaign’s duration.

CUSTOMER SEGMENTATION

Companies can utilise human mobility data to analyse where customers go and spend most of their time when they are not shopping. These movement patterns enable companies to discern the interests and hobbies of their customers. This information, in turn, can be used to create more personalised marketing campaigns to better engage existing customers in addition to potentially reeling in new ones.

Urban Outfitters (a popular lifestyle retail brand) teamed up with Appboy (a customer engagement platform) and PlaceIQ (a location analytics firm) to execute targeted marketing campaigns. The partnerships allowed Urban Outfitters to derive behavioural insights on customers using location intelligence. These insights were utilised in creating tailored digital campaigns – which took the form of email, push notifications, and in-app messages – increasing conversions and revenue by 75% and 146% respectively.

Quadrant's customer Applied Post also uses Quadrant's location data to evaluate visitation patterns for a popular home improvement retailer and their competitors in Canada. Incorporating data from surveys and loyalty programs to create consumer behaviour profiles the retailer uses Applied Post's analysis to build targeted promotional campaigns and win customers from their competitors.

RETAIL

SITE SELECTION

By employing location intelligence, businesses can analyse urban areas with high footfall. Evaluating the distribution of existing outlets – including competitor locations – alongside this intelligence enables companies to identify suitable sites for expansion. In addition to providing existing customers with more options, expansion also incentivizes people residing close to the new sites to become customers.

One of PREDIK Data-Driven's clients is a major regional footwear business that only had an online presence. The client wanted to know which mall would be ideal for opening their first physical retail store.

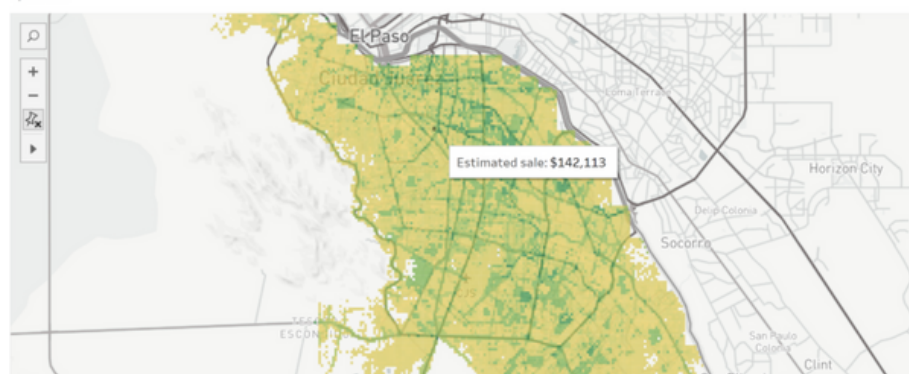
PREDIK Data-Driven started by analysing the visitor footfall patterns for both malls and identifying the competitors present in each mall. Afterwards, they analysed the social media profiles of the visitors to determine which individuals demonstrated an interest in the client's products. Along with monitoring social platforms, they also collected mobility data on customers when they were not shopping at the malls to generate consumer profiles.

Armed with the relevant demographic and psychographic information, PREDIK Data-Driven acquired information including (1) average value of online sales, (2) sales history in the city of interest, (3) volume of online visits to virtual stores from locals, and (4) locations of consumer residences as per product delivery records – to predict the sales potential of the new store in each mall.

The client used this insight to open its first brick-and-mortar store.

Potential sales prediction according to the selected POI

The following graph shows the result of the sales estimation model for each quadrant according to its characteristics. The result shown corresponds to the expected average monthly sales. The size of the quadrants is 150m x 150m and dark green means higher expected sales while light green means lower expected sales for each quadrant.



Source: [Predik Data-Driven Blog](#)



URBAN PLANNING

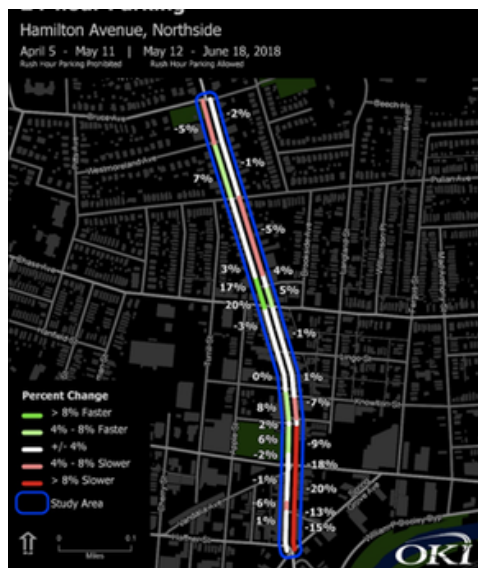
TRAFFIC MANAGEMENT

As the world's leading on-demand transportation provider, Uber has facilitated billions of trips – an average of 17 million per day at a global level. Uber's app employs mobile location data (GPS data) to match riders with drivers, as well as to keep track of the progress of trips. In 2017, Uber unveiled a platform called Uber Movement: a tool with anonymised data from all of Uber's trips that is designed to aid city administrators with urban planning and traffic management. The platform also includes a publicly accessible analytics tool to help derive insights from this data.

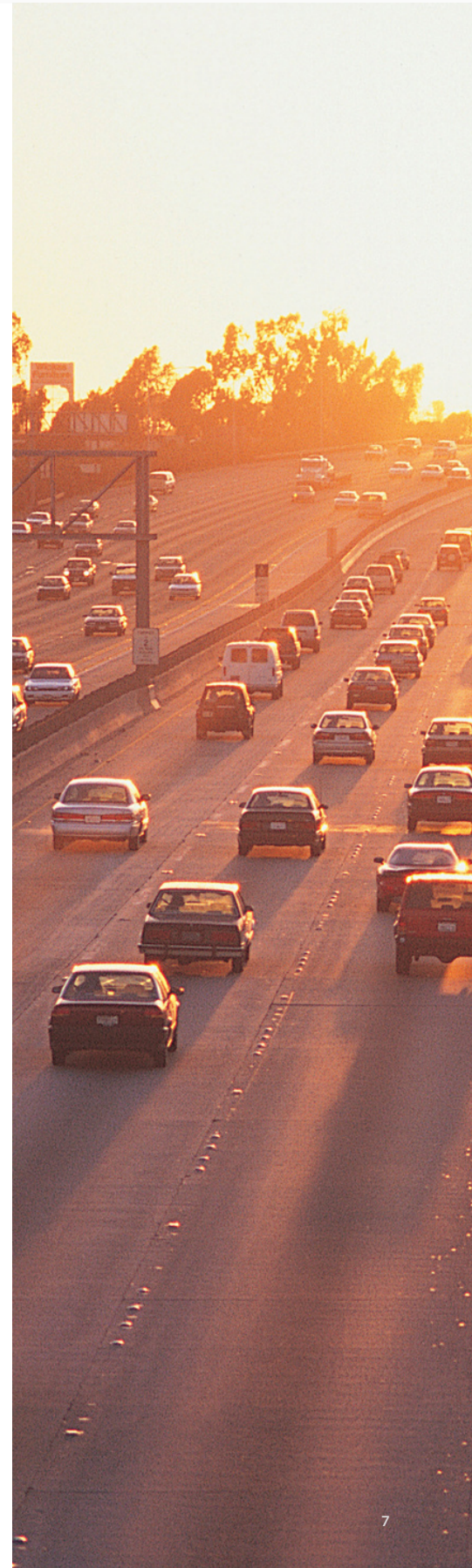
Northside is a neighborhood in Cincinnati with a booming businesses district. Located at Hamilton Avenue – a four lane road that facilitates 21,000 cars a day – the business district saw many bicycle and pedestrian accidents as compared to the national average between 2015 and 2017.

One of the ideas was to decrease the four-lane road to a two-lane road by removing parking restrictions on the curb-side lanes during peak hours. To analyse the effect of this pilot program on traffic speeds in the business district, OKI Regional Council of Governments used Uber Movement Speed data. OKI monitored the speed data throughout the district on an hourly basis and found that the project had achieved a significant reduction in average speed in both directions.

Moreover, an analysis following the pilot project showed a 39% decrease in accidents. As a result, the measures were extended indefinitely.



Source: [Medium Blog](#).



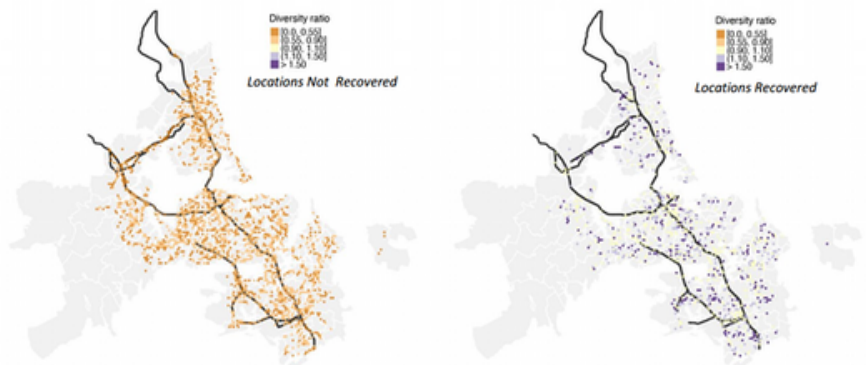


MANAGEMENT OF PUBLIC SPACES

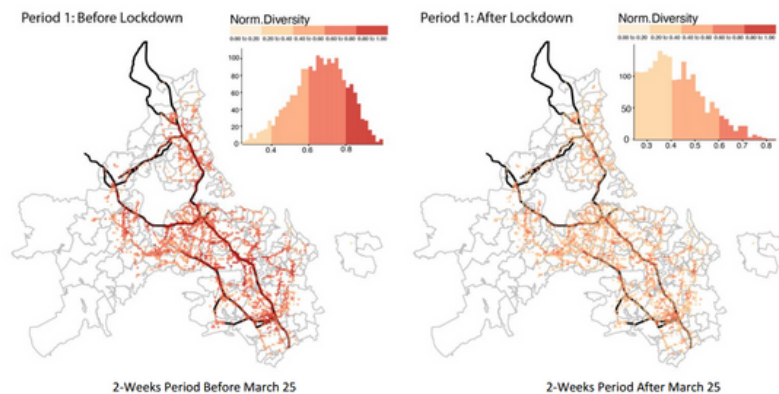
Researchers from the University of Auckland wanted to investigate how lockdowns in the city altered human mobility patterns. The researchers partnered with Quadrant to obtain mobile location datasets to determine whether mobility patterns had changed in response to lockdown-induced restrictions. Moreover, the researchers also intended to use these datasets to identify vibrant spaces in the city to suggest improvements that would attract more visitors.

Their conducted three forms of analyses using location intelligence: (1) creating home-to-destination networks, (2) determining population density per square kilometer, and (3) calculating the diversity of visitors numerous across locations in Auckland.

The results showed the changes in mobility patterns after the imposition of each of the two lockdowns in 2020. The results also underscored the fact that although some places had recovered or even surpassed their pre-lockdown diversity in terms of visitors, most had not. There were two categories of recovered areas: essential urban programs (schools, hospitals, highway ramps etc.) and green open spaces (parks etc.).



Graphic showing locations in Auckland that recovered their diversity (on the left) and those that did not (on the right).



Graphic showing how lockdowns in Auckland, New Zealand, altered human mobility patterns across the city and how diversity of visits changed during and after a lockdown.



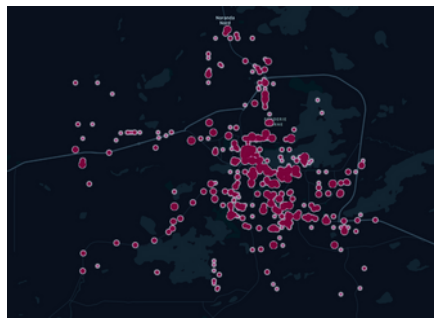
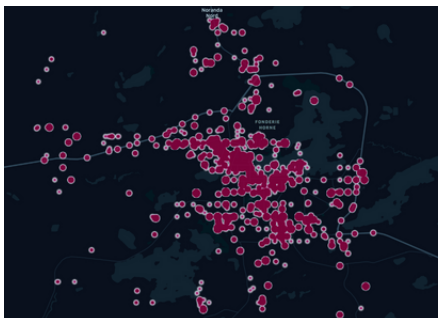
Find out how researchers use location data to observe mobility patterns around specific spaces, and study people's interactions and relationships with them. Also learn how the insights derived from location data are used to assess the changes in the visitation of public spaces in response to pandemic-induced restrictions in Auckland.

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PUBLIC TRANSPORTATION

Civilia, a company that provides urban mobility solutions, partnered with Quadrant after discovering that other data-providers did not have adequate mobile location dataset volumes for low-density urban areas in Canada. The client fed mobility data acquired from Quadrant into its Artificial Intelligence models to develop Origin-Destination (OD) matrices that accurately depicted people's movement patterns.

The Civilia's data science team also mapped geofence-based districts by population density and the distribution of public transit services in these districts. The urban planning and transportation team of Civilia used this knowledge to provide the administrators of Rouyn-Noranda with actionable intelligence on how to improve public transportation in the city.



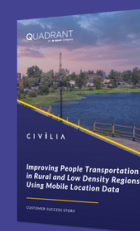
Heat-map samples represent the saturation of population based on time of day used to analyze and study movement patterns over a period of time.

ADDRESSING SOCIAL INEQUALITIES

A research team from a leading public research university wanted to conduct an in-depth examination of the public transportation services in Maputo province, Mozambique. The team partnered with Quadrant to procure mobile location datasets that were fed into Origin-Destination (O-D) Matrices and POI visitation analyses.

These analyses helped the researchers determine congestion on corridors, trip generation and attraction zones, and the distribution across different modes of travel.

The team evaluated the ease of travelling to various POIs and underscored areas with greater transit demand by identifying areas with greater foot traffic. They also highlighted areas with poor availability of and access to transit services such as metros, buses, railways, and ferries. The POI visitation analysis – which was comprised of 9 unique categories – utilised mobile location data to provide much needed context



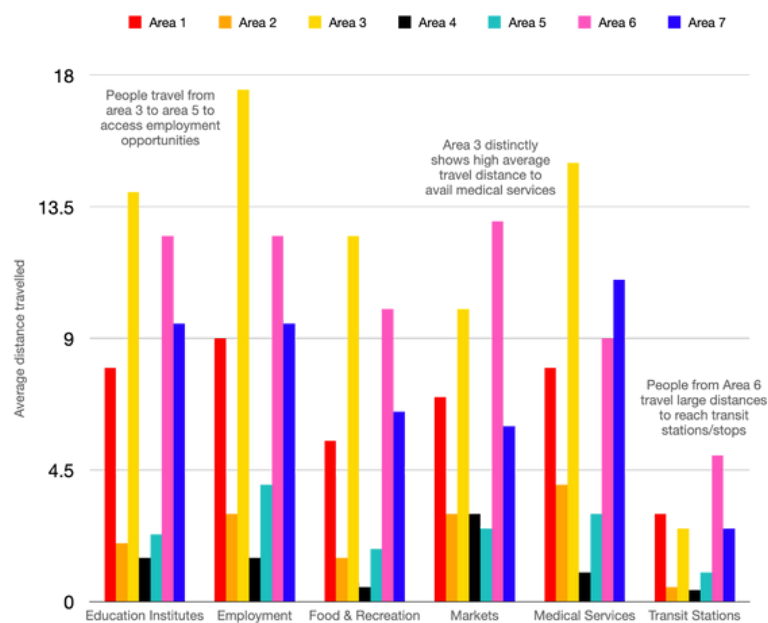
Learn more about how Civilia uses Quadrant's mobility data to power their state-of-the-art AI platforms for parking, sustainable cities, smart vehicles, ad-tech, urban architecture etc. Deep dive into how they use location data to identify and remediate the transportation challenges of citizens in a low density cities in Quebec, Canada.

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The team was able to underscore the variability in access to public transportation services across different socio-economic groups by combining data sources such as census data, poverty maps, infrastructure and road networks, and administrative boundaries – with human mobility data. The researchers also investigated the ease of travel for distinct groups by looking at the volume of transit trips during peak hours.

The researchers delivered these actionable insights to local authorities so that the latter could harness them to address the substantial inequalities present in the distribution and availability of transit services across distinct socio-economic demographics.



Learn how researchers used mobile location data to study transport usage and accessibility in Mozambique and highlighted the challenges of people living in and around the Maputo province.

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Graphic shows the varying distances that people from different areas must travel to access distinct categories of places. Analysis is performed using clustering techniques to ingest the location data and attributes and POI visitation analysis is used to highlight the challenges of people living in and around the Maputo province.

DISASTER AND PANDEMIC MANAGEMENT

COVID-19 RESPONSE

The most effective and widespread use of mobile location data in the realm of public health is monitoring the movement patterns of large swathes of people. Indeed, this is a measure that has been adopted by many governments globally in response to the COVID-19 pandemic.

Mobility data can act as an input for Origin-Destination (O-D) matrices – analytical tools that depict the movement of people between different areas. When combined with public health records, O-D analysis can be utilised to estimate the risk of virus transmission between areas with high infection rates and areas with low infection rates. This knowledge can be used to inform data-driven travel restrictions. Additionally, location intelligence can also be employed to determine the effectiveness of travel restrictions – as was the case in Italy in 2020. Finally, location data from smartphones is also used by some contact tracing applications to inform individuals about potential exposures to others with COVID-19.

The COVID-19 pandemic is not the first time decision makers, data scientists, and public health experts use human mobility data to track a disease. A similar tactic was employed in Kenya as early as 2011 to understand how malaria spread through the country.

RESPONSE TO NATURAL DISASTERS

All forms of infrastructure – whether they be roads, commercial buildings, or residential areas – sustain significant damage during natural disasters like wildfires, floods, and earthquakes. Indeed, such phenomena cause large scale evacuations from highly affected areas. The extent and distribution of population displacement can be measured by analysing human mobility data. This approach was adopted by researchers in the aftermath of Gorkha earthquake in 2015 and the Haiti earthquake in 2010. The insights from location intelligence informed the placement of facilities like evacuation shelters and helped position relief personnel where they were most needed.

A reliable way of determining the extent of post-disaster repair and reconstruction efforts is monitoring mobility trends to establish when a significant proportion of displaced individuals return to their homes. Similarly, analysing daily movement patterns in the aftermath of natural disasters provides reliable information on sections of the transportation infrastructure that have sustained significant damage. This is the only reliable means of ensuring local administrators are aware of where to channel their attention and resources – besides manual verification, which can be quite labor-intensive and time consuming.



LEISURE AND TOURISM

REACHING THE RIGHT AUDIENCE

Arts venues often don't have enough information on their audiences to personalise their marketing outreach. Such information includes interests and activities – factors that can be discerned through the analysis of location intelligence. The team at Quadrant isolated 10 theatre events that occurred in Singapore in 2018 and evaluated human mobility data to derive customer insights that can drive personalised marketing.

By combining location data data with demographics, We were able to determine the percentage of theatre enthusiasts residing in different parts of Singapore (with 38% of them living in the central region). We also discovered which other art venues are popular with people who visited theatres. We found that 44% of people who attended 'A Singapore Carol' also visited museums. There are also other theatre events attended by a sizeable proportion of museum patrons. Advertisers can leverage this knowledge to place promotional material in our around museums – thereby improving their outreach to the target demographic.

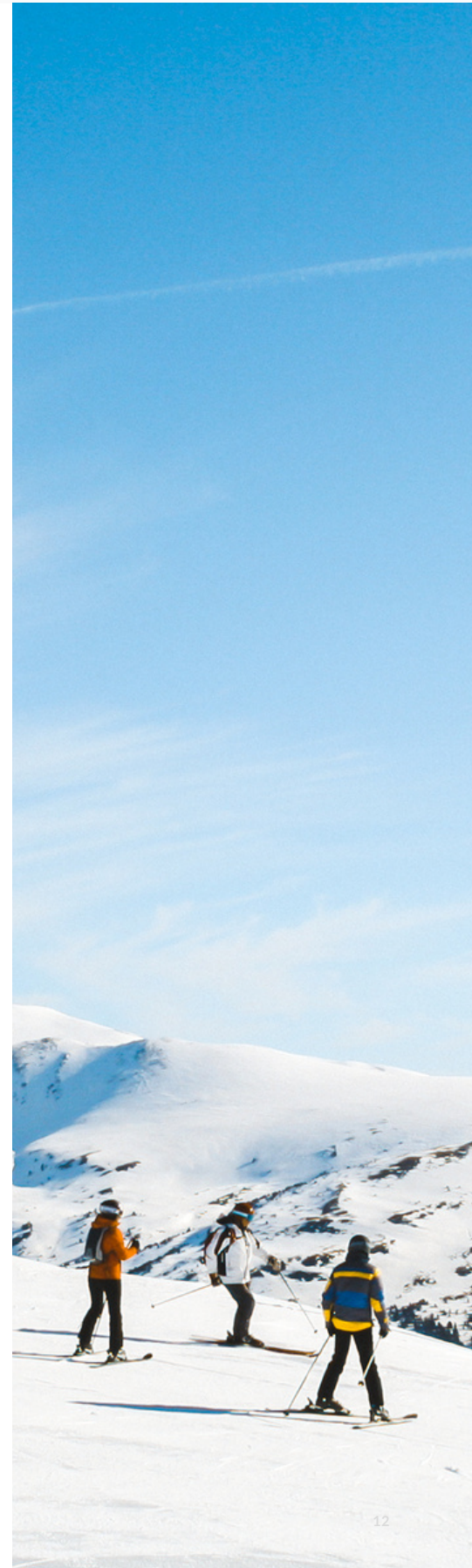
SEASONAL TOURISM MARKETING PROGRAMS

One of our customers, an eminent urban planning firm, was tasked by a leading winter apparel company to gain information on tourists that visited the mountains of Aspen, Colorado. Our client approached us in order to gain location intelligence on tourists that visited Aspen – including where they originated from and how long they spent at each mountain.

The firm was able to geofence each ski slope so that they could be analysed independently and compared thereafter. The mobile location data emanating from within these polygons was combined with device IDs to determine where the skiers came from.

Once the origin of the visitors was determined, postcodes were combined with census data to understand the income levels of the tourists. This information served as a guide to execute marketing campaigns targeted at the relevant audiences.

Our client also utilised the location data from the visitors' devices to evaluate where they spent the most time within Aspen, and whether they were close to competitor outlets during their stay in the town. This information was then used to suggest new retail store locations to the winter apparel company.



REAL-ESTATE

POWERING REAL ESTATE ANALYTICS AND MARKETPLACES

In the real estate industry, human mobility data is leveraged to identify popular sub-regions within a city. This information – when combined with Point-of-Interest (POI) data and census data – can be utilised not just to inform investments but even to deliver more accurate search results for property buyers on property websites.

A client of Quadrant used our platform to collect and analyse custom properties of condominium complexes in Singapore. They used this data as input to power their proprietary real estate analytics platform, providing valuations, demographic information, and more.

Location data, especially when combined with POI data, can radically improve efficiency and user experience on property websites, too.

Buyers can customise their search criteria by selecting POIs (such as child's school, offices, parks, and favourite restaurants) and setting an upper bound for time taken to reach these destinations from their new home. Mobile location datasets – such as those provided by Quadrant – enable estimations of travel time across different types of transportation i.e., car, transit or bike. As such, home-seekers can find properties that are close to the POIs that matter to them by using real-estate platforms like SeLogger.



Location intelligence can help make well-informed business decisions at various stages of growth. It helps businesses identify underserved areas, assess demand, and establish themselves. For already established companies, location intelligence can help maintain continuity by retaining customers. Using these insights, business leaders can create well-informed competitive and growth strategies to encourage the consumption and adoption of their services, boost ROI, influence competitors' customers and more. Consistent, timely, and reliable location data is critical for these analyses to build accurate exposure profiles for businesses and regions.

Quadrant is a global leader in mobile location data, POI data, and corresponding compliance services. Our data is verified, trustworthy, and ready to use, allowing businesses, organisations, and innovators to build tailored solutions for a myriad of real-world problems. Our ability to deliver custom, and on-demand datasets sets us apart from majority of location data players and off-the-shelf solutions. To learn more about Quadrant's data coverage and a free consultation, talk to a data specialist today!

Reach us at:

www.quadrant.io
info@quadrant.io