

References

- [1] D. Lin, W. Broere, and J. Cui, “Metro systems and urban development: Impacts and implications,” *Tunn. Underground Space Technol.*, vol. 125, p. 104509, Oct. 2022, DOI: 10.1016/j.tust.2022.104509.
- [2] Y. H. Kuo, J. M. Leung, and Y. Yan, “Public transport for smart cities: Recent innovations and future challenges,” *Eur. J. Oper. Res.*, vol. 306, no. 3, pp. 1001–1026, Jun. 2023, DOI: 10.1016/j.ejor.2022.11.037.
- [3] Metropolitan Transportation Authority, “The MTA network,” Metropolitan Transportation Authority, New York, NY, USA, 2023. [Online]. Available: <https://new.mta.info/about-us/the-mta-network>
- [4] New York City Independent Budget Office, “We Are Being Held Momentarily: How Much Time and Money Are New York City Subway Riders Losing to Delays?” NYC IBO, New York, NY, USA, 2017. [Online]. Available: <https://ibo.nyc.ny.us/iboreports/we-are-being-held-momentarily-how-much-time-and-money-are-new-york-city-subway-riders-losing-to-delays-october-2017.html>
- [5] B. Lander, “The Crisis Below: An Investigation of the Reliability and Transparency of the MTA’s Subway Performance Reporting,” Office of the Comptroller, New York, NY, USA, 2019. [Online]. Available: <https://comptroller.nyc.gov/reports/the-crisis-below-an-investigation-of-the-reliability-and-transparency-of-the-mtas-subway-performance-reporting/>
- [6] D. Huang, Y. Gu, S. Wang, Z. Liu, and W. Zhang, “A two-phase optimization model for the demand-responsive customized bus network design,” *Transp. Res. Part C Emerg. Technol.*, vol. 111, pp. 1–21, Apr. 2020, DOI: 10.1016/j.trc.2019.10.006.
- [7] H. Yu, X. Sun, W. D. Solvang, and X. Zhao, “Reverse logistics network design for effective management of medical waste in epidemic outbreaks: Insights from the coronavirus disease 2019 (COVID-19) outbreak in Wuhan (China),” *Int. J. Environ. Res. Public Health*, vol. 17, no. 5, p. 1770, Mar. 2020, DOI: 10.3390/ijerph17051770.
- [8] K. An, “Battery electric bus infrastructure planning under demand uncertainty,” *Transp. Res. Part C Emerg. Technol.*, vol. 111, pp. 572–587, Apr. 2020, DOI: 10.1016/j.trc.2019.12.026.
- [9] P. Schiewe and A. Schöbel, “Integrated optimization of sequential processes: General analysis and application to public transport,” *EURO J. Transp. Logist.*, vol. 11, p. 100073, Jan. 2022, DOI: 10.1016/j.ejtl.2022.100073.
- [10] S. S. Perumal, R. M. Lusby, and J. Larsen, “Electric bus planning & scheduling: A review of related problems and methodologies,” *Eur. J. Oper. Res.*, vol. 301, no. 2, pp. 395–413, Jul. 2022, DOI: 10.1016/j.ejor.2022.01.005.
- [11] Y. He, Z. Liu, and Z. Song, “Optimal charging scheduling and management for a fast-charging battery electric bus system,” *Transp. Res. Part E Logist. Transp. Rev.*, vol. 142, p. 102056, Mar. 2020, DOI: 10.1016/j.tre.2020.102056.
- [12] G. J. Polinder, M. Schmidt, and D. Huisman, “Timetabling for strategic passenger railway planning,” *Transp. Res. Part B Methodol.*, vol. 146, pp. 111–135, Apr. 2021, DOI: 10.1016/j.trb.2021.02.004.
- [13] R. Massobrio, S. Nesmachnow, J. Muraña, and B. Dorronsoro, “Learning to optimize timetables for efficient transfers in public transportation systems,” *Appl. Soft Comput.*, vol. 119, p. 108616, Jan. 2022, DOI: 10.1016/j.asoc.2022.108616.

- [14] K. Alamatsaz, S. Hussain, C. Lai, and U. Eicker, “Electric bus scheduling and timetabling, fast charging infrastructure planning, and their impact on the grid: A review,” *Energies*, vol. 15, no. 21, p. 7919, Nov. 2022, DOI: 10.3390/en15217919.
- [15] E. Yao, T. Liu, T. Lu, and Y. Yang, “Optimization of electric vehicle scheduling with multiple vehicle types in public transport,” *Sustain. Cities Soc.*, vol. 52, p. 101862, Jan. 2020, DOI: 10.1016/j.scs.2019.101862.
- [16] M. Stumpe, D. Rößler, G. Schryen, and N. Kliewer, “Study on sensitivity of electric bus systems under simultaneous optimization of charging infrastructure and vehicle schedules,” *EURO J. Transp. Logist.*, vol. 10, p. 100049, Oct. 2021, DOI: 10.1016/j.ejtl.2021.100049.
- [17] W. Wu, Y. Lin, R. Liu, and W. Jin, “The multi-depot electric vehicle scheduling problem with power grid characteristics,” *Transp. Res. Part B Methodol.*, vol. 155, pp. 322–347, Dec. 2022, DOI: 10.1016/j.trb.2021.12.012.
- [18] J. Zhou, X. Xu, J. Long, and J. Ding, “Integrated optimization approach to metro crew scheduling and rostering,” *Transp. Res. Part C Emerg. Technol.*, vol. 123, p. 102975, Feb. 2021, DOI: 10.1016/j.trc.2021.102975.
- [19] J. Zhou, X. Xu, J. Long, and J. Ding, “Metro crew planning with day-off pattern, duty type, and rostering scheme considerations,” *Transp. Res. Part C Emerg. Technol.*, vol. 143, p. 103832, Dec. 2022, DOI: 10.1016/j.trc.2022.103832.
- [20] L. Mertens, L. A. Wolbeck, D. Rößler, L. Xie, and N. Kliewer, “An overview of optimization approaches for scheduling and rostering resources in public transportation,” *arXiv preprint*, arXiv:2310.13425, Oct. 2023. [Online]. Available: <https://arxiv.org/abs/2310.13425>
- [21] N. Alsaleh and B. Farooq, “Interpretable data-driven demand modeling for on-demand transit services,” *Transp. Res. Part A Policy Pract.*, vol. 154, pp. 1–22, Mar. 2021, DOI: 10.1016/j.tra.2021.10.005.
- [22] K. Sparks, J. Piburn, A. Berres, M. Urban, and G. Thakur, “Temporal dynamics of place and mobility,” in *Advances in Scalable and Intelligent Geospatial Analytics*, CRC Press, 2023, pp. 65–79.
- [23] Federal Highway Administration, “National Household Travel Survey,” Washington, DC, USA, 2024. [Online]. Available: <https://nhts.ornl.gov/>
- [24] Federal Transit Administration, “The National Transit Database (NTD),” Washington, DC, USA, 2024. [Online]. Available: <https://www.transit.dot.gov/ntd/>
- [25] Y. Li, L. Yang, H. Shen, and Z. Wu, “Modeling intra-destination travel behavior of tourists through spatio-temporal analysis,” *J. Destin. Mark. Manag.*, vol. 11, pp. 260–269, Sep. 2019, DOI: 10.1016/j.jdmm.2018.04.004.
- [26] L. Ni, X. Wang, X. Chen, and D. Zhang, “Analyzing time-varying trip distributions with a random-effect spatial OD dependence model,” *PLoS One*, vol. 18, no. 1, e0280162, Jan. 2023, DOI: 10.1371/journal.pone.0280162.
- [27] NYC Department of Transportation, “Citywide Mobility Survey,” New York, NY, USA, 2024. [Online]. Available: <https://www.nyc.gov/html/dot/html/about/citywide-mobility-survey.shtml>
- [28] Z. Wang, Y. Zhang, B. Jia, and Z. Gao, “Comparative analysis of usage patterns and underlying determinants for ride-hailing and traditional taxi services: A Chicago case study,” *Transp. Res. Part A Policy Pract.*, vol. 179, p. 103912, Jan. 2024, DOI: 10.1016/j.tra.2023.103912.

- [29] M. B. Ulak, A. Yazici, and M. Aljarrah, "Value of convenience for taxi trips in New York City," *Transp. Res. Part A Policy Pract.*, vol. 142, pp. 85–100, Sep. 2020, DOI: 10.1016/j.tra.2020.10.010.
- [30] C. Liao, C. Chen, Z. Zhang, and H. Xie, "Understanding and visualizing passengers' travel behaviours: A device-free sensing way leveraging taxi trajectory data," *Pers. Ubiquitous Comput.*, pp. 1–13, Aug. 2022, DOI: 10.1007/s00779-022-01683-7.
- [31] M. G. Demissie, L. Kattan, S. Phithakkitnukoon, G. H. de Almeida Correia, M. Veloso, and C. Bento, "Modeling location choice of taxi drivers for passenger pickup using GPS data," *IEEE Intell. Transp. Syst. Mag.*, vol. 13, no. 1, pp. 70–90, Jan. 2021, DOI: 10.1109/MITS.2020.2969251.
- [32] M. A. Ribeiro, D. Gursoy, and O. H. Chi, "Customer acceptance of autonomous vehicles in travel and tourism," *J. Travel Res.*, vol. 61, no. 3, pp. 620–636, Mar. 2022, DOI: 10.1177/00472875211003272.
- [33] K. A. Perrine, K. M. Kockelman, and Y. Huang, "Anticipating long-distance travel shifts due to self-driving vehicles," *J. Transp. Geogr.*, vol. 82, p. 102547, Apr. 2020, DOI: 10.1016/j.jtrangeo.2019.102547.
- [34] G. Pareschi, L. Küng, G. Georges, and K. Boulouchos, "Are travel surveys a good basis for EV models? Validation of simulated charging profiles against empirical data," *Appl. Energy*, vol. 275, p. 115318, Oct. 2020, DOI: 10.1016/j.apenergy.2020.115318.
- [35] Y. Guo and Y. Zhang, "Understanding factors influencing shared e-scooter usage and its impact on auto mode substitution," *Transp. Res. Part D Transp. Environ.*, vol. 99, p. 102991, Mar. 2021, DOI: 10.1016/j.trd.2021.102991.
- [36] U.S. Department of Transportation, "Long Distance Transportation Patterns: Mode Choice," Bureau of Transportation Statistics, Washington, DC, USA, 2011. [Online]. Available: https://www.bts.gov/archive/publications/america_on_the_go/long_distance_transportation_patterns/entire
- [37] M. Katranji, S. Kraiem, L. Moalic, G. Sanmarty, G. Khodabandelou, A. Caminada, and F. H. Selem, "Deep multi-task learning for individuals origin-destination matrices estimation from census data," *Data Min. Knowl. Discov.*, vol. 34, no. 1, pp. 201–230, Jan. 2020, DOI: 10.1007/s10618-019-00660-7.
- [38] A. Ali, "AI-based mode of transportation and destination classification and prediction in origin-destination surveys," M.S. thesis, Dept. Comput. Sci., Concordia Univ., Montreal, QC, Canada, 2022.
- [39] Z. Jin, Y. Chen, C. Li, and Z. Jin, "Trip destination prediction based on hidden Markov model for multi-day global positioning system travel surveys," *Transp. Res. Rec.*, vol. 036119812211079, pp. 1–12, 2022, DOI: 10.1177/03611981221107938.
- [40] H. Gong, C. Chen, E. Bialostozky, and C. T. Lawson, "A GPS/GIS method for travel mode detection in New York City," *Comput. Environ. Urban Syst.*, vol. 36, no. 2, pp. 131–139, Mar. 2012, DOI: 10.1016/j.compenvurbsys.2011.05.003.
- [41] L. Shen and P. R. Stopher, "Review of GPS travel survey and GPS data-processing methods," *Transp. Rev.*, vol. 34, no. 3, pp. 316–341, May 2014, DOI: 10.1080/01441647.2014.903530.
- [42] M.-P. Pelletier, M. Trépanier, and C. Morency, "Smart card data use in public transit: A literature review," *Transp. Res. Part C Emerg. Technol.*, vol. 19, no. 4, pp. 557–578, Aug. 2011, DOI: 10.1016/j.trc.2010.10.003.

- [43] G. Xiao, Q. Cheng, and C. Zhang, "Detecting travel modes using rule-based classification system and Gaussian process classifier," *IEEE Access*, vol. 7, pp. 116741–116752, Aug. 2019, DOI: 10.1109/ACCESS.2019.2935416.
- [44] P. Sivalingam, D. Asirvatham, and K. Chinna, "A travel behaviour model to predict travel behaviour pattern of urban road user using rule-based approach," in *Proc. IEEE 7th Int. Conf. Comput., Eng. Design (ICCED)*, Kuala Lumpur, Malaysia, Aug. 2021, pp. 1–5, DOI: 10.1109/ICCED52941.2021.9585613.
- [45] Q. Zou, X. Yao, P. Zhao, H. Wei, and H. Ren, "Detecting home location and trip purposes for cardholders by mining smart card transaction data in Beijing subway," *Transp.*, vol. 45, pp. 919–944, May 2018, DOI: 10.1007/s11116-016-9767-3.
- [46] A. Alsger, A. Tavassoli, M. Mesbah, L. Ferreira, and M. Hickman, "Public transport trip purpose inference using smart card fare data," *Transp. Res. Part C Emerg. Technol.*, vol. 87, pp. 123–137, Feb. 2018, DOI: 10.1016/j.trc.2017.12.015.
- [47] Q. Gao, J. Molloy, and K. W. Axhausen, "Trip purpose imputation using GPS trajectories with machine learning," *ISPRS Int. J. Geo-Inf.*, vol. 10, no. 11, p. 775, Nov. 2021, DOI: 10.3390/ijgi10110775.
- [48] H. Sun, Y. Chen, Y. Wang, and X. Liu, "Trip purpose inference for tourists by machine learning approaches based on mobile signaling data," *J. Ambient Intell. Humaniz. Comput.*, pp. 1–15, 2023, DOI: 10.1007/s12652-023-04567-6.
- [49] H. Farooqi and M. Mesbah, "Inferring trip purpose by clustering sequences of smart card records," *Transp. Res. Part C Emerg. Technol.*, vol. 127, p. 103131, Feb. 2021, DOI: 10.1016/j.trc.2021.103131.
- [50] E. J. Kim, Y. Kim, and D. K. Kim, "Interpretable machine-learning models for estimating trip purpose in smart card data," *Proc. Inst. Civ. Eng. - Munic. Eng.*, vol. 174, no. 2, pp. 108–117, Jun. 2021, DOI: 10.1680/jmuen.20.00031.
- [51] C. Chen, H. Gong, C. Lawson, and E. Bialostozky, "Evaluating the feasibility of a passive travel survey collection in a complex urban environment: Lessons learned from the New York City case study," *Transp. Res. Part A Policy Pract.*, vol. 44, no. 10, pp. 830–841, Dec. 2010, DOI: 10.1016/j.tra.2010.08.002.
- [52] M. G. S. Oliveira, P. Vovsha, J. Wolf, and M. Mitchell, "Evaluation of two methods for identifying trip purpose in GPS-based household travel surveys," *Transp. Res. Rec.*, vol. 2405, no. 1, pp. 33–41, Dec. 2014, DOI: 10.3141/2405-05.
- [53] L. Gong, X. Liu, L. Wu, and Y. Liu, "Inferring trip purposes and uncovering travel patterns from taxi trajectory data," *Cartogr. Geogr. Inf. Sci.*, vol. 43, no. 2, pp. 103–114, Mar. 2016, DOI: 10.1080/15230406.2015.1014424.
- [54] U.S. Bureau of Labor Statistics, "American Time Use Survey," Washington, DC, USA, 2024. [Online]. Available: <https://www.bls.gov/>
- [55] NYC Office of Technology and Innovation, "Points of Interest," New York, NY, USA, 2024. [Online]. Available: https://data.cityofnewyork.us/City-Government/Points-of-Interest/t95h-5fsr/about_data
- [56] J. E. Anderson, "The gravity model," NBER Working Paper No. 16576, Nat. Bureau Econ. Res., Cambridge, MA, USA, Nov. 2010. [Online]. Available: <http://www.nber.org/papers/w16576>
- [57] Y. Liu, L. Gong, and Q. Tong, "Quantifying the distance effect in spatial interactions," *Acta Sci. Nat. Univ. Pekin.*, vol. 50, no. 3, pp. 526–534, 2014.

- [58] D. Das, “UApredictor: Urban anomaly prediction from spatial-temporal data using graph transformer neural network,” in *Proc. Int. Joint Conf. Neural Netw. (IJCNN)*, Jul. 2022, pp. 1–8, DOI: 10.1109/IJCNN55064.2022.9892135.
- [59] P. Kaszczyszyn and N. Sypion-Dutkowska, “Walking access to public transportation stops for city residents. A comparison of methods,” *Sustainability*, vol. 11, no. 14, p. 3758, Jul. 2019, DOI: 10.3390/su11143758.
- [60] R. I. Sarker, M. Mailer, and S. K. Sikder, “Walking to a public transport station: Empirical evidence on willingness and acceptance in Munich, Germany,” *Smart Sustain. Built Environ.*, vol. 9, no. 1, pp. 38–53, Jan. 2020, DOI: 10.1108/SASBE-06-2018-0032.
- [61] L. Li, T. Gao, Y. Wang, and Y. Jin, “Evaluation of public transportation station area accessibility based on walking perception,” *Int. J. Transp. Sci. Technol.*, vol. 12, no. 2, pp. 640–651, Jun. 2023, DOI: 10.1016/j.ijtst.2022.10.007.
- [62] G. Georgiadis, A. Kopsacheilis, I. M. Andreadis, and I. Politis, “Analyzing efficiency and built environment factors for achieving convenient access to public transport: A Europe-wide DEA application,” *Environ. Sci. Policy*, vol. 158, p. 103792, Jan. 2024, DOI: 10.1016/j.envsci.2023.103792.
- [63] S. Burbidge and K. Goulias, “Active travel behavior,” *Transp. Lett.*, vol. 1, no. 2, pp. 147–167, Apr. 2009, DOI: 10.3328/TL.2009.01.02.147-167.
- [64] D. D. Dhananjaya and T. Sivakumar, “Enhancing the POI data for trip purpose inference using machine learning techniques,” in *Proc. IEEE 25th Int. Conf. Intell. Transp. Syst. (ITSC)*, Oct. 2022, pp. 3496–3501, DOI: 10.1109/ITSC55140.2022.9922113.
- [65] Centers for Disease Control and Prevention, “Weekly trends in number of COVID-19 cases in the United States reported to CDC,” Atlanta, GA, USA, 2022. [Online]. Available: https://covid.cdc.gov/covid-data-tracker/#trends_weeklycases_select_00
- [66] Metropolitan Transportation Authority, “Subway and bus ridership for 2019,” New York, NY, USA, 2019. [Online]. Available: <https://new.mta.info/agency/new-york-city-transit/subway-bus-ridership-2019>
- [67] Metropolitan Transportation Authority, “Turnstile data,” New York, NY, USA, 2024. [Online]. Available: <http://web.mta.info/developers/turnstile.html>
- [68] Google, “Places API,” 2024. [Online]. Available: <https://developers.google.com/maps/documentation/places/web-service/overview>
- [69] A. Godzik, “The structural alignment between two proteins: is there a unique answer?” *Protein Sci.*, vol. 5, no. 7, pp. 1325–1338, Jul. 1996, DOI: 10.1002/pro.5560050718.
- [70] Y. Wu, E. Winston, D. Kaushik, and Z. Lipton, “Domain adaptation with asymmetrically-relaxed distribution alignment,” in *Proc. Int. Conf. Mach. Learn. (ICML)*, Jul. 2019, pp. 6872–6881. [Online]. Available: <https://proceedings.mlr.press/v97/wu19j.html>
- [71] M. A. Cuomo, “Governor Cuomo signs the ‘New York State on PAUSE’ Executive Order,” Mar. 2020. [Online]. Available: <https://www.governor.ny.gov/news/governor-cuomo-signs-new-york-state-pause-executive-order>
- [72] NYC Mayor’s Office, “Mayor de Blasio issues state of emergency,” Mar. 2020. [Online]. Available: <https://www.nyc.gov/office-of-the-mayor/news/138-20/mayor-de-blasio-issues-state-emergency>
- [73] L. Zhang and K. Liu, “Unsupervised origin-destination flow estimation for analyzing COVID-19 impact on public transport mobility,” *Cities*, vol. 151, p. 105086, Mar. 2024, DOI: 10.1016/j.cities.2023.105086.

- [74] World Health Organization, “Daily new confirmed COVID-19 cases and deaths, United States,” Geneva, Switzerland, 2025. [Online]. Available: <https://ourworldindata.org/grapher/daily-covid-cases-deaths-7-day-ra?time=earliest..latest&country=~USA>
- [75] B. Teirlinck, “Access to health care in NYC: Borough inequality + the pandemic effect,” NYC Economic Development Corporation, New York, NY, USA, 2025. [Online]. Available: <https://edc.nyc/research-insights/access-health-care-nyc-borough-inequality-pandemic-effect>