Transit Origin-Destination Survey Flow Analysis
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ABSTRACT TEXT: A well-balanced transportation system with a mix of multimodal options including high quality public transit is vital for the future of growing regions around the country. As part of the development of Comprehensive Operational Analyses (COA) and Transit Development Plans (TDP), it is critical to understand how people are currently traveling, in addition to analyses of service productivity and regional travel patterns, to put forth recommendations for future transit service.

An understanding of the travel patterns currently utilized by transit riders enables planners to not only design a better system for existing passengers but also to create a system the entire community can use. Generally conducted approximately once every three years by transit agencies, origin-destination (OD) surveys can effectively illustrate existing transit travel patterns. Therefore, as part of our COA and TDP work, we take the basic data provided to the transit agency travel flows tied to a route or a zip code, but not a complete trip and use that to determine actual OD patterns using the current system fixed-routes. In many growing and changing regions, where congestion mitigation measures and mobility options are sorely warranted, the ability to adequately visualize, analyze, and act on OD survey results is of paramount importance. For each passenger surveyed, the OD information reveals where a trip began and ended, the trip purposes, and additional demographic information of the rider.

However, because OD surveys often field a very large number of responses, the analysis process can elicit particular challenges. To create a mechanism that is easily digestible for the planner and public alike, we developed a method of aggregating OD survey data by geographic unit to summarize results in a clear, aesthetically useful fashion.

The analysis method begins by establishing districts throughout a given study area. Districts are defined as any grouping of similar geographic units, including clusters of adjacent Transportation Analysis Zones, Census tracts or block groups, or major activity centers. Next, for each individual survey trip’s origin and destination, latitude-longitude coordinates are determined and then related to each district. This allows for the creation of individual travel flows between districts in which travel activity has occurred. Trip flows are then aggregated based upon the districts they connect, with the direction of flow disregarded. The resulting visualization of district-to-district travel flow connections allows for a much clearer look at the relative prevalence of transit travel patterns across the region than would be the case if each original origin-destination line were plotted individually.

Leveraging Big Data to Improve Operational Performance, Reliability, and Efficiency
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ABSTRACT TEXT: Transit agencies have a wealth of data today coming from CAD/AVL systems, APC sensors, smart cards, and more. While this data is essential to monitor and optimize performance, having too much data can be complicated to analyze and use.

The presentation will explore how Silicon Valley’s Santa Clara Valley Transportation Authority is using public-private partnerships with the Swiftly to analyze millions of data points in seconds so that may discover performance problems and improve service reliability.
Title VI Service Equity Analysis
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ABSTRACT TEXT: Small transit providers often lack the resources or technical skills to perform high-level analyses of their routes and transit system. Federal requirements under Title VI mandate that agencies in an area with a population over 200,000 (Transportation Management Areas) and 50 or more vehicles in fixed route service must complete a service and fare equity analysis. A service equity analysis is an assessment conducted by a transit provider to determine whether route changes, either eliminations or changes, will result in a disparate impact on Title VI-protected populations. The two methodologies presented below use Census population data and ridership survey data to simplify service equity analyses. These methodologies are simple enough to be performed by non-GIS experts at transit agencies with the bare minimum knowledge of ArcGIS software and tools.

The first scenario uses demographic data from the Census, American Community Survey, or Longitudinal Employer-Household Dynamics (LEHD) data to make rough estimates about populations served by transit. The demographic data must be converted and displayed in ArcGIS. The data can be drawn at the block group, census tract, or traffic analysis zone (TAZ) level. The data required includes the total population, minority population, low-income population, and employment information. The information collected will be used to determine if a route change or elimination would cause a disparate impact on one of the protected populations.

The second scenario utilizes ridership survey data from the region to create estimates of the population impacted by route change or elimination. This method is more accurate than the method described in the first scenario, as it uses actual ridership data rather than estimated data based on local populations. The ridership data must be collected by route in order to compare the minority and low-income populations riding the impacted routes with the minority and low-income populations of the system. The ridership data for the entire transit system must be compared to the ridership of the route being changed or eliminated. First, this analysis calculates the percentage of low-income riders and minority riders using the transit system compared to overall ridership for both average weekdays and average weekend days. Then, the percentage of low-income riders and minority riders on a particular route in the transit system for both average weekdays and average weekend days are calculated. These percentages are then compared to the percentage of low-income and minority riders in the overall system. If the difference in percentage of low-income and minority riders utilizing the selected route and the overall transit system is larger than the locally determined threshold, changing or eliminating the route would cause a disparate impact on these protected populations.