Data Visualization Project
Livability Dashboard By ZIP Code

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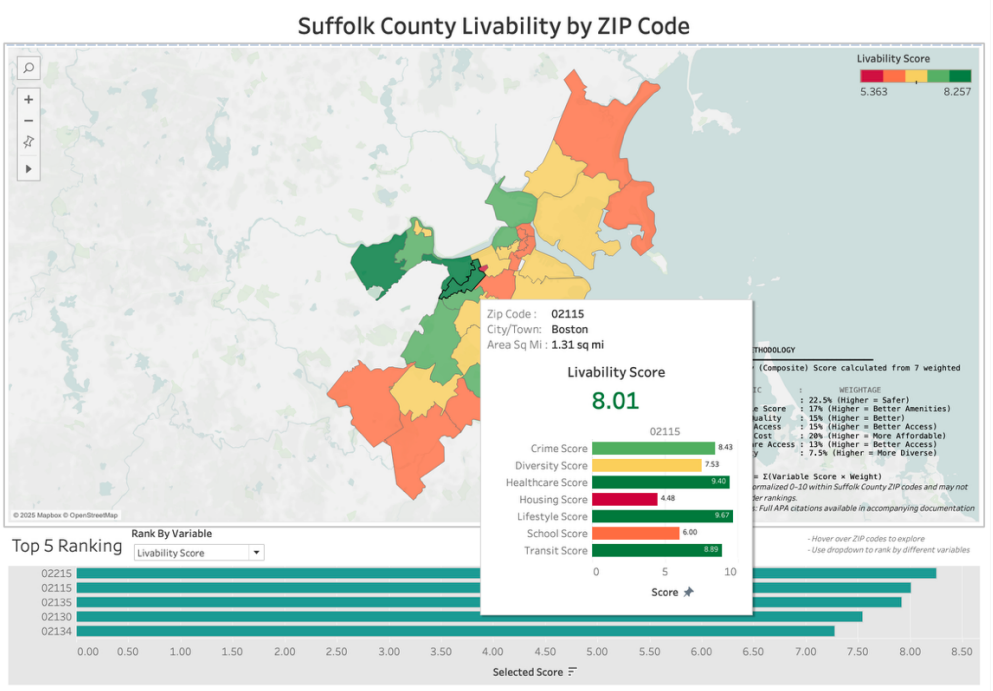
Executive Summary

This project delivers an interactive Tableau dashboard analyzing livability across 34 ZIP codes in Suffolk County, Massachusetts. By combining seven variables from six authoritative data sources, it generates a 0-10 composite score for objective neighborhood comparison. Key innovations include a viz-in-tooltip feature that reveals detailed breakdowns on map hover and interactive ranking parameters that let users explore metrics by preference. The dashboard transforms complex multi-dimensional data into actionable insights for prospective residents, urban planners, and real estate professionals.



Methodology

- **Variable Selection & Weighting:**

Seven variables were selected based on quality-of-life research and weighted by universal impact:

Variable	Weight	Data Source	Metric
Crime Score	22.5%	BostonPD	Crimes/sq mi (inverted)
Lifestyle Score	17.0%	Niche.com	Nightlife + Outdoor Activities + Health & Fitness average
School Quality	15.0%	Niche.com	Letter grade conversion
Transit Access	15.0%	MBTA GTFS	Stops count + Density
Healthcare Access	13.0%	CMS	Distance + Hospital density
Housing Costs	10.0%	Census ACS	Home value + rent (inverted)
Diversity Score	7.5%	Census ACS	Shannon Diversity Index

- **Weighting Rationale:**

Seven variables were selected based on quality-of-life research and weighted by universal impact:

1. **Crime (22.5%)** – Highest Priority
    a. Safety is foundational to all quality-of-life factors
    b. Universal concern across all demographics
    c. Directly affects daily decisions and wellbeing
2. **Lifestyle (17%)** - Second highest
    a. Daily satisfaction compounds over time
    b. Modern urban residents prioritize amenities highly
    c. Mental health tied to neighborhood character
3. **Schools (15%) & Transit (15%)** - Tied importance
    a. Schools: Critical for 60% of households with children
    b. Transit: Essential for sustainable living in urban environment
    c. Both enable economic mobility and access
4. **Healthcare (13%)** - Essential service

   a. Basic need, particularly for families and elderly
   b. Note: Limited variation in Suffolk (Boston's hospital concentration)
5. **Housing (10%)** - Lower because income-relative
   a. Affordability depends on personal income (not captured)
   b. Urban residents demonstrate willingness to pay premiums
   c. Users can filter by housing when prioritizing cost
6. **Diversity (7.5%)** - Most subjective
   a. Highly individual preference
   b. Cultural enrichment but less logistically determinant

- **Scoring Methodology:**

  Normalization: All variables scaled 0-10 relative to Suffolk County only

  Missing Data: Weights auto-adjust proportionally when variables unavailable

  Direction:

  - Crime, Housing: **Inverted** (lower value = higher score)
  - All others: **Direct** (higher value = higher score)

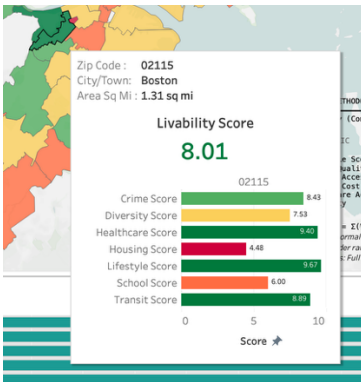
  Composite Formula:

  $composite = (crime \times 0.225) + (lifestyle \times 0.170) + (school \times 0.150) + (transit \times 0.150) + (healthcare \times 0.130) + (housing \times 0.100) + (diversity \times 0.075)$

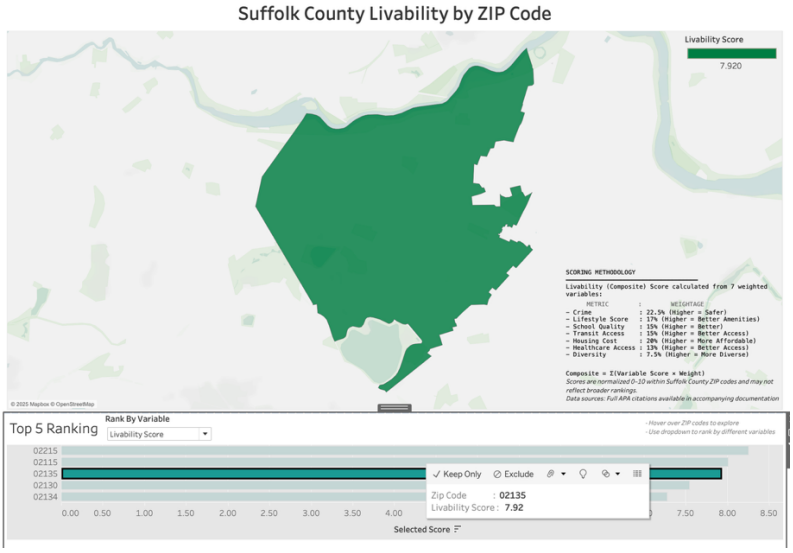
Dashboard Design & Analysis

The dashboard employs an "overview first, details on demand" philosophy through three integrated visualizations:

- a choropleth map color-coding 34 ZIP codes by composite score
- a viz-in-tooltip feature displaying detailed breakdowns on hover, and
- a Top 5 rankings panel with interactive parameter control.



The viz-in-tooltip—an advanced Tableau technique—solves the fundamental tension between comprehensive information and clean design by keeping the main view uncluttered while providing full 7-variable breakdowns exactly when users need them. This, combined with the "Rank By Variable" dropdown that dynamically updates rankings by any metric, makes the dashboard versatile for diverse users: families can prioritize schools, young professionals can focus on lifestyle, and budget-conscious users can filter by housing affordability.



Analysis of the data reveals clear geographic patterns and trade-offs across Suffolk County's score range. The most interesting finding: healthcare shows minimal variation (all ZIPs 7.0-9.5) due to Boston's concentration of world-class hospitals, making it less discriminating than other variables. In addition, trade-

offs are also evident—location vs. cost, transit vs. space, safety vs. diversity—validating that no neighborhood excels universally and the "best" choice depends on individual priorities.

Challenges & Solutions

The project navigated the following technical challenges through pragmatic solutions:

1. Census API reliability—implemented error handling with synthetic fallback data for special ZIPs, flagged with source column for transparency.
2. Niche data accessibility—manually collected 136 data points (34 ZIPs × 4 metrics) into standardized CSV, verified against website.
3. Tooltip clutter—deployed viz-in-tooltip with grouped bar chart to display 7 variables cleanly using visual encoding instead of text lists.
4. Weighting subjectivity—based weights on quality-of-life research with transparent documentation, while providing ranking tool for users to effectively override composite by filtering on any single variable.

These solutions prioritized usability and transparency over theoretical perfection, recognizing that real-world data visualization requires balancing methodological rigor with practical constraints.

Conclusion

The project reinforced that effective data visualization requires balancing analytical rigor with practical usability—the most sophisticated methodology means nothing if users can't understand it. The following learnings emerged:

1. normalization scope (local vs. national) fundamentally changes interpretation and must be explicitly communicated
2. real data demands pragmatic solutions—APIs fail, websites evolve, and perfect data rarely exists
3. user experience should drive design decisions (viz-in-tooltip over permanent clutter)

Future enhancements can include customizable weight sliders for personalized scoring, temporal trend analysis, walkability integration, and commute time modeling to major employment centers—capabilities that would transform the tool from snapshot to dynamic decision-support system.

In conclusion, the Suffolk County Livability Dashboard successfully demonstrates the complete data visualization workflow from multi-source collection through interactive presentation, synthesizing 34 ZIP codes × 7 variables into an intuitive decision-support tool. By combining rigorous quantitative methods (Shannon Diversity Index, weighted composite scoring, spatial analysis) with innovative visualization design (viz-in-tooltip, parameter-driven exploration), the project addresses a genuine real-world need: transforming the traditionally subjective process of neighborhood selection into a data-informed decision. Most importantly, it acknowledges that quantitative scores complement but don't replace personal judgment—the dashboard serves as a starting point for research, not a definitive answer. This balance between analytical depth and humble scope represents the core achievement: making complex data accessible, actionable, and honest about its limitations.

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