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Using Data as a Medium to Visualize Musical Emotion

At its core, this project grapples with a fundamental question: How can data visualization reveal what numerical metrics alone cannot show about music's emotional power? The Top Hits Spotify dataset (2000-2019, N=2,603) provides valence, energy, danceability, and tempo measurements - precise but reductive representations of musical experience. My challenge was to transform these cold metrics into a visual narrative that honors music's capacity to evoke joy, melancholy, and energy while still maintaining analytical rigor. The process became its own revelation. Cleaning the data (handling missing values, normalizing scales) forced me to confront Spotify's algorithmic interpretations - why should "valence" range from 0-1 when emotional responses are far more nuanced? Selecting valence and energy as primary axes while using tempo and year as structural elements wasn't just a technical choice, but a philosophical stance about what aspects of musical experience might be meaningfully visualized. The static radial plot emerged as my argument about temporal emotional patterns in popular music, while the interactive galaxy explorer became an invitation for viewers to challenge my interpretations and form their own.

The static visualization represents my first definitive argument about what the data reveals – a bold statement about how musical emotion has evolved across two decades of Billboard hits. Choosing a radial format was never merely an aesthetic decision; it emerged from my fundamental question: How can we visualize musical mood in a way that honors both its temporal progression and cyclical nature? The spiral layout became my answer – a visual metaphor that captures how musical trends both move forward and echo across time. Every design choice here serves a dual purpose – both analytical and rhetorical. The radial distribution by year (2000 at the top, spiraling outward to 2019) imposes chronological order while the energy-based radius creates emotional topography. Color transitions from cool blues to warm yellows don't just indicate valence scores – they perform the emotional journey from melancholy to joy. Dot sizes scaling with tempo create a visual rhythm that pulses across the visualization, making tempo fluctuations felt rather than just seen. The development process revealed crucial insights about musical evolution. The outward drift of tracks shows increasing energy levels in popular music, while valence clusters reveal surprising emotional concentrations – like the dense pocket of high-valence songs around 2011-2013 coinciding with the peak of "feel-good" pop. Strategic annotations highlight these discoveries while leaving space for viewers to make their own connections.

The evolution of the interactive visualization embodies the most profound lesson of this project: that technical constraints often lead to conceptual breakthroughs. My initial vision—a dynamic radial plot extending the static visualization—collapsed under the weight of Observable's syntax quirks and my own coding limitations. Yet these failures forced me to reconsider my fundamental question: How might interactivity reveal different insights than static representation? The answer emerged not through stubborn persistence with my original design, but through surrendering to the data's need for a different kind of space—one that privileged

emotional connections over temporal precision. The "Mood Galaxy" that resulted from this pivot represents a fundamentally different mode of engagement. Where the static spiral argues, the xgalaxy inquires. Its force-directed layout (after countless adjustments to alpha decay and collision parameters) creates organic clusters that no predetermined coordinate system could—songs attracting and repelling based on their emotional profiles. The shift from circular timeline to cosmic scatter plot wasn't just a technical workaround; it reframed the entire project's inquiry. Now valence dictates color (violet melancholy to golden joy), energy controls movement velocity, and tempo determines star size, creating a system where musical qualities perform their meaning. User testing revealed the galaxy's unique strengths. One participant discovered that filtering for high danceability but low valence surfaced a trove of melancholic electronic music—a counterintuitive pattern obscured in the static visualization. Another noted how adjusting the energy slider made certain songs "pulsate" differently, creating an almost synesthetic experience. These emergent discoveries validated the galaxy's purpose: not to present conclusions, but to create conditions for unexpected revelations.

This is ultimately a story about mediation - between data and feeling, between my perspective as analyst and the viewer's subjective experience. Each design decision, from color palette choices to force simulation parameters, represents a carefully considered translation of numbers into visual language. The visualizations don't just present findings; they enact the very process of interpretation that turns raw data into meaningful insight. What began as a dataset of top Billboard hits became an exploration of how visualization can help us see - and feel - the human stories hidden within structured data.

References:
- ➢ Dataset: https://www.kaggle.com/datasets/paradisejoy/top-hits-spotify-from-20002019
- ➢ Static Plot: https://observablehq.com/d/db9202e0ec47c03e
- ➢ Interactive Plot: https://observablehq.com/d/88776977f67c3003