

Measuring Musical Sampling Impact Through Network Analysis



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Motivation and Goal

- Musical Sampling** is the act of taking a portion of an existing recording and using it in a new recording.
 
- Sampling can inform listeners of the artist's level of **influence** on other musicians in the community
- Explore relationships between **influential artists/genres** and determine which sample/are sampled the most

Related Work

- Network Analysis and Rank of Sample-Based Music (Bryan and Wang, 2011) [1]**
 - Found relative flow of samples between genres
 - No intra-genre vs. inter-genre analysis
- Influence Networks in Popular Music (Alban, 2015) [2]**
 - Built influence relationships based on harmonic features
 - No temporal analysis

Approach

- Build directed graphs from WhoSampled database (categorized by genre and time period) to indicate sample usage
- Analyze intra-genre and inter-genre sampling activity over time
- Unique Edge Property: Sampled audio elements (new property in dataset)

Acknowledgments

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Implementation

Use 30,000 data points from WhoSampled Database



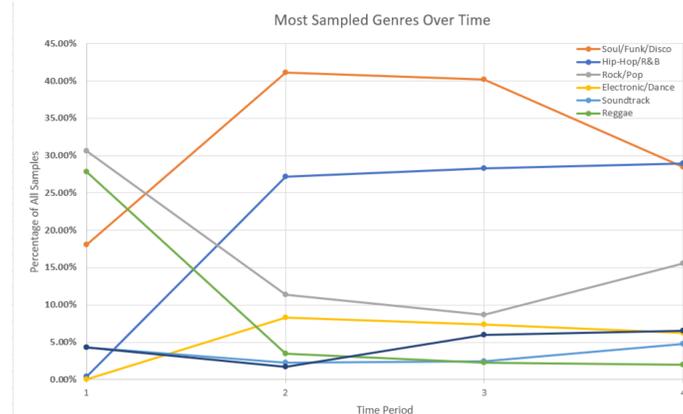
Build directed graphs with artists + audio elements on edges



Evaluate using:

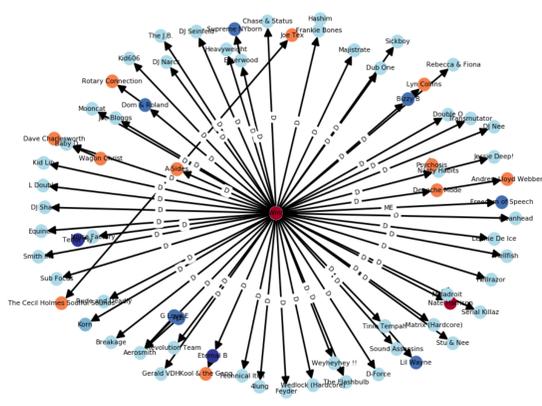
- Statistical Influence:** Compare sampling properties like genres and temporally analyze for patterns
- Centrality Influence:** Measure artist influence as defined by type of centrality

Results (Statistical Influence)



- The most popular sampling genre has become the most sampled genre

Ego Graph for 2nd Most-Sampled Artist in Network (The Winstons)



- Audio Element data from WhoSampled was not detailed enough!

Future Work

- Predict the types of samples likely to be found in a song based on musical properties
 - Aid music sampling identification software by acting as a false positive check

Results (Centrality Influence)

In-Degree Centrality
(Calculates the fraction of nodes from the entire graph that the node is connected to)

Year	Overall	1980's	1990's	2000's
Top 5 Artists	1. James Brown	1. James Brown	1. James Brown	1. James Brown
	2. The Winstons	2. Beside	2. Public Enemy	2. The Winstons
	3. Public Enemy	3. Run-DMC	3. The Winstons	3. The Notorious B.I.G.
	4. Lyn Collins	4. Public Enemy	4. Lyn Collins	4. Beside
	5. Beside	5. Kurtis Blow	5. Run-DMC	5. Public Enemy

- James Brown occupies 9/10 first-place rankings, implying great influence on neighbors and the community at-large

PageRank
(Observes neighbor centrality and edge directionality)

Year	Overall	1980's	1990's	2000's
Top 5 Artists	1. James Brown	1. James Brown	1. James Brown	1. Run-DMC
	2. Lyn Collins	2. Fred Wesley	2. Lyn Collins	2. Public Enemy
	3. Afrika Bambaataa	3. The J.B.'s	3. Afrika Bambaataa	3. The Notorious B.I.G.
	4. Public Enemy	4. Afrika Bambaataa	4. Public Enemy	4. James Brown
	5. The Winstons	5. Beside	5. The Winstons	5. Beside

- Hip-Hop/R&B and Soul/Funk/Disco artists occupy all positions in the centrality rankings

Conclusion

- Soul/Funk/Disco is the **most influential genre** overall but Hip-Hop/R&B has recently challenged this
- James Brown is **one of the most influential artists** throughout all eras of music
- Intra-genre influences** are strong!
- Artists tend to sample **Multiple Elements** of a song OR just Vocals BUT **no genre-based patterns** emerged

References

- N. J. Bryan and G. Wang, "Musical influence network analysis and rank of sample-based music," in ISMIR, 2011.
- M. G. Albán, V. Choksi, and S. B. Tsai, "Cs 224 w final report: Influence networks in popular music," 2015.