Hellenic Complex Systems Laboratory

Network of Musical Instruments for Rhythm Accompaniment

Technical Report XV

Chrysavgi Chatzimichail and Aristides T. Hatjimihail
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WOLFRAM Demonstrations Project

Network of Musical Instruments for Rhythm Accompaniment

Chrysavgi Chatzimichail [a] and Aristides T. Hatjimihail [a]

[a] Hellenic Complex Systems Laboratory

Search Terms: network, graph, music, popular songs of Smyrna, musical instruments, rhythm accompaniment instruments, recordings

Short Description of the Demonstration

This Demonstration plots a network encoding musical instruments used for rhythm accompaniment. The data consists of 100 recordings of 21 popular songs of Smyrna in nine-beat rhythms. You can choose various measures. The results are also presented in tables and scatter plots.

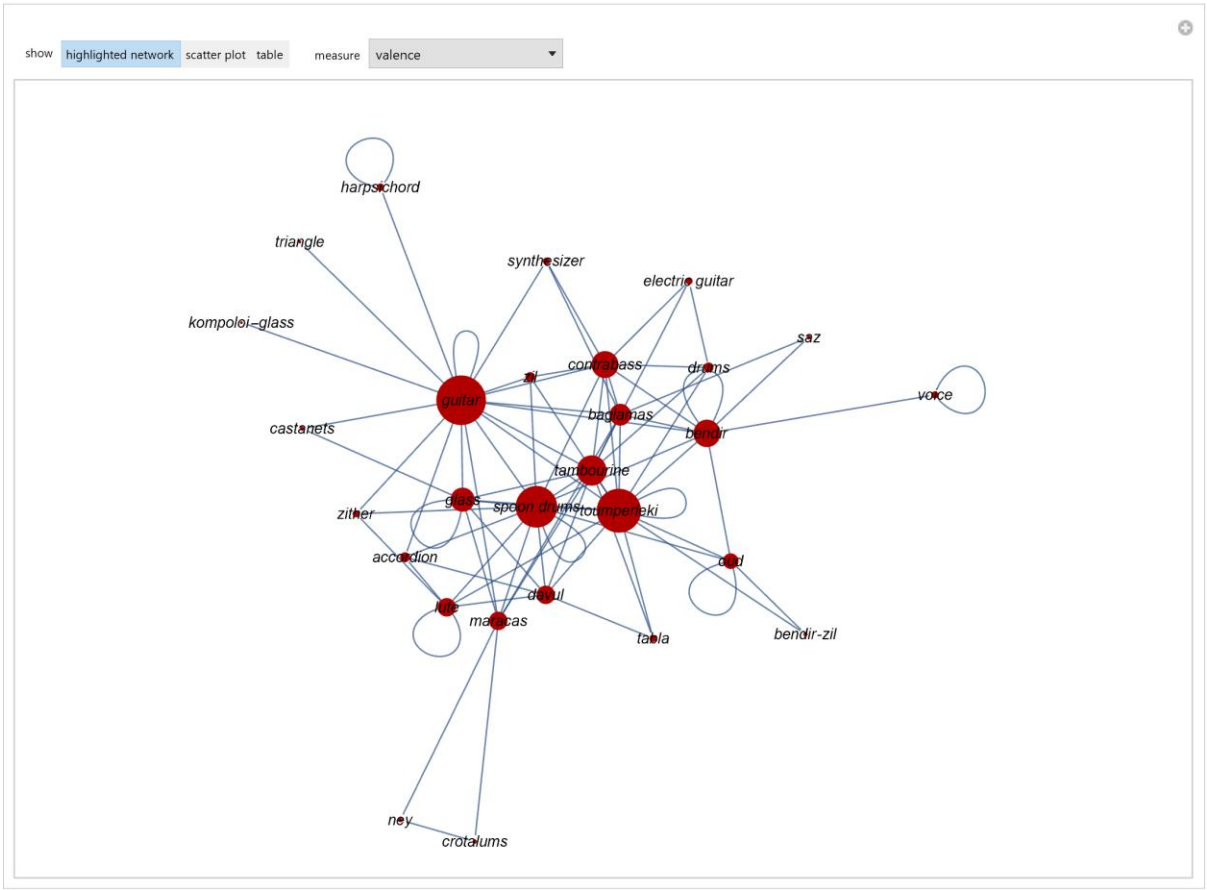

Figure 1: *A network encoding musical instruments used for rhythm accompaniment in 100 recordings of 21 popular songs of Smyrna in nine-beat rhythms. The surface of each highlighted vertex is proportional to its valence.*

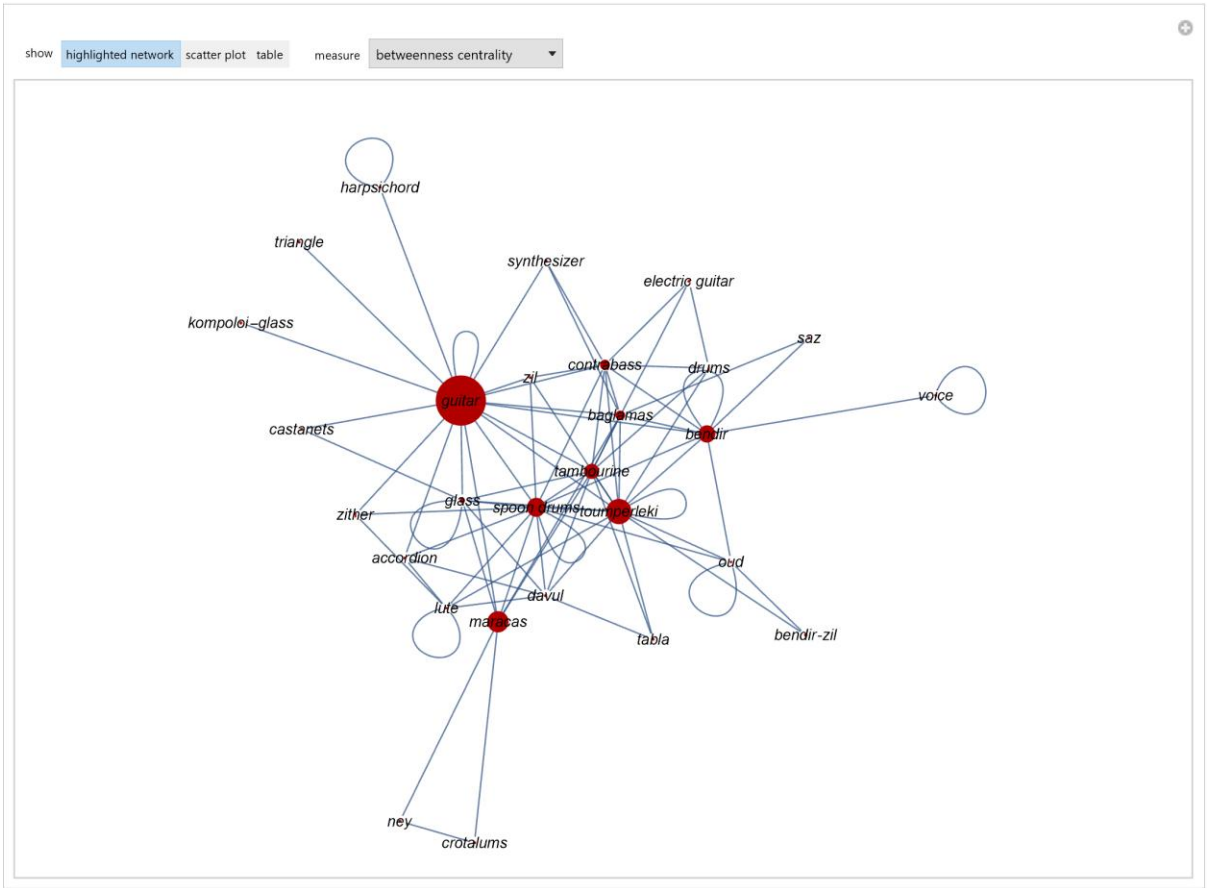

Figure 2: *A network encoding musical instruments used for rhythm accompaniment in 100 recordings of 21 popular songs of Smyrna in nine-beat rhythms. The surface of each highlighted vertex is proportional to its degree centrality.*

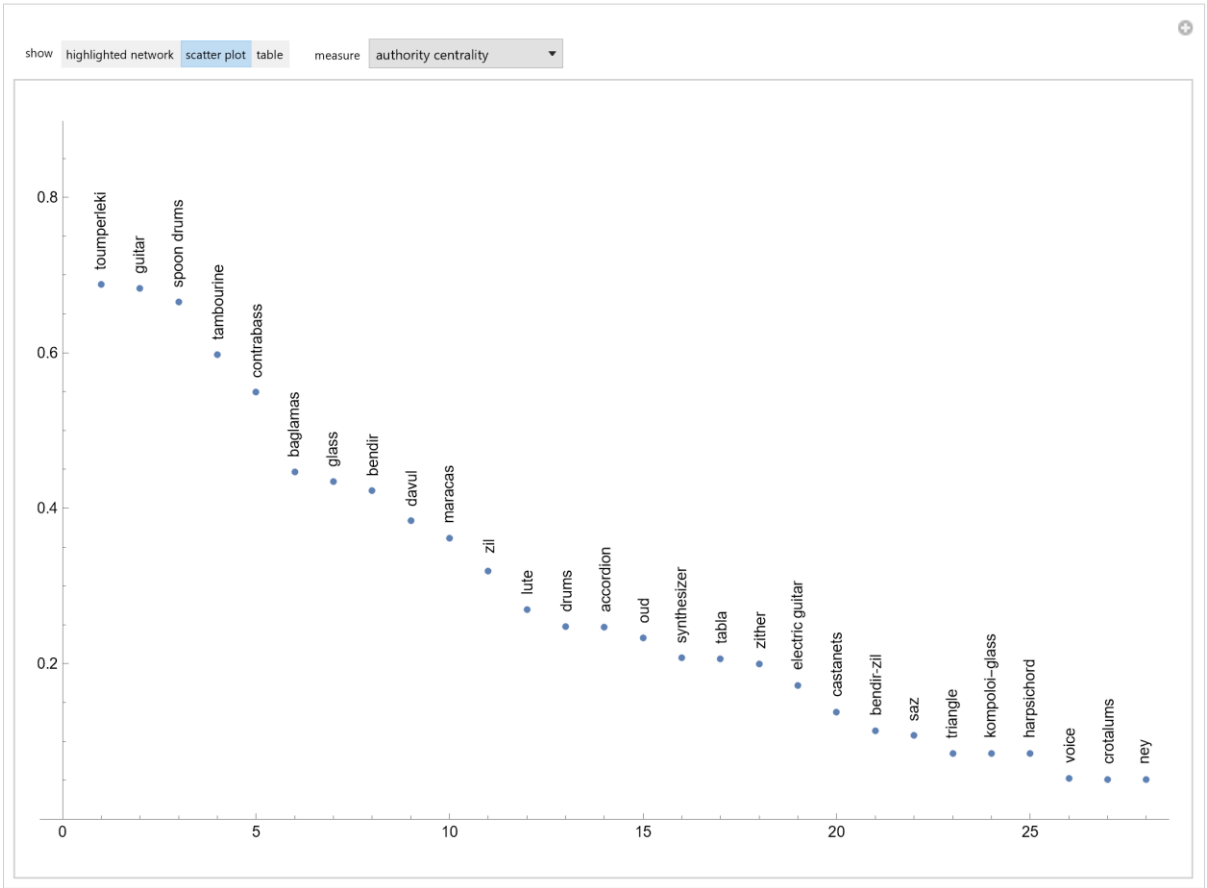

Figure 3: *A scatterplot of the closeness centralities of a network encoding musical instruments used for rhythm accompaniment in 100 recordings of 21 popular songs of Smyrna in nine-beat rhythms.*

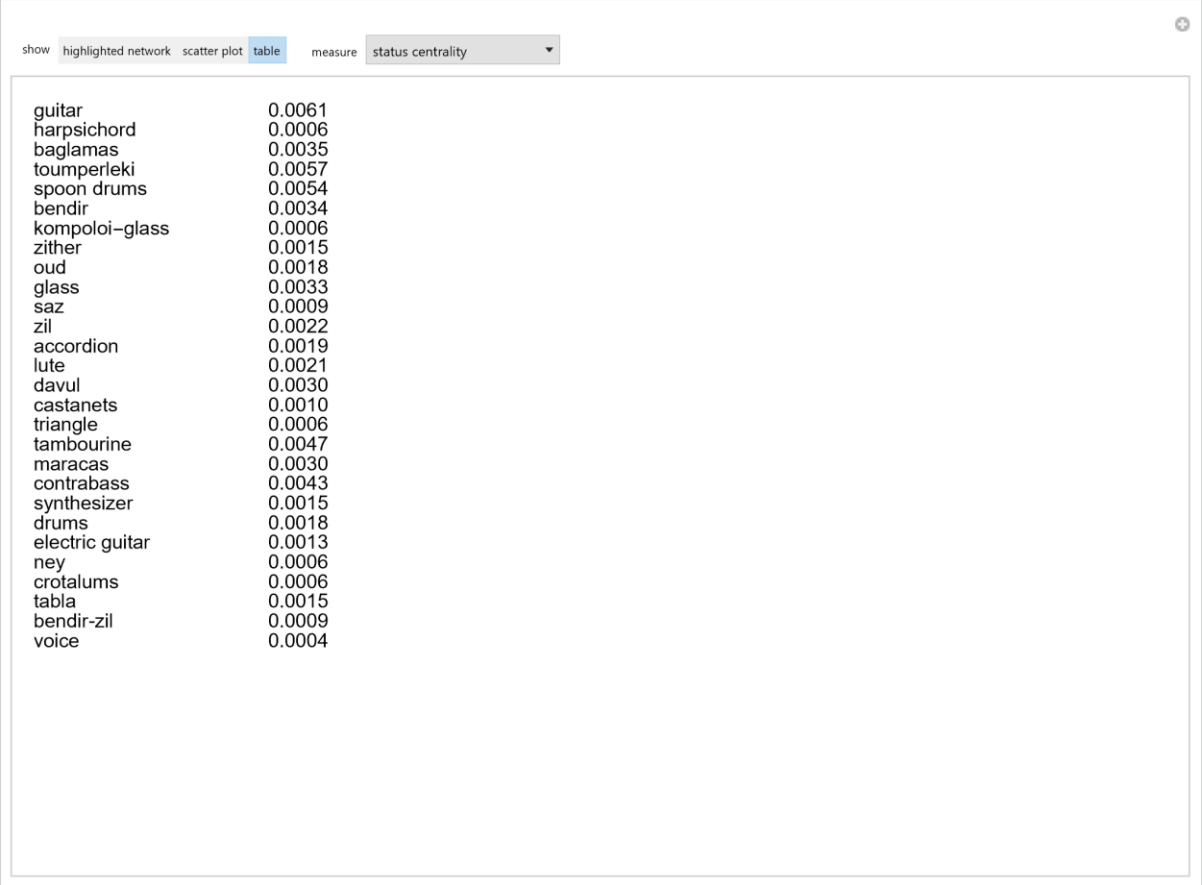

Figure 4: *A table of the status centralities of a network encoding musical instruments used for rhythm accompaniment in 100 recordings of 21 popular songs of Smyrna in nine-beat rhythms.*

Details

The following musical instruments used for rhythm accompaniment were considered: guitar, toumperleki, spoon drums, bendir, baglamas, contrabass, oud, harpsichord, glass, zil, tambourine, lute, maracas, davul, saz, zither, bendir with zil (bendir-zil), drums, castanets, accordion, kompoloi with a glass (kompoloi-glass), synthesizer, tabla, crotalums, ney, electric guitar, and triangle, as well as the voice.

The network encodes the use of these musical instruments in the recordings, either alone or in combination. Each vertex of the network represents an instrument. If an instrument was used alone, it is connected to itself with a loop. If it was used in combination with any other instruments, it is connected to each of them with an edge. The network is weighted. The weight of each loop or edge is the frequency of use for each instrument or combination of instruments in the recordings. The surface of each highlighted vertex is proportional to its respective measure. The calculated measures are the valences, the closeness, betweenness, degree, radiality, eccentricity, hub, authority, eigenvector and status centralities, the page ranks, the local clustering coefficients and the mean neighbor degrees .

As far as we know, this Demonstration presents a novel method for studying the characteristics of musical instruments.

Reference

[1] C. Chatzimichail, "The Popular Songs of Smyrna in Nine Beat Rhythms Before and After the Destruction of Smyrna," thesis, Department of Traditional Music, Technological Educational Institute of Epirus, Greece, 2017. DOI: 10.17605/OSF.IO/WEK3Q. Available at: https://thesiscommons.org/wek3q/

Source Code

Programming language: Wolfram Language

Availability: The updated source code is available at: https://www.hcsl.com/Tools/Demonstrations/NetworkOfMusicalInstrumentsForRhythmAccompaniment.nb

Software Requirements

Operating systems: Microsoft Windows, Linux, Apple macOS and iOS

Other software requirements: Wolfram Player®, freely available at: https://www.wolfram.com/player/ or Wolfram Mathematica®.

System Requirements

Processor: x86-64 compatible CPU.

System memory (RAM): 4GB+ recommended.

Permanent Citation:

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