Using Social Network Techniques to Visualize Structured and Unstructured Activities of Latino Youth

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Abstract

Involvement in structured and unstructured activities has positive effects on academic achievement for Latino youth. In order for school staff to be effective in crafting intervention strategies, it is important to have a holistic picture of the culture of activities that students are involved in. Social Network Analysis (SNA) offers several methods for visualizing relational data. In this poster, we highlight a strategy to visualize the involvement data of Latino youth. Using GEARUP data on 10th grade Latino youth we construct a two-mode affiliation matrix of youth by activity. We then visualize this data using Gephi, which is an open source data visualization application. Results of the visualization provide a holistic image of the culture of involvement and highlight "communities of practice" among the Latino youth.

Why detecting youth-based communities of practice is important?

Youth who participate in a diverse set of activities may increase the probability of having varied social relationships that span age, gender, ethnicities, and experiences.

Youth who participate in a varied set of activities may increase the likelihood of learning diverse sets of human, social and cultural capital.

Research Questions

To what extent do Latino youth cluster into communities based on heavy participation in activities?

Can social network analysis cluster Latino youth in meaningful ways?

Sample

1860 Latino 10th grade youth (48.9%, Male; 51.1%, Female) from disadvantaged schools in Southwest Arizona (data source: GEARUP 2010).

Seventeen types of activities ranging from structured to unstructured.

Frequencies range from 377 (Time hanging out with friends) to 20 (Doing volunteer or community service).

Hanging out with friends and organized sports were the top two activities.

The bottom two activities were non—school clubs or organizations and volunteer or service work.

Methods

To detect communities, of youth activities, a two-mode network is developed.

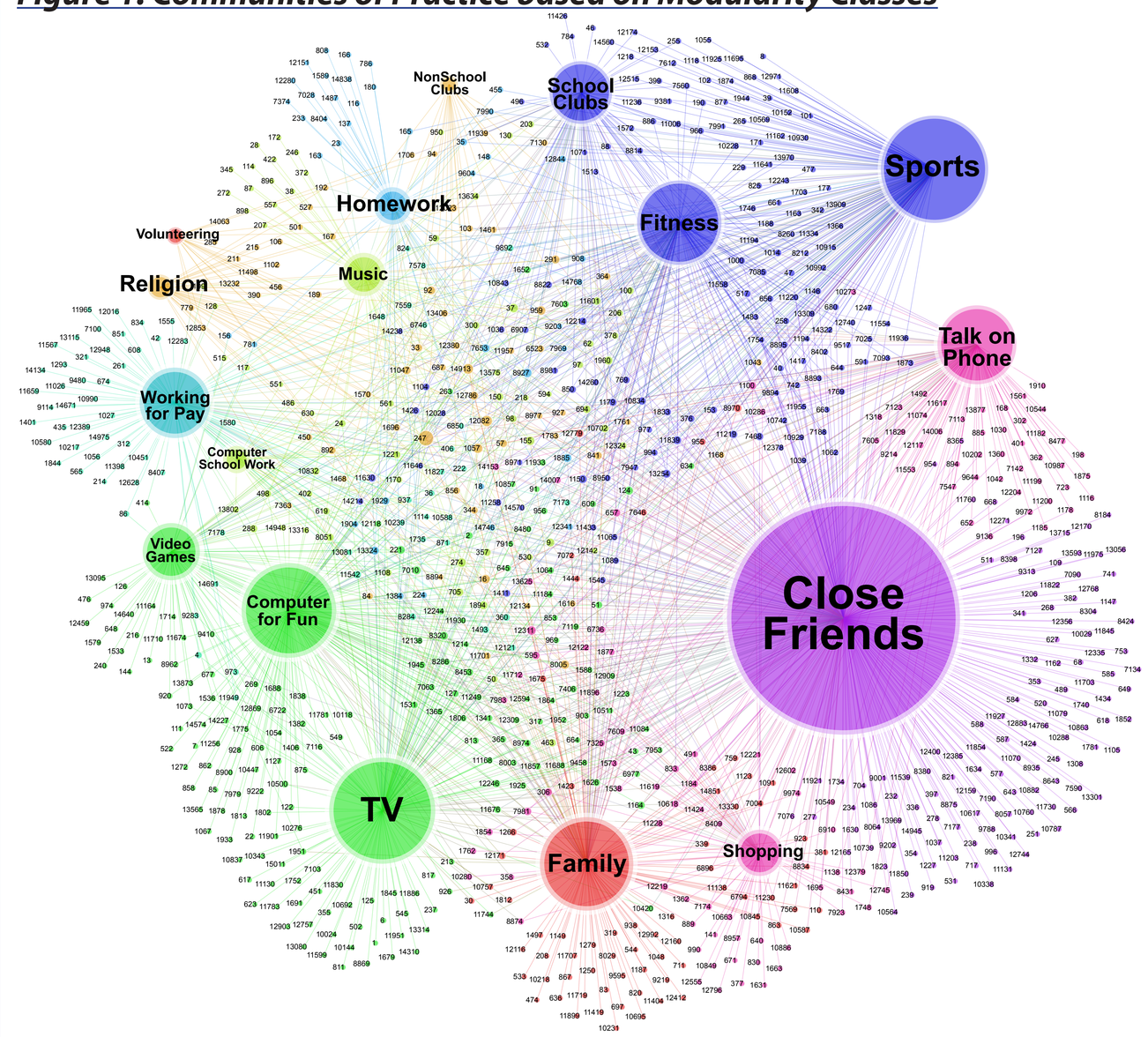
The two-mode network is a matrix of relationships between youth and the activities they engaged in for seven hours or more in a given week.

The data is then imported into Gephi for computation of the modularity of the network, along with visualization of the two-mode graph.

Table 1. Percentages of Modularity Classes by Activity

	Modularity Classes								
Activities (7 hours or more)	1 (Computer for fun, TV, Video games)	2 (Working for pay)	3 (Music, Computer for school work)	4 (Close friends)	5 (Volunteering, Family fun)	6 (Fitness, School clubs, Sports)	7 (Homework)	8 (Non-school clubs, Religion)	9 (Shopping, Talk on phone)
Volunteer or community service	0.0%	0.0%	0.0%	0.0%	95.0%	0.0%	0.0%	5.0%	0.0%
Playing a musical instrument	0.0%	0.0%	79.4%	0.0%	1.6%	0.0%	6.3%	12.7%	0.0%
Computer for fun	59.5%	2.7%	8.1%	0.0%	2.0%	6.8%	2.0%	7.4%	11.5%
Non-school clubs or organizations	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	85.7%	0.0%
Computer for school work	0.0%	0.0%	85.2%	0.0%	3.7%	0.0%	0.0%	11.1%	0.0%
Fun things with family	10.3%	2.1%	7.5%	0.0%	52.1%	8.9%	4.1%	4.1%	11.0%
Other fitness activities	5.3%	4.6%	9.9%	0.0%	4.6%	59.5%	5.3%	6.9%	3.8%
Hanging out with close friends	14.3%	2.9%	6.1%	33.2%	9.5%	15.6%	2.1%	4.8%	11.4%
Homework	0.0%	0.0%	7.5%	0.0%	3.8%	0.0%	77.4%	11.3%	0.0%
Religious activities	0.0%	0.0%	0.0%	0.0%	13.5%	0.0%	0.0%	86.5%	0.0%
School clubs or organizations	6.3%	1.1%	12.6%	0.0%	7.4%	56.8%	5.3%	8.4%	2.1%
Shopping	2.9%	4.4%	8.8%	0.0%	1.5%	2.9%	2.9%	4.4%	72.1%
Organized sport	10.1%	1.8%	7.1%	0.0%	5.3%	59.2%	5.3%	7.1%	4.1%
Talking on the telephone	8.2%	4.9%	8.2%	0.0%	4.1%	9.8%	0.8%	4.9%	59.0%
Watching TV	58.1%	3.0%	7.2%	0.0%	3.6%	9.0%	4.8%	3.6%	10.8%
Playing video games	64.0%	3.5%	12.8%	0.0%	3.5%	4.7%	4.7%	5.8%	1.2%
Working for pay	1.9%	65.7%	10.2%	0.0%	8.3%	4.6%	1.9%	2.8%	4.6%

Figure 1. Communities of Practice based on Modularity Classes



Nine "Communities" based on Modularity

Table 1 are the percentages of activities within modules

1 (Computer for fun, TV, Video games)

2 (Working for pay)

3 (Music, Computer for school work)

4 (Close friends)

5 (Volunteering, Family fun)

6 (Fitness, School clubs, Sports)

7 (Homework)

8 (Non-school clubs, Religion)

9 (Shopping, Talk on phone)

Visualization of Activities

Figure 1 is a visualization of a two-mode network; youth and activity

Numeric-based nodes represent de-identified youths

Larger nodes represent a greater number of connections or edges

Similar colors represent similar patterns of linkages, or "communities"

Future direction

Using centrality measures, test whether youth who are central to the network and have high levels of centrality are prone to greater levels of academic success, resilience, and social capital.

Determine the activities that are more relevant to academic success, along with key configurations of activities for that success.

Compare highly active youth with youth who are unengaged or tend to focus their time on few activities in relation to academic success.

Note how communities of practice change over time as youth develop and navigate the school setting.

Compare gender, ethnicity and age of the youth in terms of engagement and academic success.

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