A Study on the Impact of Crowd-Based Voting Schemes in the Eurovision European Contest

Gema Bello Orgaz, Raul Cajias and David Camacho

Departamento de Informática. Universidad Autónoma de Madrid.
C/Francisco Tomás y Valiente, n 11, 28049 Madrid, Spain.
{gema.bello, raul.cajias, david.camacho}@uam.es

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- The Eurovision Song contest can be understood as a complex system, where interactions between countries are heavily influenced by factors like geography, shared history, culture and migration patterns.
- Voting patterns for each country seem to be dictated, not by the artistic value of the song.
- Our interest in the contest therefore, is rooted on the potential for it to be used as a measure of the overall composition of the European Union.

- The Eurovision Song Contest is an annual competition among members of the Éuropean Broadcasting Union'running continuously ever since 1956.
- Each country submits a song, votes are casted and a winner is selected.
- The votes ranging from 1-8, 10 and 12 points (with no repetitions).

Voting System

- From 1956 to 1996, votes where casted by a *jury*.
- In 1997 *televoting* was introduced in five countries.
- Since 2004 *televoting* was made mandatory for all participants.
- Finally in 2009 was established the current voting system—a hybrid system of *televoting* and a *jury*.

Past studies

- Data clusterization methods.
- Regression analysis.
- Dynamical networks.
- Analytical identification of statistically significant tends.

All of which where able to group the participating countries into blocs of like behavior

Some Examples

- Data clusterization methods: *Mediterranean Bloc*, *North Bloc* and *West Bloc*
- Analytical identification of statistically significant tends: *The Viking Empire*, *The Warsaw Pact* and a number of smaller blocs

Directed Graph-based Representation

Contests are modeled as a as a directed graph $G_t = (V_t, E_t)$, where:

- $V_t = \{\text{set of participating countries in year } t\}$
- $E_t = \{\text{ set of all votes casted in year } t\}$
- The points country u votes to v is denoted by the function to $w(e_y) = (u, v)$
- Restriction: Only the edges for which $w(e_t) > 7$

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Eurovision Contest Data Preparation

In order to compare the impact of *televoting* the periods which we consider are:

- 1992–1996: Jury-based voting system was used exclusively.
- 2004–2008: *Televoting* was used exclusively, as well as having the *semi-finals* round.
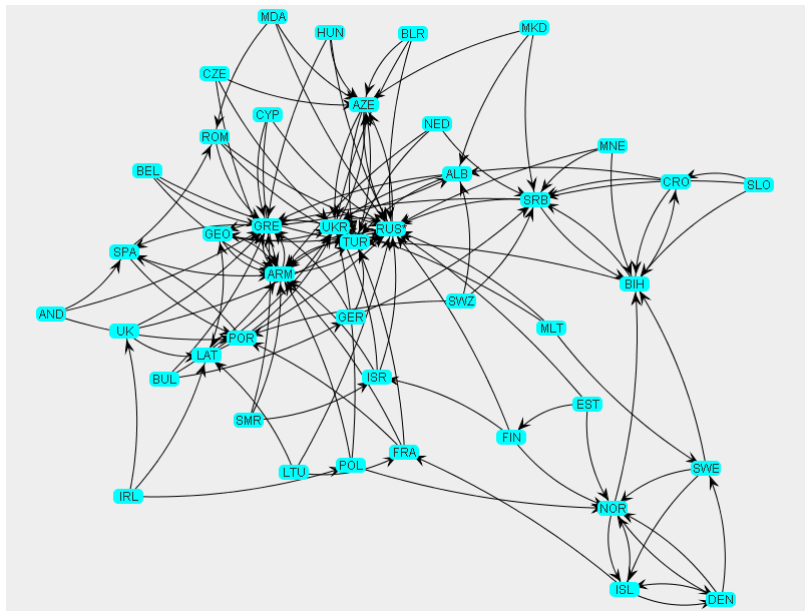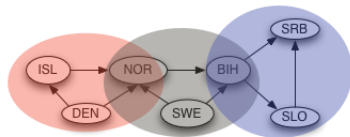
Clique Percolation Method (CPM)

Is a link density-based module finding technique that allows community or cluster overlapping. The *clique percolation cluster* is the maximal set of *k*-cliques that are connected to each other.
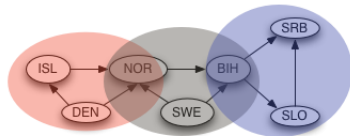
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Edge Betweenness and community structure algorithm (EBC)

The algorithm focuses on find the *most between* edges. Defines the *edge betweenness* of an edge as the number of shortest path between pairs of vertices that run along it.

1. Calculate the betweenness for all edges in the network
2. Remove the edge with the highest betweenness
3. Recalculate the betweenness for all edges affected by the removal
4. Repeat from step 2 until no edges remain

Data Mining Process

Our goal is to find core members in the communities detected per selected periods. We define core-*ness* as of a node, as the number of times that node is a member of a community.

1. For each year in the periods selected we weploy the chosen *CFAs* individually
2. Join together all sub-communities and then identify the core members in each community
3. Plot different coincidence values against the core-communities

CPM	4 years	3 years
1	BIH,SLO	ARM,BEL,FRA,NED,TUR
2	CYP,GRE,ROM	ARM,BLR,RUS,UKR
3	LAT,LTH	ARM,NED,TUR,UKR
4	NED,TUR	AUT,BIH,CRO,SCG,SLO
5	RUS,UKR	BUL,CYP,GRE,ROM
6		DEN,ISL,NOR,SWE
7		GRE,MOL,ROM
8		IRL,LAT,LTH
9		AND,SPA(*)

We study the number of core members obtained by grouping together countries that have belonged to the same community with some level of frequency

|	5 years	4 years	3 years	2 years	1 year
CPM *before* Televoting		**5**	5	2	2
EBC *before* Televoting	1	**4**	8	2	2
CPM *after* Televoting		5	**8**	13	20
EBC *after* Televoting	**4**	**5**	7	4	2

- The desired level of coincidence would have to be both high enough to be meaningful, and yet provide a good number of core sub-communities to study
- The resulting core communities shown previously have amount of redundant information due to overlap. To filter out these redundancies, we construct a similarity matrix where the level of overlap between communities is measured (merge communities with have a level of overlap above 80 %)

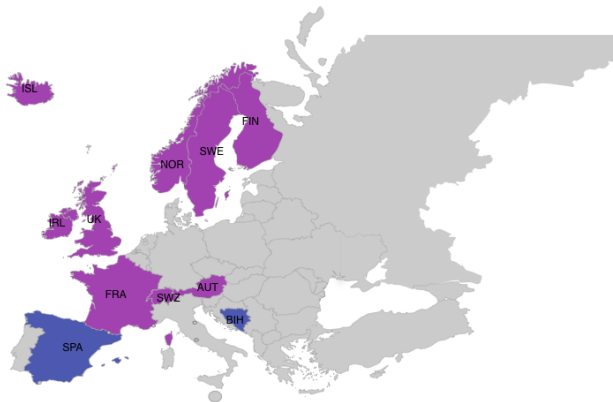| C	CPM	EBC
1	AUT,FRA,**NOR**,UK,SLO	AUT,BIH,**IRL**,SPA,SWE
2	CYP,GRE	AUT,FIN,FRA,**IRL**,ISL,**NOR**,SWE,SWZ,UK
3	**IRL**,SWE	

- Both algorithms do find a strong relationship between the countries {AUT, FRA, NOR, UK}
- Plots the communities in a geographical context, a high correlation between neighboring countries and their membership to like communities can already be appreciated. These communities also happen to have common cultural roots.
  - Greece and Cyprus
  - A subset of CPM community 2: Norway, Sweden, Finland and Iceland

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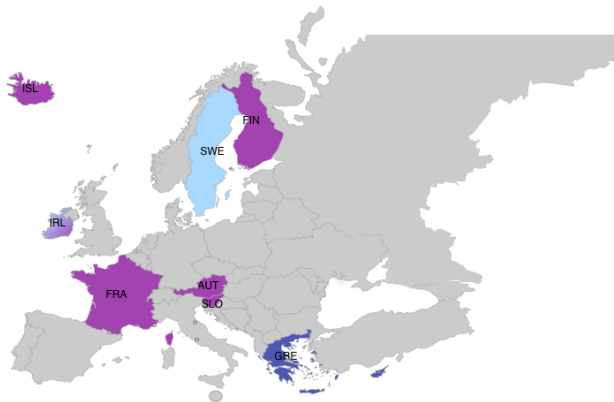
- Norway, Sweden, Finland and Iceland (Nordic Countries)

C	CPM	EBC
1	ARM,BEL,FRA,NED,TUR,**UKR**	ALB,BLR,DEN,ISL,SWE,**UKR**
2	ARM,BLR,**RUS**,**UKR**	AND,BEL,FRA,GER,ISR,NED,TUR
3	AUT,BIH,CRO,**SCG**,SLO	BIH,CRO,SLO
4	BUL,CYP,**GRE**,ROM,MOL	CYP,**GRE**,MLT,POL
5	DEN,ISL,NOR,SWE	
6	IRL,LAT,LTU	
7	AND,SPA*	

- The number of core communities identified dramatically increases
- The correlation between country adjacency and like membership is more discernible

- Greece and Cyprus persists and grows (Bulgaria, Romania and Moldavia called the bloc of *Balkan Countries*)
- Appear community formed by Russia, Armenia, Belarus and Ukraine (*Old Soviet Union*)
- Appear community contained several of the former *Yugoslav States* or neighbours, such as, Bosnia Herzegovina, Croatia, Serbia and Montenegro, Slovenia and Austria.
- The previously community called *Nordic Countries* has lost Finland and has incorporated Denmark
- Appear the community formed by Lithuania and Latvia (*Baltic States*)
- Appear the community formed by Spain and Andorra, (*Iberian Peninsula*)
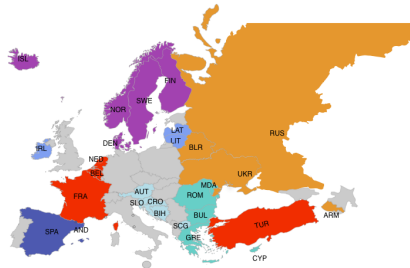
The EBC results are less fit in the geographical context. Also displayed blocs similar as we have named:

- *Yugoslav States* (Bosnia Herzegovina, Croatia and Slovenia)
- *Balkan Countries* (Greece, Cyprus, Malta and Poland)
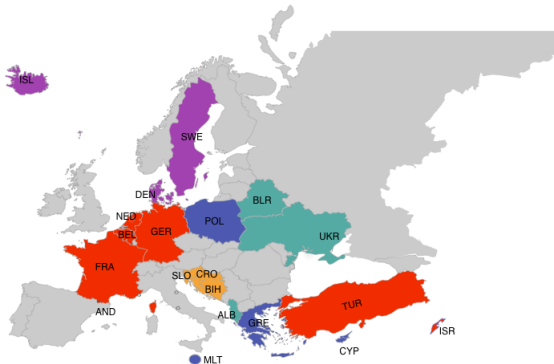
Diaspora

- The *NorthWest-Mixed Countries* (Armenia, Belarus, France, Netherlands, Turkey, Ukraine)
- Andorra, Belarus, France, Germany, Israel, Netherlands, Turkey

The two algorithms find communities where the diaspora occurs with Turkey (there is a large numbers of turkish migrants in northwestern european countries).

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Winners

- Ireland holds the record for the most number of wins before de Televoting
- From 2004 to 2008, Ireland received votes only from neighbors like the UK and from the Baltic Countries (Lithuania and Estonia).

These findings make the case for a much more fragmented Eurovision, both geographically and culturally, post-*televoting*, disrupting the reign of past classical winners.

Conclusions

- We have centered our investigation around two the periods of 1992-1996 and 2004-2008 to analyse the effect of Televoting.
- We model the yearly outcome as directed graphs to find communities.
- Our findings show that stable communities throughout time can be identified using community-finding algorithms.
- We also show evidences of:
  - These communities tend to have countries that share a common past or boarder, or have similar historical and cultural roots.
  - Diaspora in the voting
  - A change in the winners

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Future Work

- Measure how the communities evolve through time.
- Build a learning system.
- Try to predict the future Eurovision contest results.

Thanks for your attention.
Any question?