Using Cluster Analysis to Monitor Religious Pluralism

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Abstract: *This paper discusses a unique method that quantitatively evaluates the programming of all national radio stations regarding religious pluralism. This method identifies stations with similar programming characteristics and identify those that are problematic. The method is presented and illustrated using real-life data.*

INTRODUCTION

Radio Logos is the largest regional FM radio network in the European country of Albania consisting of seven transmission sites which cover a wide geographical area of the country. The governmental agency over Radio Logos is the Albanian Audiovisual Media Authority (AMA) which is responsible for licensing radio and television stations and ensuring compliance to the broadcasting laws of the country. One aspect of these laws is that the content of our programs must clearly express general pluralism and impartiality of information. This includes religious pluralism.

Unfortunately, the exact meaning of pluralism is not well-defined in the academic literature. Although the expression 'diversity' is sometimes used as a synonym, the general lack of quantitative methods to measure pluralism causes discussions on the matter to often degenerate into futile exchanges of subjective opinions.

This lack of clarity also includes what broadcasting programs should be included in a discussion on pluralism. Although some might say that all transmitted programs must be considered, Ofcom says "We recommended that the scope of any plurality review should

be limited to news and current affairs, but that these genres should be considered across television, radio, the press and online" (OFCOM, 2012:2). BBC also had a similar opinion (House of Lords, 2014:12) where it states, "The BBC concurred that news and current affairs are the most important genres in terms of driving the news agenda and developing public debate, and so therefore should be the primary genres to be considered in any plurality policy."

There are even some who express concern that the concept of pluralism is not only ambiguous but lacks any universally recognized standards for evaluating media performance and quality (Karppinen, 2013 in his book introduction).

Nevertheless, a recent study proposes a unique method to measure religious pluralism which involves the use of an "appeal score" combined with various measures of entropy from Information Theory (Sturm, 2024). This method gives the operator a clear indication of whether the media station's programming is in compliance or not with religious pluralism and which programs might be problematic. The limitation of this method is that it is an internal analysis of a station's programming efforts. It does not give the operator any idea of the station's performance against other competitors.

The method of this paper involves a broader analysis that compares the religious pluralism compliance status of all stations in the national media market.

This study is restricted to licensed Albanian radio stations. According to the AMA OSHMA database (AMA, 2024) there are 55 such stations which include local, regional, national and religious community stations. We also added the "gold standard" of all Albanian stations, the state-run Radio Tirana, to this list for a total of 56 stations. If there is any station that is pluralistic and diverse, it is Radio Tirana.

METHODOLOGY

As with any analysis, good data is needed. Thus, a multi-week data collection task was initiated that monitored all Albanian radio stations.

Of these 56 radio stations, 44 were accessible for listening either via FM broadcasting or via an internet URL. Unfortunately, 12 radio stations in the AMA OSHMA database were not accessible even on the internet. The reason for this silence is unknown. Perhaps they had gone bankrupt and discontinued their transmissions or were experiencing severe technical difficulties. As a result, our database was restricted to only 44 stations.

At the end of the data collection process the following eight variables were calculated for each radio station, variables that help characterize the station's typical 24 hour transmission day. The unit of measurement is hours per day.

Table 1: The research variables

PMu	The number of hours of music per day.
PFe	The number of hours of "heavily" religious programs. For example, readings, prayers, rituals, etc.
PIA	The number of hours of Informational and Actual (news) programs.
PFm	The number of hours of programs for children.
PMi	The number of hours of programs for minorities.
PE	The number of hours of educational programs. Such programs might or might not have a "slight" religious content. For example, if the program was about finances and the risks of going into debt, it might use a quote or verse from a holy book to emphasize that "the borrower becomes a slave to the lender."
PAr	The number of hours of programs that are for fun and enjoyment.
RD	The number of hours of radio-drama programs.

Obviously, the sum of these eight variables is 24 hours.

It must be said that the estimation of the values for these variables is not easy since playlists change over time. For example, perhaps during our monitoring period we noticed no radio-dramas, thus the value for RD was zero. This does not mean that that station never transmits this type of program. Perhaps in a different monitoring period it would have. However, if a station published an online outline of its daily schedule, then that information was a great help.

In addition, distinguishing between types of programs is often difficult. For example, should a program for children with lots of music be considered as a children's program or music? Should classical music be considered as simply music or a program for fun and enjoyment. For this study, an uninterrupted time-period of continuous classical music was classified as a program for fun and enjoyment.

Nevertheless, despite these and other challenges, the data for these 44 stations was compiled and is shown in Table 2.

To protect the privacy of these businesses, most radio names were changed to "R1", "R2", and so. The exceptions are the national radio stations (Top Albania, Club FM and Klan), the religious community stations (Dodona [Bektashi], Maria [Catholic], Ngjallja [Orthodox], Spektrum [Muslim]), the news stations (ABC News, BBC, News 24 and RFI)

and Radio Tirana (the state-owned radio station). Finally, Radio Logos remained identified since the author of this paper is its owner and operator.

Table 2: The data

Station	PMu	PFe	PIA	PFm	PMi	PE	PAr	RD
Top_Albania	13.00	0.00	0.00	0.00	0.00	0.00	11.00	0
Club_FM	8.00	0.00	0.00	0.00	0.00	0.00	16.00	0
Klan	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Dodona	4.00	13.00	2.00	1.00	0.00	3.00	1.00	0
Maria	9.50	11.00	1.00	1.50	0.00	0.00	0.00	1
Ngjallja	5.00	12.00	2.00	1.00	0.00	3.00	1.00	0
Spektrum	5.00	13.00	2.00	1.00	0.00	2.00	1.00	0
R1	8.00	9.00	2.00	1.00	0.00	3.00	1.00	0
R2	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R3	15.65	1.78	0.42	0.17	0.00	1.98	4.00	0
R4	15.65	1.78	0.42	0.17	0.00	1.98	4.00	0
ABC_News	0.00	0.00	24.00	0.00	0.00	0.00	0.00	0
R5	12.00	5.00	0.00	0.00	0.00	4.00	2.00	1
R6	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
BBC	0.00	0.00	24.00	0.00	0.00	0.00	0.00	0
R7	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R8	9.00	8.00	2.00	1.00	0.00	3.00	1.00	0
R9	21.50	0.00	0.00	0.00	0.00	0.00	2.50	0
R10	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R11	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R12	17.66	1.17	0.50	0.17	0.73	0.60	3.17	0
R13	21.00	0.00	1.00	0.00	0.00	0.00	2.00	0
R14	22.00	0.00	1.00	0.00	0.00	0.00	1.00	0
R15	6.00	11.00	2.00	1.00	0.00	3.00	1.00	0
R16	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R17	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Logos	13.40	1.50	2.00	1.00	0.10	2.30	2.70	1
R18	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R19	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R20	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R21	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R22	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
News_24	0.00	0.00	24.00	0.00	0.00	0.00	0.00	0
R23	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0

R24	21.00	0.00	0.00	0.00	0.00	0.00	3.00	0
RFI	0.00	0.00	24.00	0.00	0.00	0.00	0.00	0
R25	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R26	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R27	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R28	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R29	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
R30	23.00	0.00	0.00	0.00	0.00	0.00	1.00	0
R31	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Radio_Tirana	15.50	0.00	3.00	0.50	0.00	2.00	3.00	0

The question now becomes – How do we collectively use this data to monitor religious pluralism? The answer is Cluster Analysis.

Cluster Analysis is a classical statistical technique that helps the researcher "reduce" or "simplify" the data into similar clusters. In our situation, Cluster Analysis will group the radio stations into similar clusters based upon the variables PMu, PFe, PIA, PFm, PMi, PE, PAr and RD. Applying this technique to our data, a Cluster Dendrogram is produced which is a graphical method to assess which radio stations are similar.

For our analysis, Cluster Analysis was used in two stages. The first gives an overall look as to which stations are similar. The second stage involved eliminating from the study stations that transmit only music 24/7, stations that obviously run no risk of non-compliance. The resulting analysis gives a better focus on which stations are in compliance with religious pluralism

RESULTS

The first Cluster Analysis includes all 44 stations and gives a general overview as to which stations are similar. Using the pvclust method (Ryota, 2019) with "distance=correlation" from the R software package (R Core Team, 2014) and applying this to our data, we obtain the following Dendrogram (see Figure 1).

To understand the Dendrogram the reader will see three values at each tree branch, two on the top and on either side of the branch. The third value is directly below the first two. The two top numbers are probability values for each cluster which indicates how strong the cluster is supported by the data. The left one is the AU (Approximately Unbiased) probability value and the right one is the BP (Bootstrap Probability) value. The AU probability value is thought to be a better approximation as to which clusters are significant. Thus, we will use the AU value instead of the BP value. The idea is that if the AU value is

greater than or equal to 99 (or whatever value the user selects), then we can group programs into a single cluster. The single value below is an index number indicating the clustering sequence. For example, the index number of 41 represents the joining of the two clusters that had been formed at steps 38 and 39. In addition, several rectangles are drawn to highlight "significant" clusters.
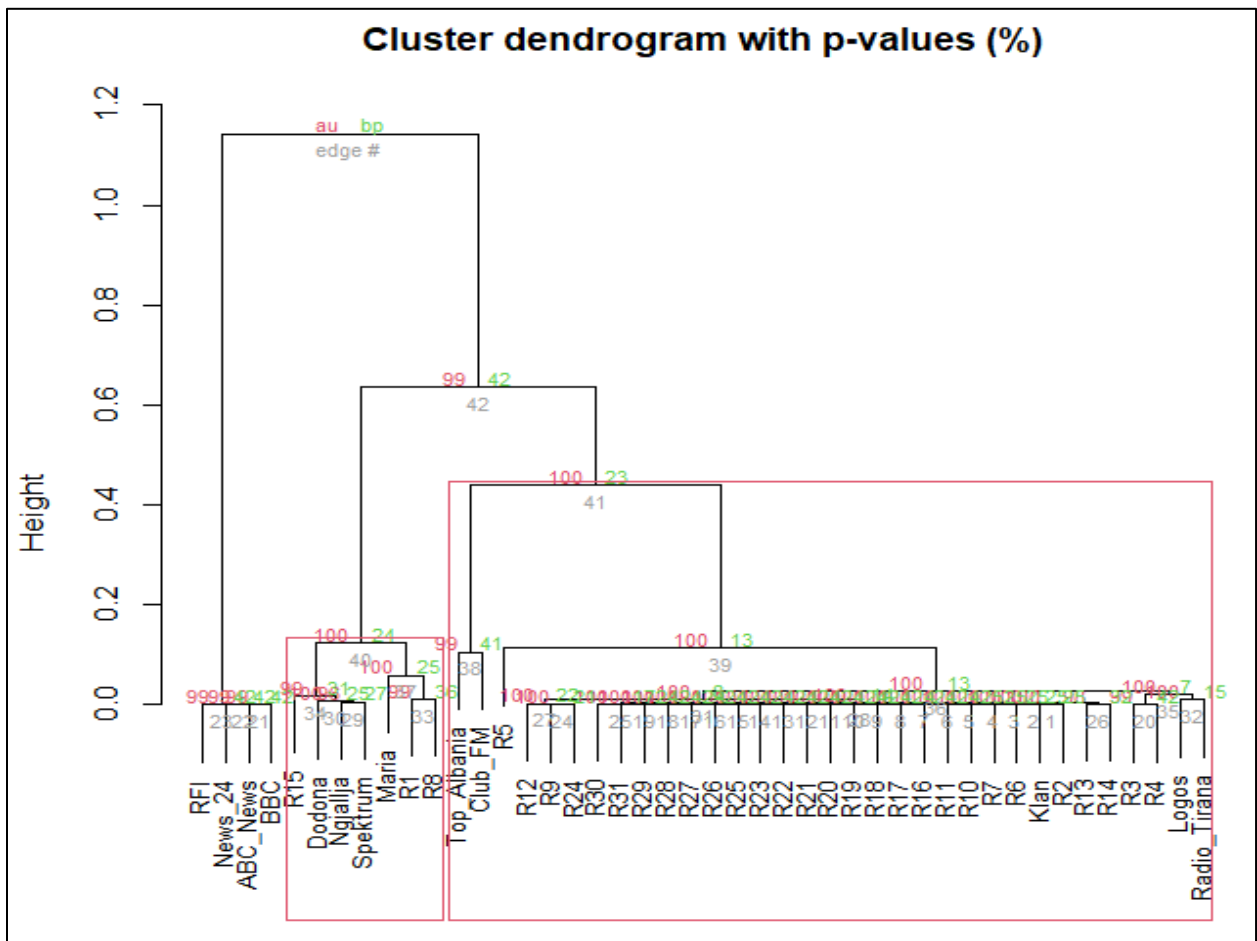

Figure 1: Cluster analysis for all 44 stations

The results show that there are 3 main clusters. Not surprisingly, the first cluster is made up of the 24-hour news/informational type of stations (Radio RFI, News 24, ABC News, and BBC).

The second cluster is made up of the "heavily" religious stations. Besides the official religious stations (Dodona, Ngjallja, Maria and Spektrum), this cluster also contains R1, R8 and R15.

The third cluster is quite large. It is made up of 33 stations including those that transmit music 24 hours per day.

To bring further clarity to this analysis, we removed the 19 stations that transmit music 24 hours per day. The resulting Cluster Analysis is shown below in Figure 2.
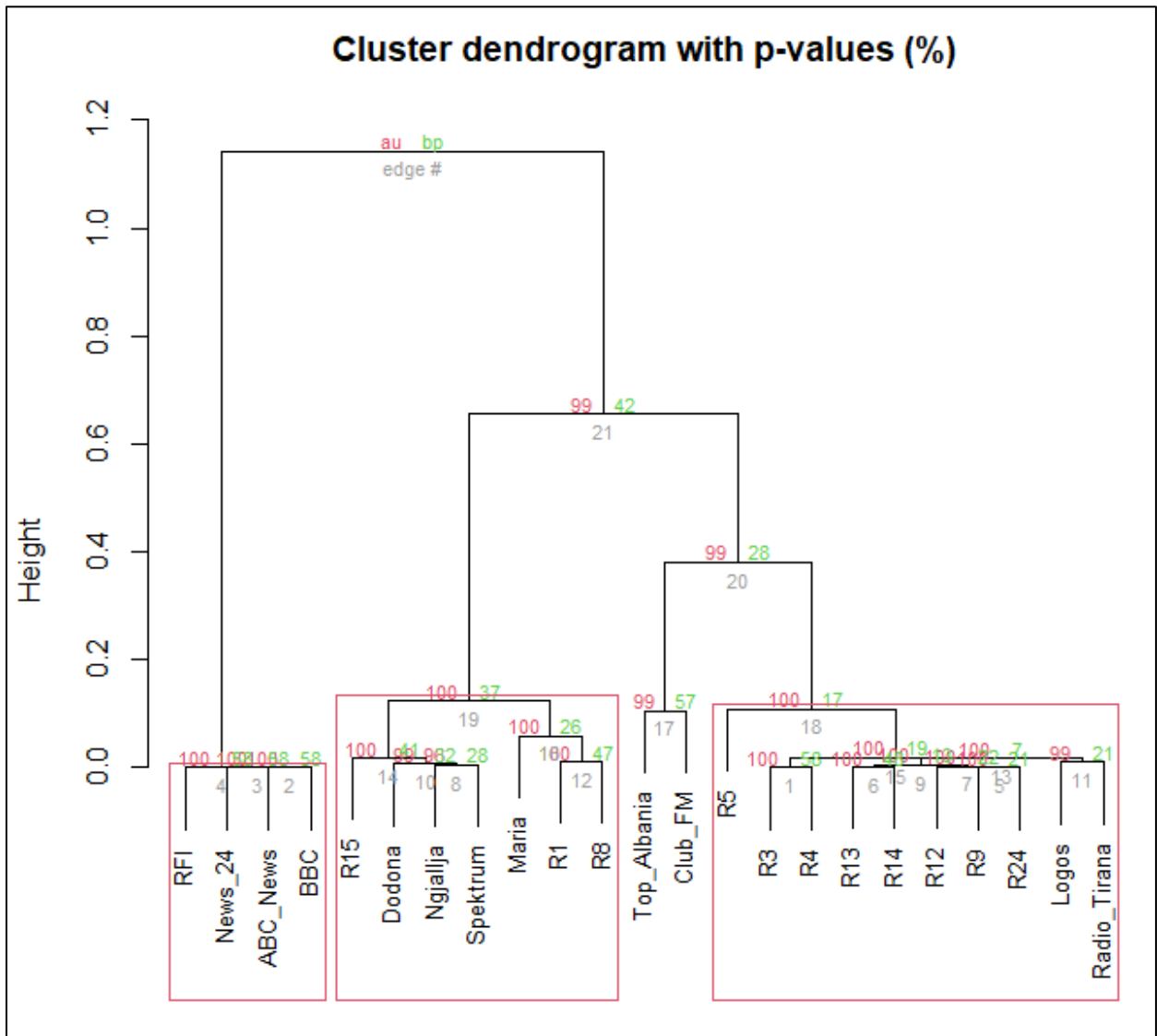

Figure 2: Without the music-only stations

The results show that there are 4 major clusters.

Cluster 1 - The "News Only" stations.

Cluster 2 - The "heavily" religious stations. Besides the official religious stations, this group includes R1, R8 and R15.

Cluster 3 - Top Albania and Radio Club FM, two of the national stations which are in a class by themselves.

Cluster 4 – This group has ten similar programming style stations which includes R3, R4, R5, R9, R12, R13, R14, R24, Radio Logos and Radio Tirana. Obviously, this cluster represents those stations that are diverse and pluralistic.

Regarding religious pluralism, several important results can be identified. First, it appears that stations R1, R8 and R15 are not in compliance with religious pluralism. It should be noted that, although the Albanian law does allow religious stations, all others should be "general" and pluralistic in nature, especially regarding religious pluralism. While religious programming, to some extent, is allowed on general stations, there is a line where a "general" station can become too "religiously heavy." Exactly where is this invisible line where a "general" station becomes too "heavily religious?" The answer is revealed through our Cluster Analysis. This helps the government agency to have a quantitative basis for discussing this problem with the stations in question (R1, R8 and R15) instead of relying on subjective opinions.

Second, this analysis is very useful to any individual station in that the manager can have a clear idea of where the station stands regarding pluralism and if changes need to be made to be assured of compliance.

Third, the analysis also helps to identify which type of radio the station really is. That is, is it a news-only station? A music-only station? A full-service station with diverse programs? Or is it mainly religious?

For example, for stations R1, R8, R15, while they might think that they are "general" stations, the data shows that they are more like the official religious stations. In other words, changes need to be made. On the other hand, the analysis shows that Radio Logos is very similar to Radio Tirana in its overall programming style. The reason for this is that Radio Logos invests a lot of time and money to have quality music, information, news, programs for children and minorities, educational programs, programs for enjoyment and pleasure, and radio-dramas.

CONCLUSION

Discussions about plurality, especially religious pluralism, often degenerate into useless debates based upon subjective opinions. This simple method, based upon quantitative data analysis, can easily identify which stations are at risk and which stations are in compliance.

This method, therefore, becomes a powerful tool for both governmental officials and station managers. That is, it can be used to ensure pluralism compliance and to identify areas for programming improvement.

However, the greatest benefit of using this tool is that the end user, the listener, will enjoy a high level of quality broadcasting.

ACKNOWLEDGEMENTS

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