Data Processing

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Overview

This Rmarkdown report processes and cleans the Eurovision Song Contest (ESC) data for modeling.

This includes:

1. Redefine variables as factor or numeric
2. Dividing the variables into the three predefined groups;
    - Performance
    - External
    - Competition
3. Normalize the Numeric Data to have mean 0 and standard deviation 1
4. Dummy Encoding all Categorical Factor levels.
5. Data Reduction
    - Redundant Variables
    - Variables of Linear Combinations
    - Categorical Variables via Chi-Squared Tests of Association

Redefine Factor Variables

Some of the numeric music features need to be redefined as nominal variables, the variables are key, mode and time signature.

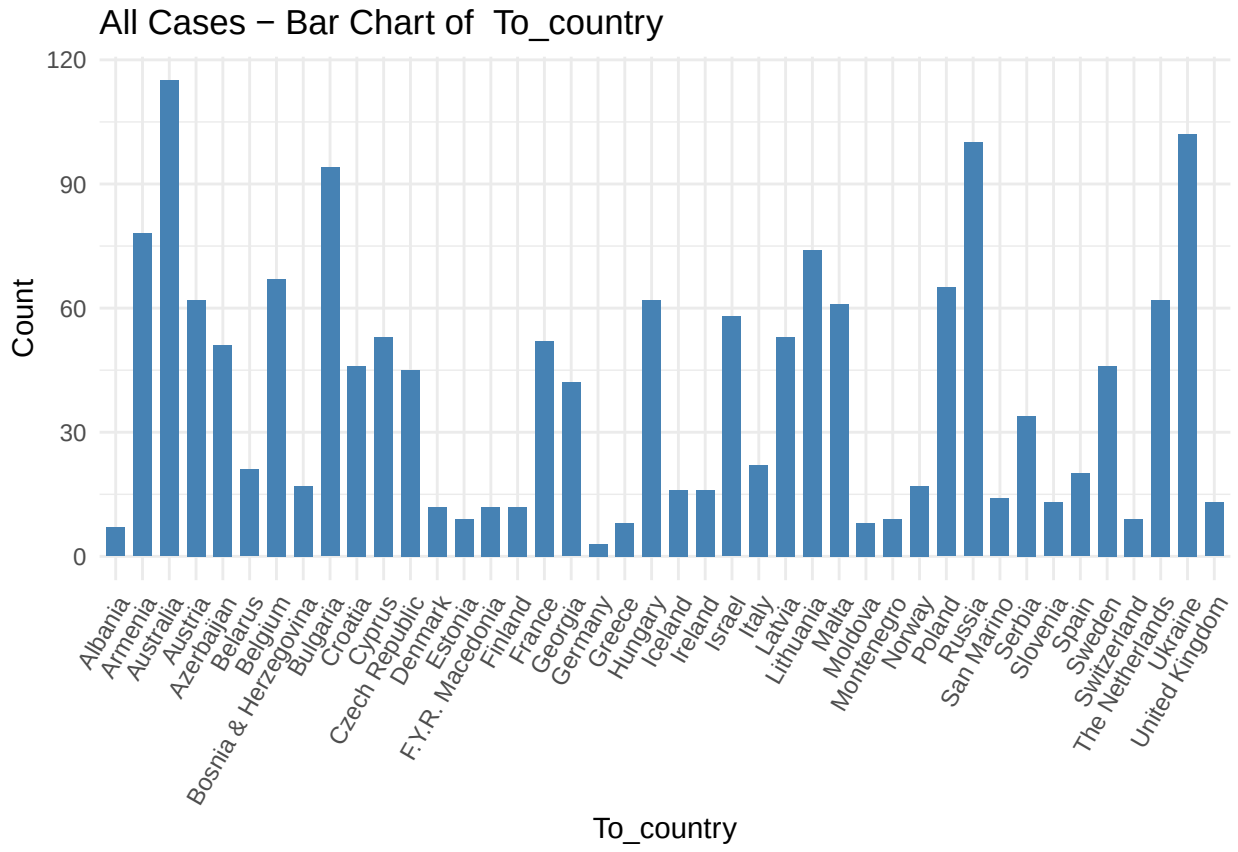
	Data Type
From_country	character

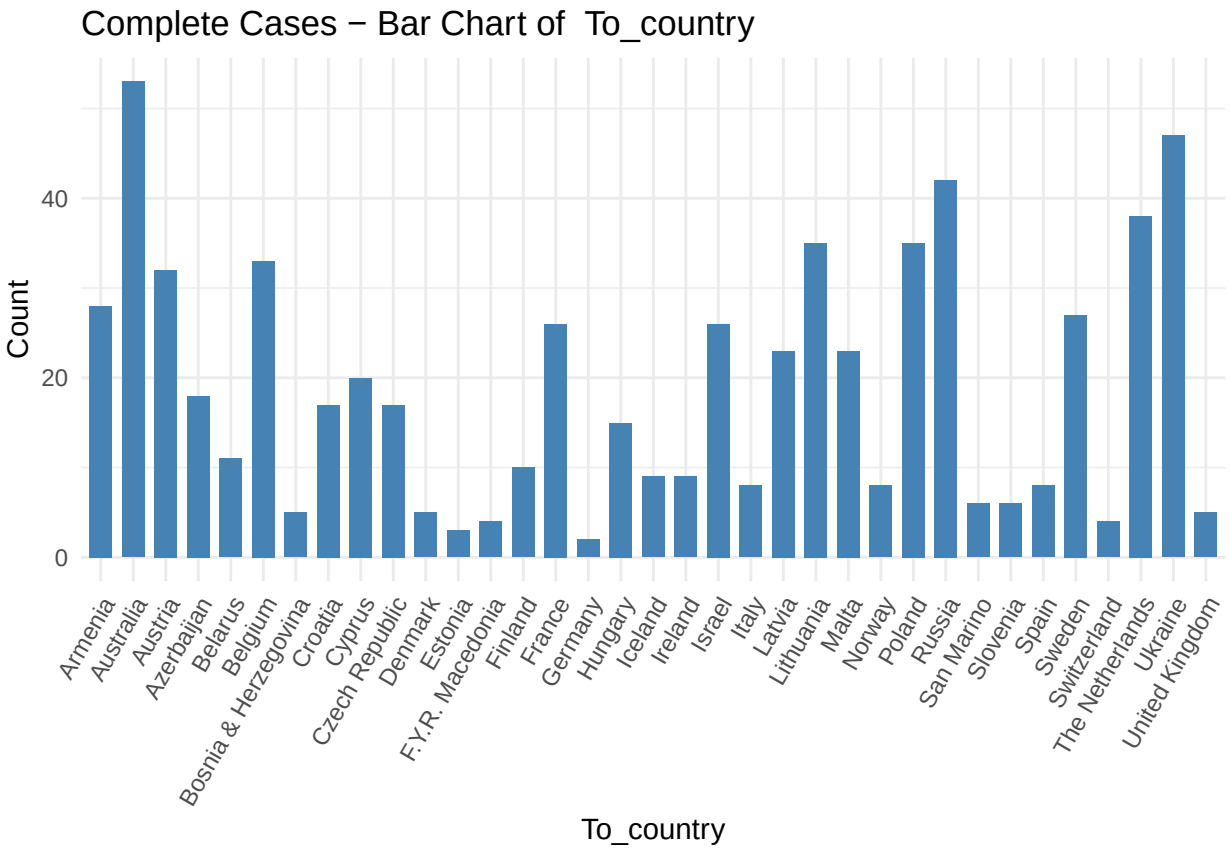
	Data Type
To_country	character
Points	integer
Round	character
Voting_Method	character
Host_Nation	character
OOA	integer
Average_Points	numeric
VBlocs1_FC	factor
VBlocs2_FC	factor
VBlocs1_TC	factor
VBlocs2_TC	factor
ComVBlocs1	character
ComVBlocs2	character
FC_LANGFAM	character
TC_LANGFAM	character
ComLANGFAM	character
Neighbours	character
TC_NumNeigh	integer
FC_NonCOB	integer
FC_NonCitzens	integer
FC_COB	integer
FC_Citizens	integer
FC_Population	integer
METRIC_COB	numeric
METRIC_Citizens	numeric
METRIC_COBCit	numeric
FC_GDP_mil	numeric
TC_GDP_mil	numeric
GDP_PROP	numeric
FC_CAP_LAT	numeric
FC_CAP_LON	numeric
TC_CAP_LAT	numeric
TC_CAP_LON	numeric
CAP_DIST_km	numeric
TC_PerfType	character
TC_SingerGender	character
FC_SONGLANG	character
TC_SONGLANG	character
ComSONGLAN	integer
danceability	numeric
energy	numeric
key	factor
loudiness	numeric
mode	factor
speechiness	numeric
acousticness	numeric
instrumentalness	numeric
liveness	numeric
valence	numeric
tempo	numeric
duration_ms	integer
time_signature	factor

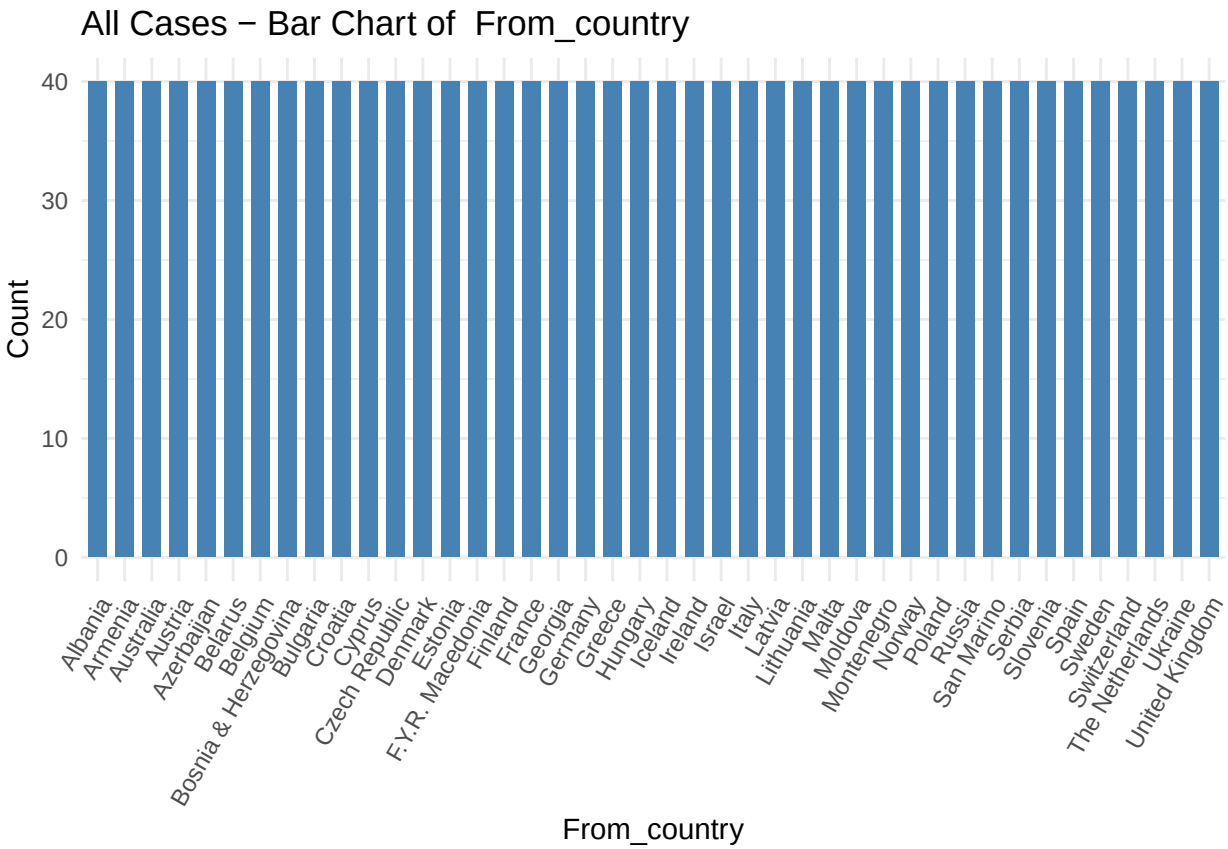
Remove Missing Observations

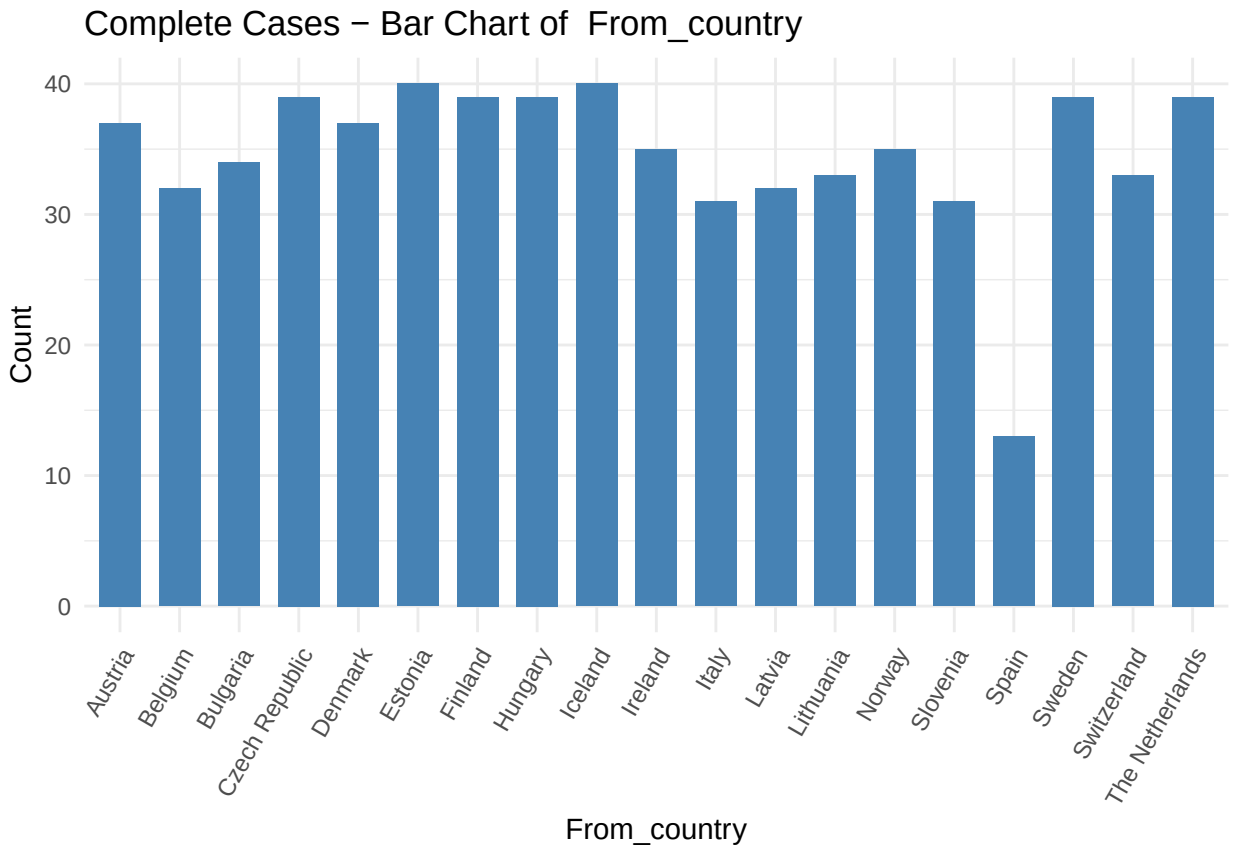
There is a total of 1022 rows missing from the data. This corresponds to approximately 60.83% of the data. Removing all of these rows with missing values leaves a total of 658 rows remaining. This is a substantial loss of data, a notable limitation to the research, and an area of improvement for future research iterations. An alternative solution could be to use different sources such as the world bank for the migration / diaspora based data. However at time of research, these data repositories did not store migration / diaspora information by country of birth / citizenship.

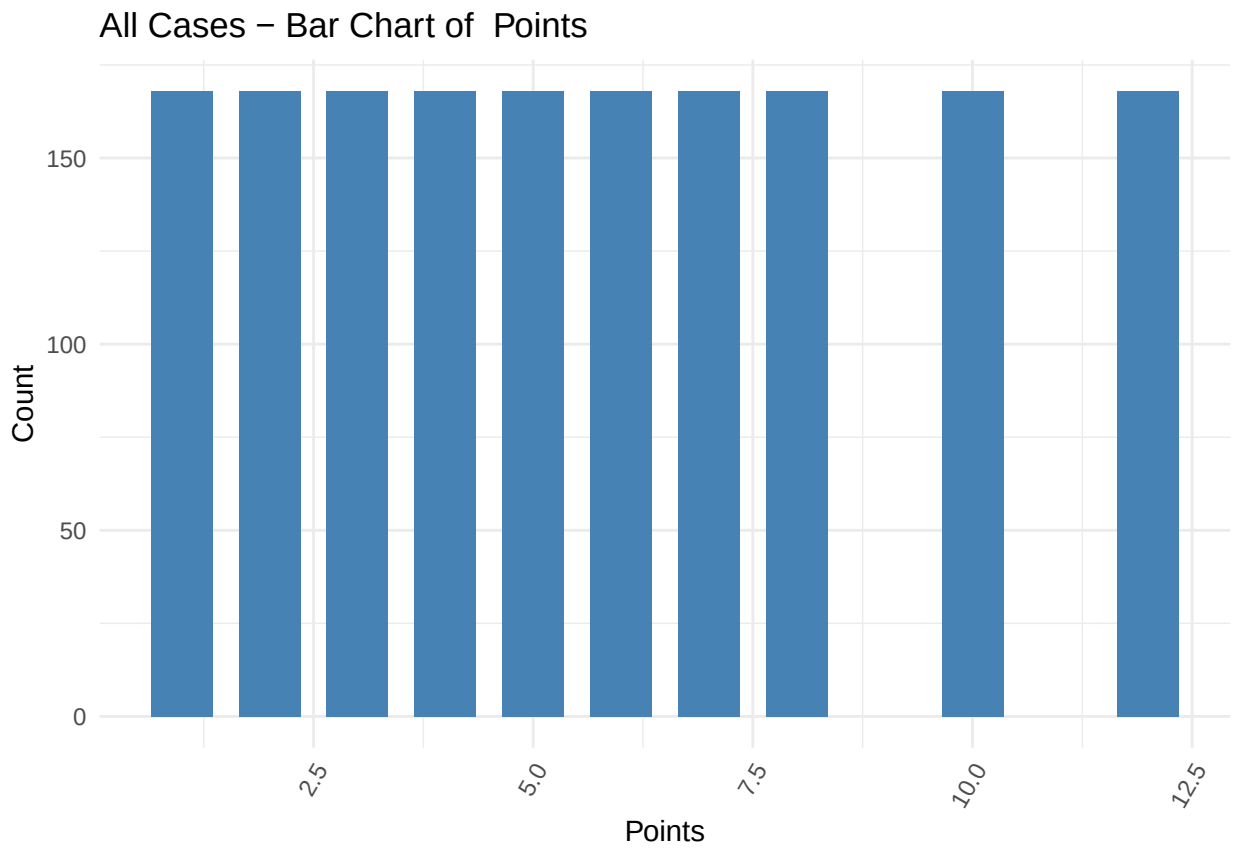
http://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data

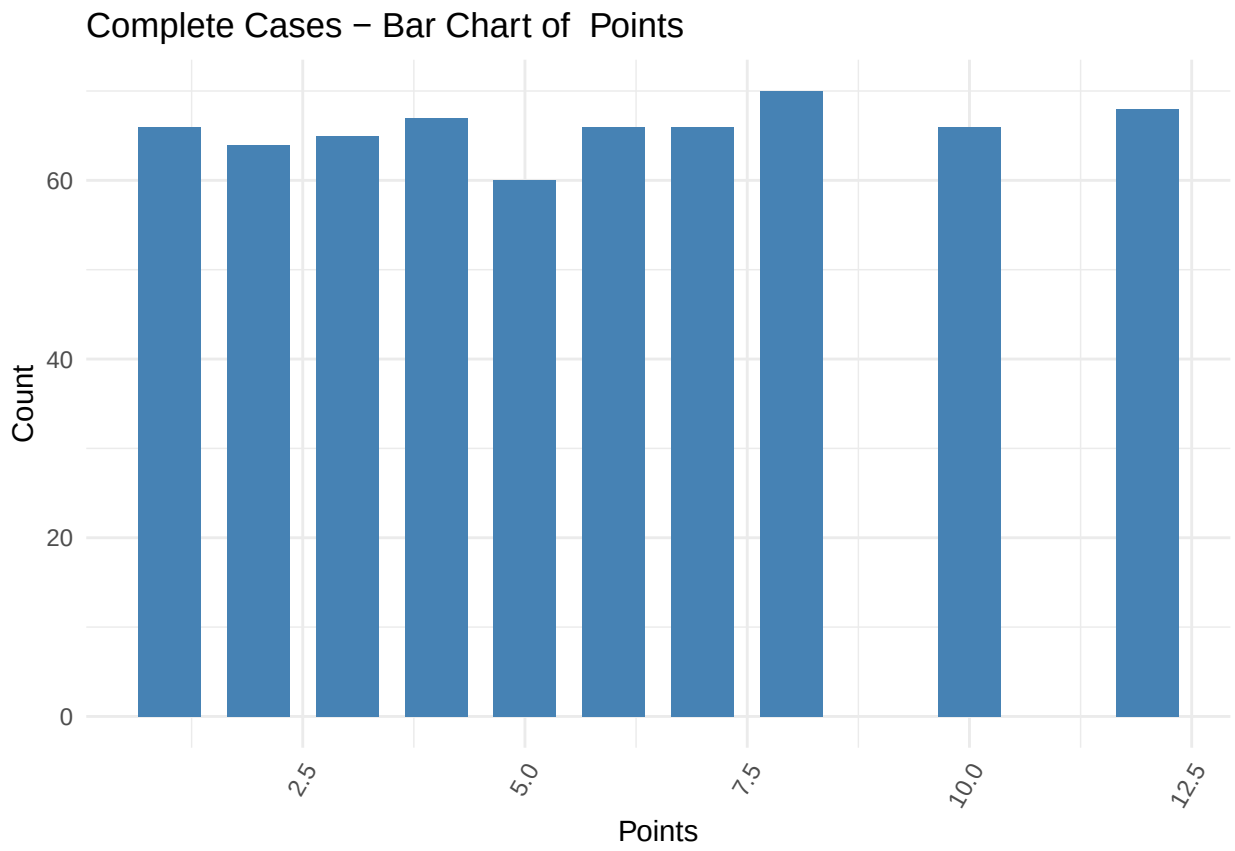



Complete Cases − Bar Chart of To_country
Count
0
20
40
Armenia
Australia
Austria
Azerbaijan
Belarus
Belgium
Bosnia & Herzegovina
Croatia
Cyprus
Czech Republic
Denmark
Estonia
F.Y.R. Macedonia
Finland
France
Germany
Hungary
Iceland
Ireland
Israel
Italy
Latvia
Lithuania
Malta
Norway
Poland
Russia
San Marino
Slovenia
Spain
Sweden
Switzerland
The Netherlands
Ukraine
United Kingdom
To_country


All Cases − Bar Chart of From_country
Count
40
30
20
10
0
Albania
Armenia
Australia
Austria
Azerbaijan
Belarus
Belgium
Bosnia & Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
F.Y.R. Macedonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Latvia
Lithuania
Malta
Moldova
Montenegro
Norway
Poland
Russia
San Marino
Serbia
Slovenia
Spain
Sweden
Switzerland
The Netherlands
Ukraine
United Kingdom
From_country


Complete Cases − Bar Chart of From_country
Count
40
30
20
10
0
Austria
Belgium
Bulgaria
Czech Republic
Denmark
Estonia
Finland
Hungary
Iceland
Ireland
Italy
Latvia
Lithuania
Norway
Slovenia
Spain
Sweden
Switzerland
The Netherlands
From_country


All Cases − Bar Chart of Points
150
100
50
0
Count
2.5
5.0
7.5
10.0
12.5
Points



Generate Factor Blocs

In total, there are:

- 3 Voting Factors
- 5 Competition Factors
- 27 External Factors
- 18 Performance Factors

Extract Numeric & Categorical Features

In total, there are:

- 2 Numeric Voting Factors
- 3 Categorical Voting Factors
- 17 Numeric Competition Factors
- 10 Categorical Competition Factors
- 11 Numeric External Factors
- 7 Categorical External Factors
- 1 Numeric Performance Factors
- 2 Categorical Performance Factors

Dummy Encoding Categorical Variables

All categorical variables for each variable bloc are dummy encoded. It is not necessary to dummy encode the voting factors To_country and From_country as we will not be incorporated as model predictor variables

Standardise Numeric Data

This section normalizes or range standardizes the numeric variables in each block. There is also a special case for OOA in the competition Bloc. OOA will need to be standardized in relation to each round. This shall be done after the numeric variables from each bloc have been standardized

	mean	sdev
Average_Points	0	1
OOA	0	1

	mean	sdev
TC_NumNeigh	0	1
FC_NonCOB	0	1
FC_NonCitzens	0	1
FC_COB	0	1
FC_Citizens	0	1
FC_Population	0	1
METRIC_COB	0	1
METRIC_Citizens	0	1
METRIC_COBCit	0	1
FC_GDP_mil	0	1
TC_GDP_mil	0	1
GDP_PROP	0	1
FC_CAP_LAT	0	1
FC_CAP_LON	0	1
TC_CAP_LAT	0	1
TC_CAP_LON	0	1
CAP_DIST_km	0	1

	mean	sdev
ComSONGLAN	0	1
danceability	0	1
energy	0	1
loudiness	0	1
speechiness	0	1
acousticness	0	1
instrumentalness	0	1
liveness	0	1
valence	0	1
tempo	0	1
duration_ms	0	1

From_country	To_country	Round	OOA
Austria	Belgium	f	1
Bulgaria	Belgium	f	1
Czech Republic	Belgium	f	1
Denmark	Belgium	f	1
Denmark	Belgium	f	1
Iceland	Belgium	f	1

From_country	To_country	Round	OOA
Austria	Belgium	f	0
Bulgaria	Belgium	f	0
Czech Republic	Belgium	f	0
Denmark	Belgium	f	0
Denmark	Belgium	f	0
Iceland	Belgium	f	0

From_country	To_country	Round	OOA
Austria	Armenia	f	1.0000000
Austria	Armenia	sf1	0.3529412
Austria	Armenia	sf1	0.3529412
Belgium	Armenia	f	1.0000000
Bulgaria	Armenia	f	1.0000000
Bulgaria	Armenia	f	1.0000000

	From_country	To_country	Round	OOA
9	Austria	Armenia	f	26
10	Austria	Armenia	sf1	7
11	Austria	Armenia	sf1	7
14	Belgium	Armenia	f	26
18	Bulgaria	Armenia	f	26
19	Bulgaria	Armenia	f	26

	Average_Points	OOA
9	1.339881	2.2137693
10	1.339881	-0.6879442
11	1.339881	-0.6879442
14	1.470934	2.2137693
18	1.034092	2.2137693
19	1.034092	2.2137693

Data Reduction

This section performs data reduction whereby Categorical / Numeric variables are removed if: 1. They have only a single type of observation, 0 or 1 2. They form part of a linear combination with other variables 3. They are strongly associated / correlated with other variables

In total, there are:

- 13 Redundant External Categorical Factors
- 0 Redundant Competition Factors
- 0 Redundant Performance Factors

If two variables are feature a lot of 0s or 1s then there will be a strong association between the two variables as they share a lot of common observations. In such cases, one of the variables can be removed as they both measure the same entity. This lowers the chance of collinearity and reduces the number of dimensions

If two numeric variables are very highly correlated and represent the same entity then it is unnecessary to include them in the data modeling stage. This is particular the case for the migration data. The correlation test function implement is the same as the one that was used during the exploratory analysis section.

Data Output