Part II - PISA 2012 Exploration

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Investigation Overview

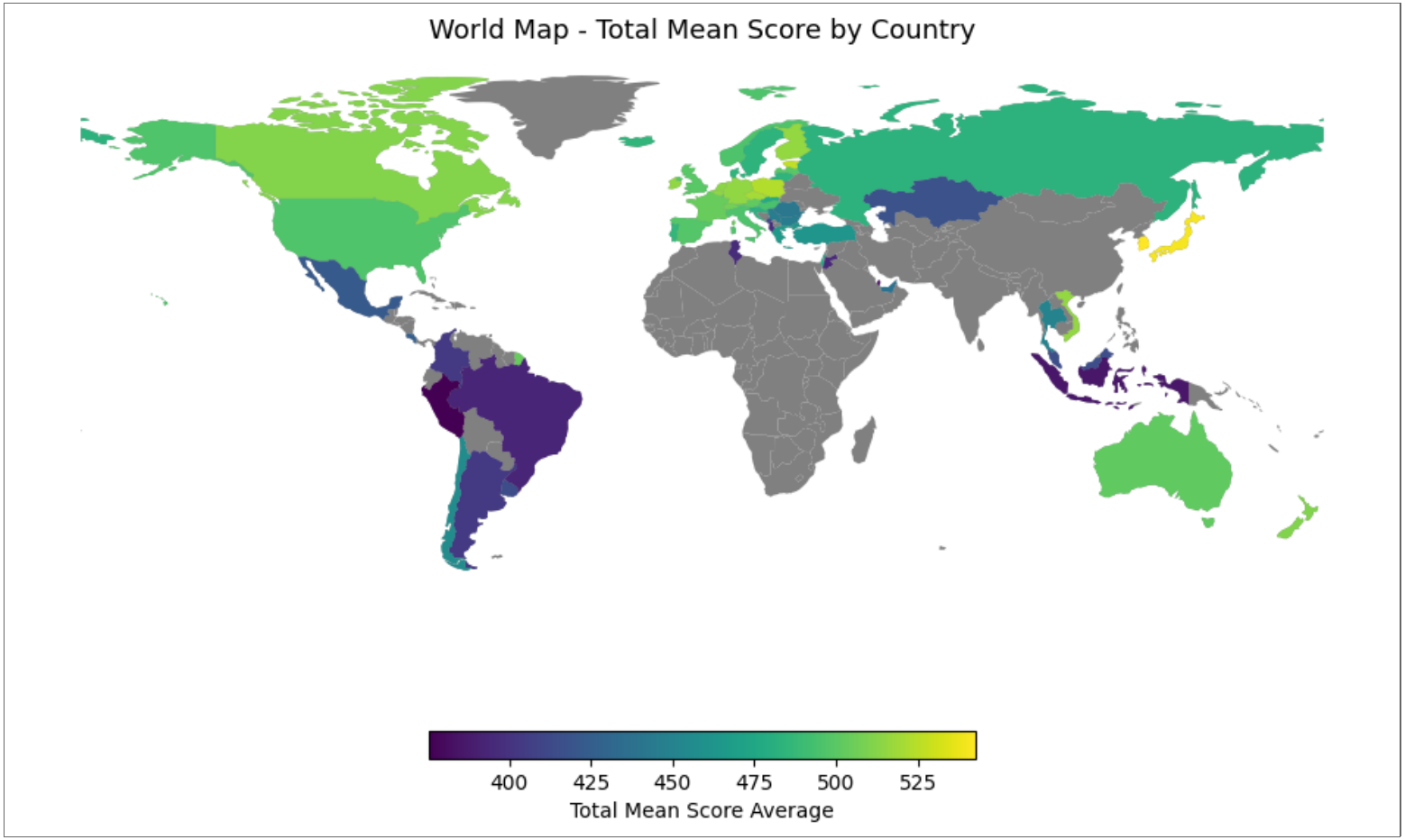
It is known in the education research field that the socio-economic index has an effect on student achievement in school, in the PISA 2018 data base this correlation could be seen clearly. In this analysis, I tried to create Visualization that succeed in illustrating the gaps and the various results that PISA has recorded around the world.

Dataset Overview

The database consists of questionnaire answers and test results of almost half a million children born in 1996, the questionnaire was conducted in 2012. The questionnaire was collected from a random sample represented in 68 different countries that requested to be included in the test. As far as I understand, the database was taken from the PISA website and the udacity team converted it from SPSS to CSV.

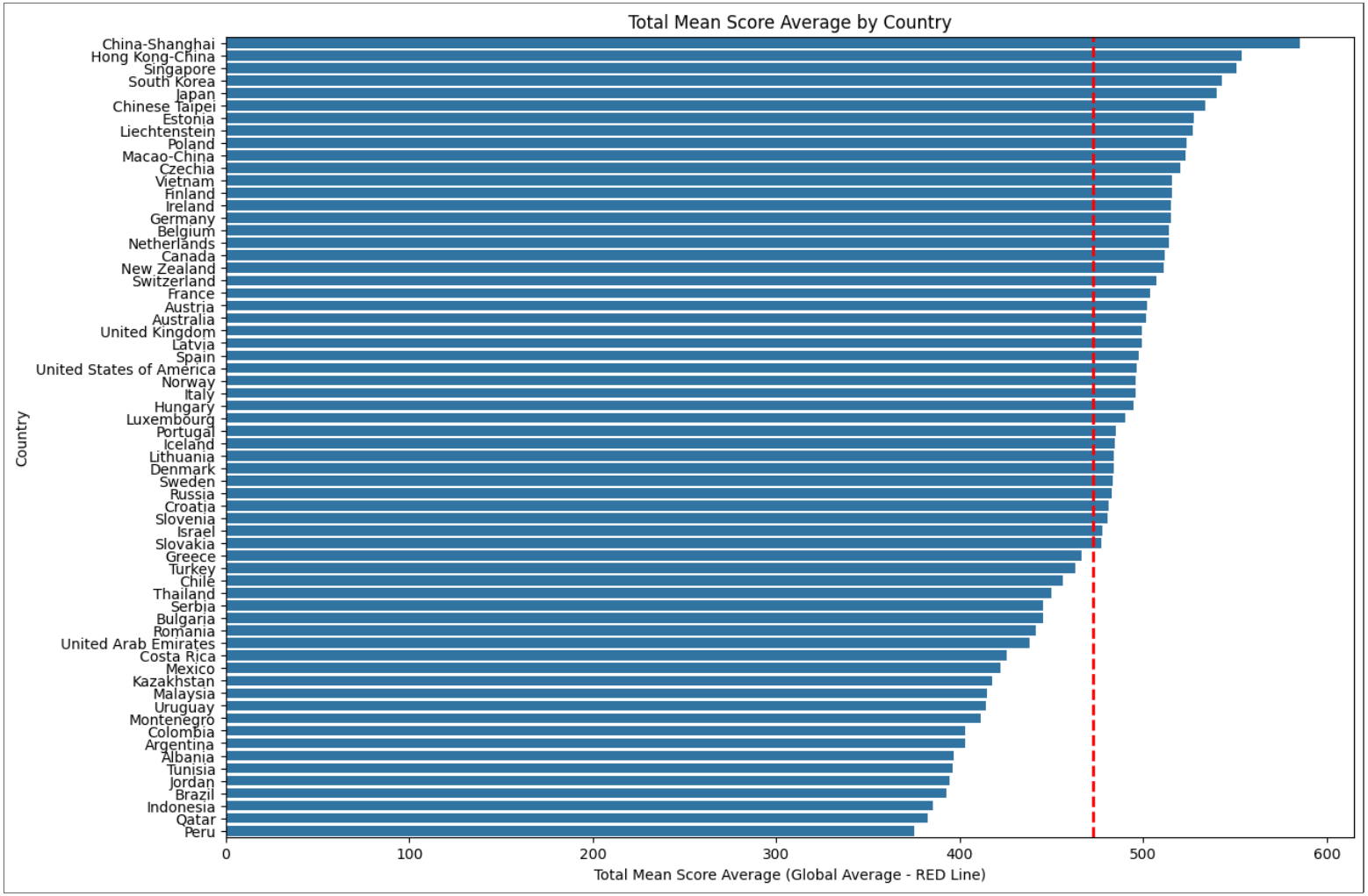
Total Mean Score by Country

- PISA measures students' abilities in three categories - math, science, and reading.
- For the purpose of this analysis, I chose to simplify the data and create an Total Mean Score for each student.
- In the Visualization below we can see all the countries (except micro-countries) that participated in the study and the Total Mean Score of the country's students.


World Map - Total Mean Score by Country
400
425
450
475
500
525
Total Mean Score Average

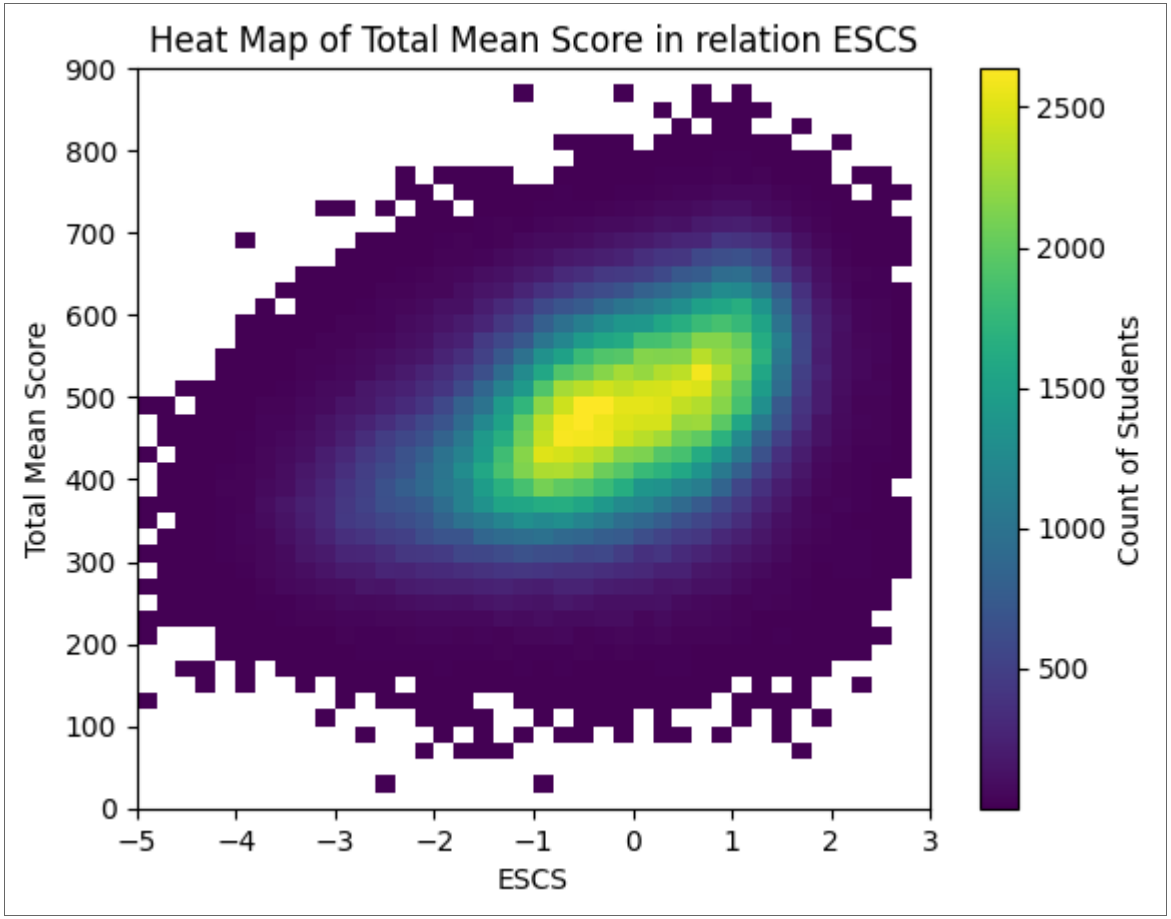
Total Mean Score by Country in a simple bar-plot

To easily see the distribution of scores between the countries, a simple bar plot is attached below that includes all the countries that participated in the study and the global average


Total Mean Score Average by Country
China-Shanghai
Hong Kong-China
Singapore
South Korea
Japan
Chinese Taipei
Estonia
Liechtenstein
Poland
Macao-China
Czechia
Vietnam
Finland
Ireland
Germany
Belgium
Netherlands
Canada
New Zealand
Switzerland
France
Austria
Australia
United Kingdom
Latvia
Spain
United States of America
Norway
Italy
Hungary
Luxembourg
Portugal
Iceland
Lithuania
Denmark
Sweden
Russia
Croatia
Slovenia
Israel
Slovakia
Greece
Turkey
Chile
Thailand
Serbia
Bulgaria
Romania
United Arab Emirates
Costa Rica
Mexico
Kazakhstan
Malaysia
Uruguay
Montenegro
Colombia
Argentina
Albania
Tunisia
Jordan
Brazil
Indonesia
Qatar
Peru
Country
0
100
200
300
400
500
600
Total Mean Score Average (Global Average - RED Line)

Total Mean Score in relation ESCS

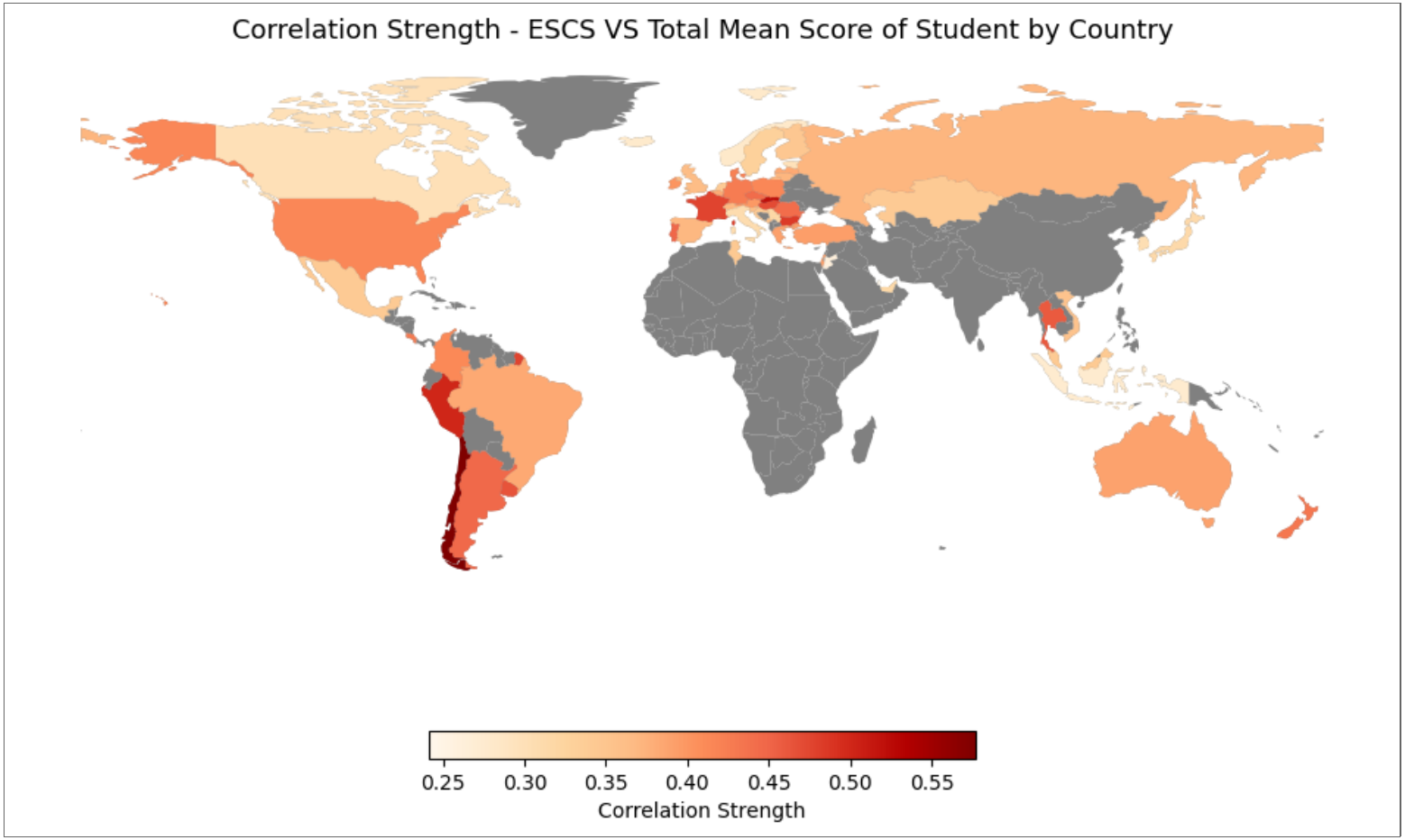
- It is known in the education research field that the socio-economic index has an effect on student achievement in school, in the PISA 2018 data base this correlation could be seen clearly.
- The ESCS index is an integration of various characteristics measured in the PISA study and gives a number that represents the student's socioeconomic index.
- In the Visualization we can clearly see a positive relationship between ESCS and the student's average score


Heat Map of Total Mean Score in relation ESCS
Total Mean Score
ESCS
Count of Students
900
800
700
600
500
400
300
200
100
0
−5
−4
−3
−2
−1
0
1
2
3
2500
2000
1500
1000
500

Correlation Strength - ESCS Level VS Total Mean Score of Student by Country

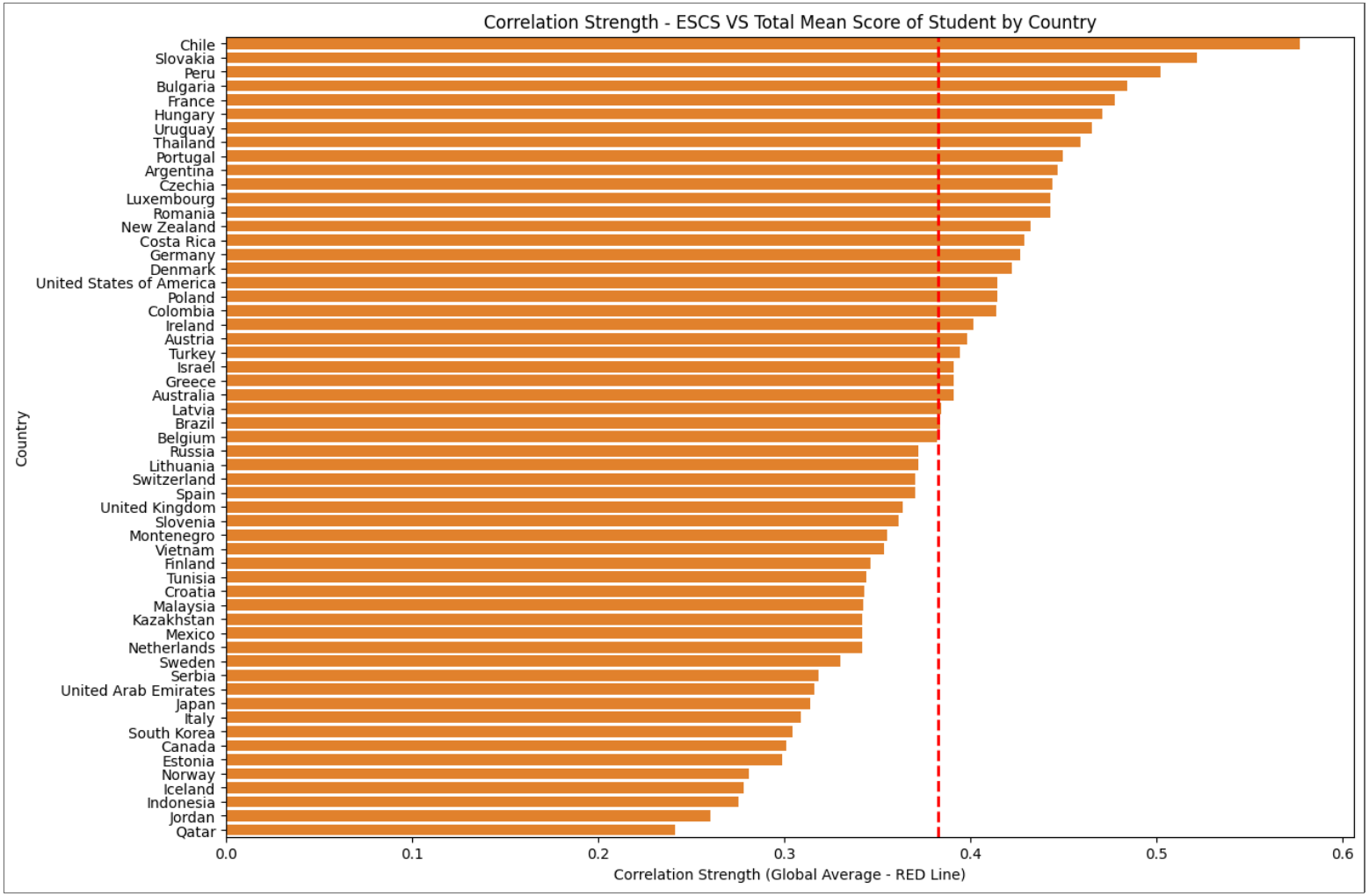
In the Visualization below we can see the strength of the relationship between the socio-economic status (ESCS) and the student's grade by country. The stronger the correlation, the more significant the student's socioeconomic status is as a predictor of his Total Mean Score.

- 0 indicates that there is no correlation, 1 indicates that there is a complete correlation.


Correlation Strength - ESCS VS Total Mean Score of Student by Country
0.25
0.30
0.35
0.40
0.45
0.50
0.55
Correlation Strength

Correlation Strength - ESCS Level VS Total Mean Score of Student by Country in a bar-plot

It is my opinion that the strength of the correlation between the socioeconomic index and the student's grades is a relatively good assessment, even if a little superficial, of the level of equality in the education system in different countries. The smaller the correlation, it can be assumed that the education system in the country provides the same level of education to all students. In order to confirm my thesis, a comparison is needed here between the research countries over the years and an examination of the trends.


Correlation Strength - ESCS VS Total Mean Score of Student by Country
Country
Chile
Slovakia
Peru
Bulgaria
France
Hungary
Uruguay
Thailand
Portugal
Argentina
Czechia
Luxembourg
Romania
New Zealand
Costa Rica
Germany
Denmark
United States of America
Poland
Colombia
Ireland
Austria
Turkey
Israel
Greece
Australia
Latvia
Brazil
Belgium
Russia
Lithuania
Switzerland
Spain
United Kingdom
Slovenia
Montenegro
Vietnam
Finland
Tunisia
Croatia
Malaysia
Kazakhstan
Mexico
Netherlands
Sweden
Serbia
United Arab Emirates
Japan
Italy
South Korea
Canada
Estonia
Norway
Iceland
Indonesia
Jordan
Qatar
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Correlation Strength (Global Average - RED Line)

Key Insights

- Educational systems around the world see different importance in the right to equality in education (educational justice). Creating a test to stand for equality in the system over time and its effects on student achievement can give us many insights and help in the public discourse and data-based policy promotion.
- The PISA database is an amazing tool for international comparison of the various education systems. Caution is required and it is dangerous to draw conclusions from measurements of only one year, yet the examination of the trends throughout the years of the study can greatly contribute to the participating countries and the field of education research.