



STUDY GROUP 4

**BETTER  
SCHOOLS  
FOR ALL**

A background image showing a group of children in a classroom or school setting. In the foreground, a young boy is looking up and holding a brown bag with the UNICEF logo. Other children in the background are also holding similar bags. The image is overlaid with a semi-transparent dark brown filter.

## SUSTAINABLE DEVELOPMENT GOAL: 4

Ensure **inclusive and equitable quality education** and promote lifelong learning opportunities for all.

# SOURCE OF DATA

**DEPARTMENT OF EDUCATION  
EDUCATION ANALYTICS 2015**

**CLEANED  
SORTED  
FILTERED**

School ID  
School Name  
Region

Total Enrollees  
Total Classrooms  
Geographic Data

# THE METHOD OLOGY

## EXPLORATORY DATA ANALYSIS

Gather topline learning through descriptive analytics

## FEATURES ENGINEERING

Create new features using existing data pertinent to the exploration

## K-MEANS CLUSTERING

Harness the power of machine learning to discover patterns in the data

## INSIGHT GATHERING

Interpret results and design next steps & recommendations

**LOWEST: NCR**

**605**

schools per region

**HIGHEST: REGION VI**

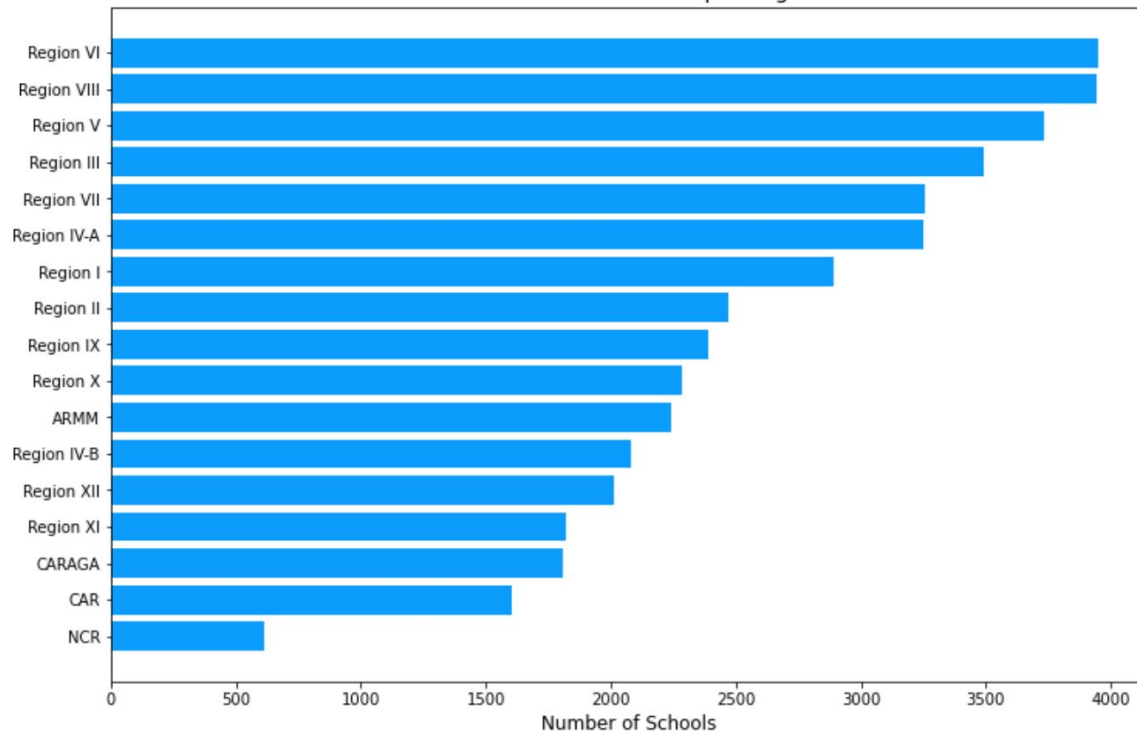
**3,924**

schools per region

AROUND

**6X MORE**

Total Number of Schools per Region





LOWEST: CAR

**293K**

enrollees  
per region

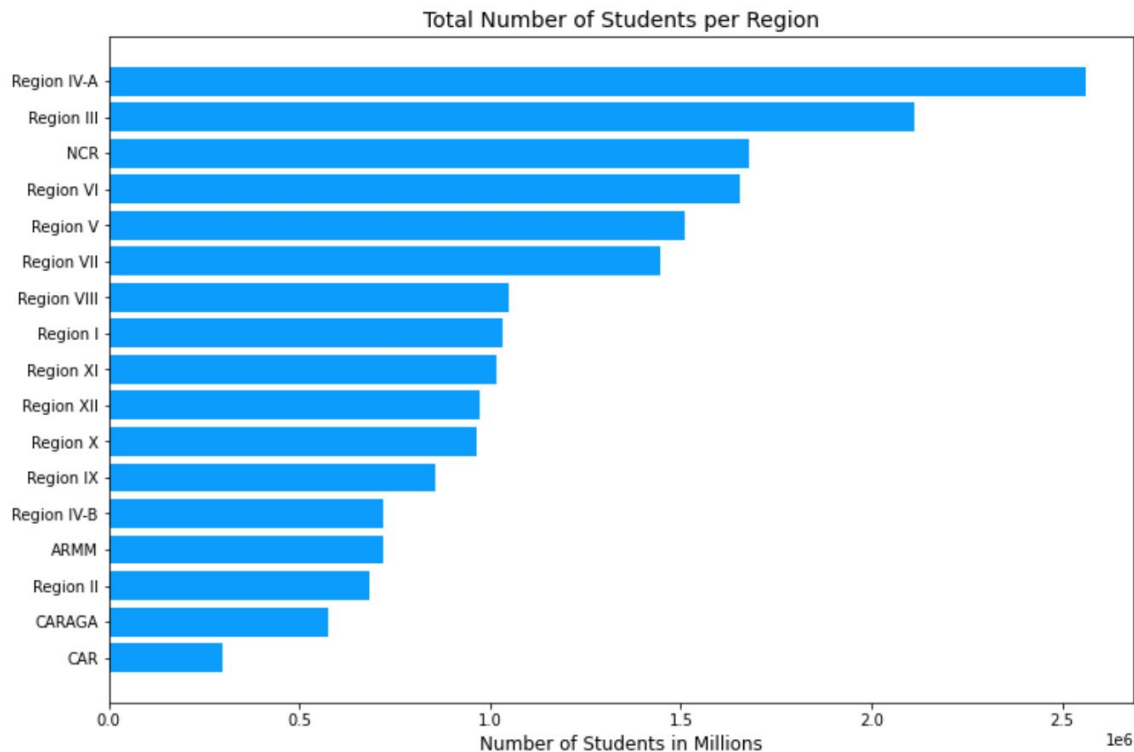
HIGHEST: REGION IV-A

**2.5M**

enrollees  
per region

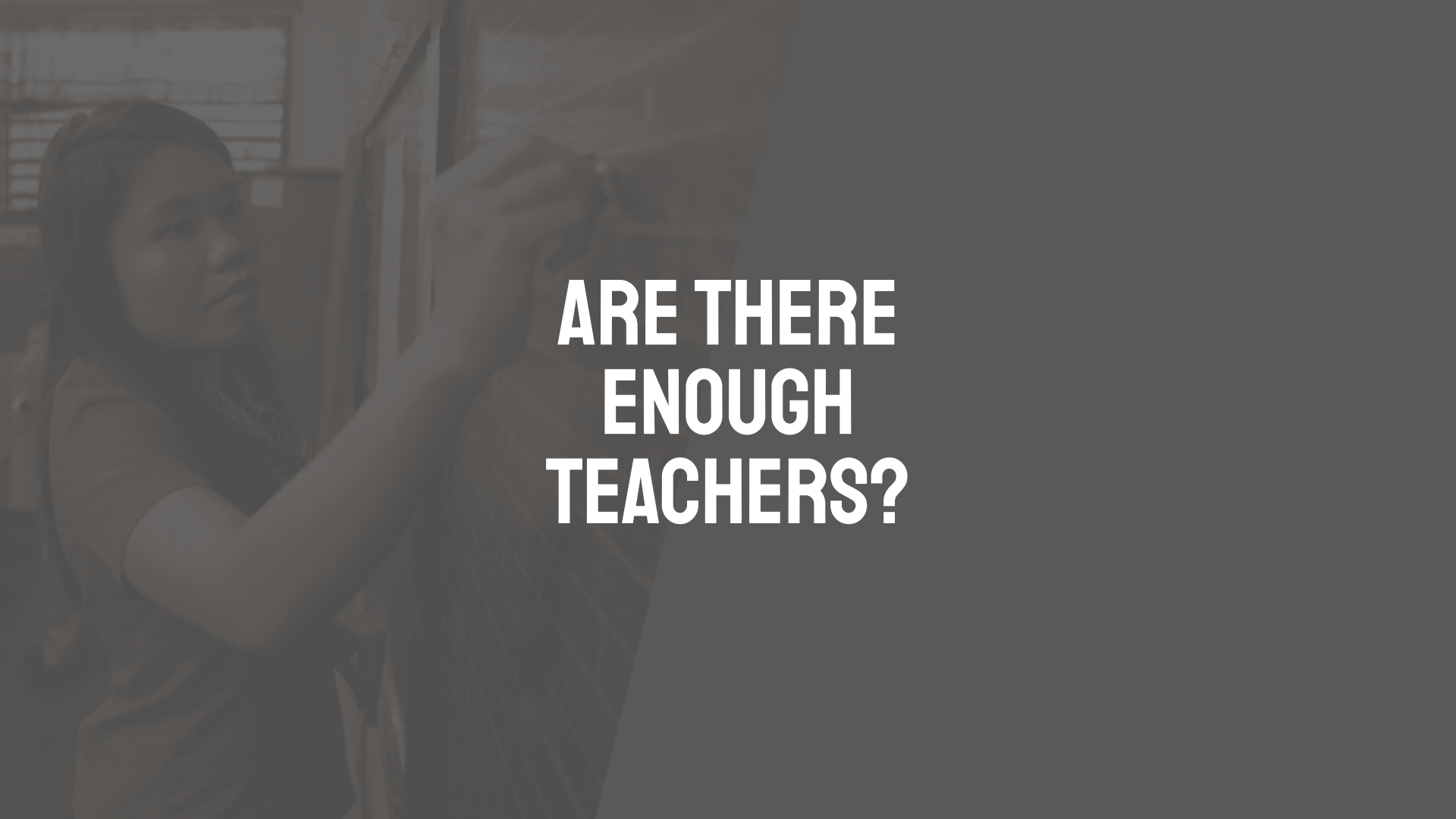
AROUND

**8X MORE**



**ARE THESE  
SCHOOLS  
ENOUGH?**



A woman with long dark hair, wearing a dark top, is standing in a classroom and writing on a large whiteboard. She is looking at the board with a focused expression. The background shows a window with horizontal blinds and some wooden structures. The image is dimmed, and a large, semi-transparent dark grey triangle is overlaid on the right side, containing the text.

**ARE THERE  
ENOUGH  
TEACHERS?**



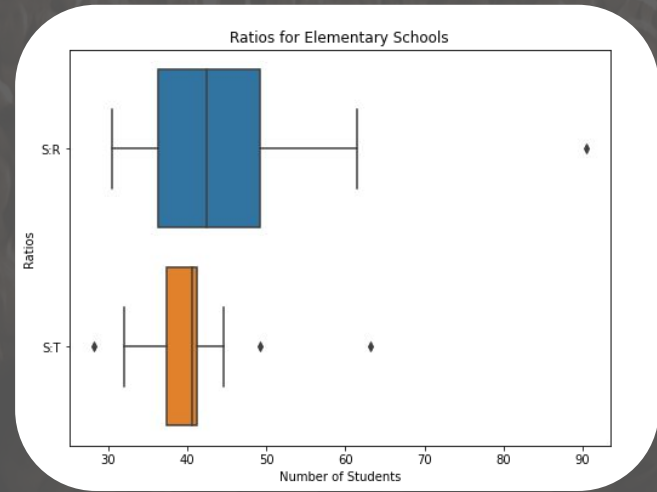


**DO WE HAVE  
ENOUGH CLASSROOMS?**

## OVERALL STUDENT-TEACHER RATIOS

**49** HIGHEST:  
REG XII

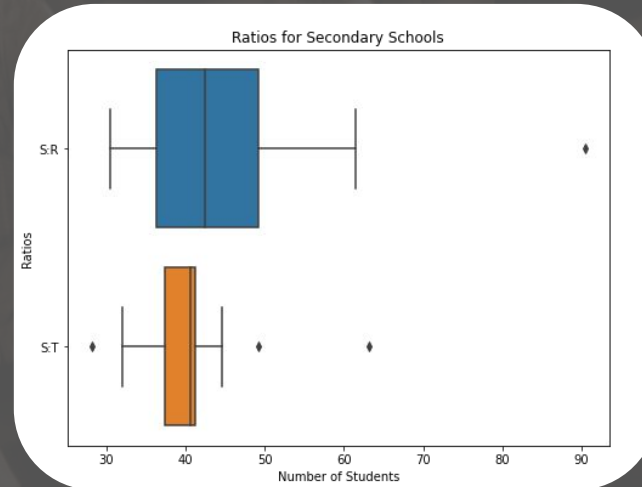
**26** LOWEST:  
CAR



## OVERALL STUDENT-ROOM RATIOS

**93** HIGHEST:  
NCR

**31** LOWEST:  
CAR



Distribution  
of Ratios per  
Elementary  
& Secondary  
Schools

**LOWEST: CAR**

**167**

enrollees  
per school per region

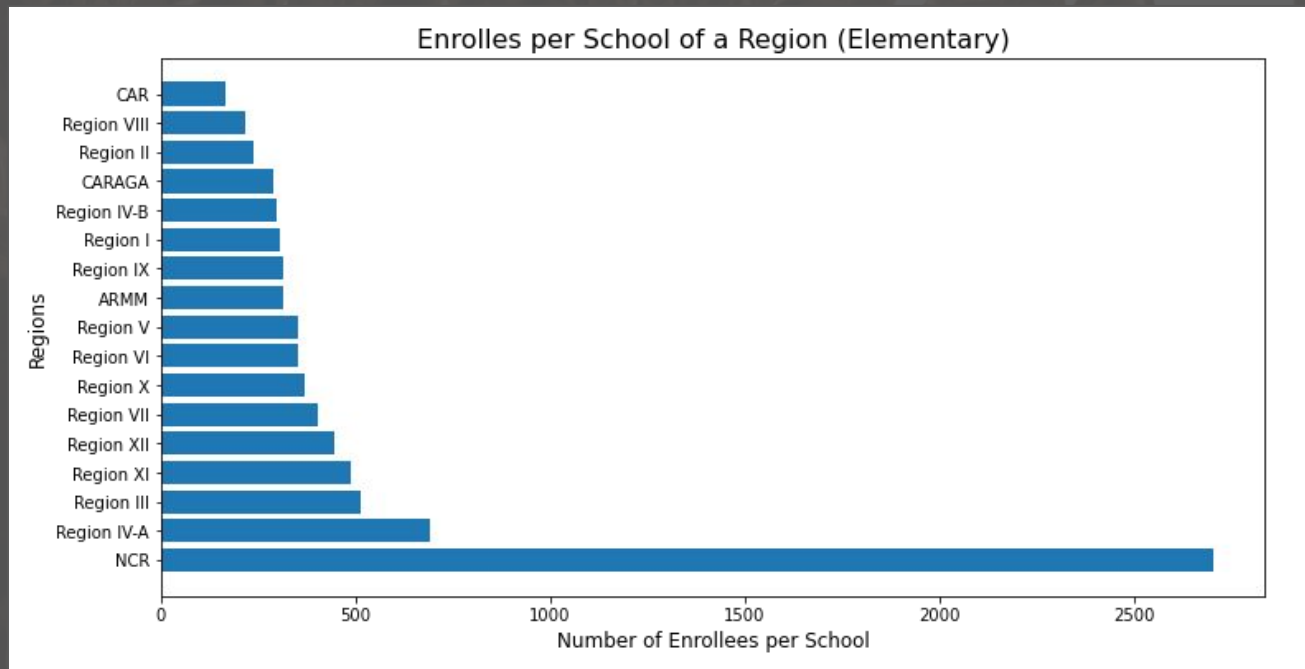
**HIGHEST: NCR**

**2,702**

enrollees  
per school per region

AROUND

**16X MORE**



LOWEST: CAR

356

enrollees  
per school per region

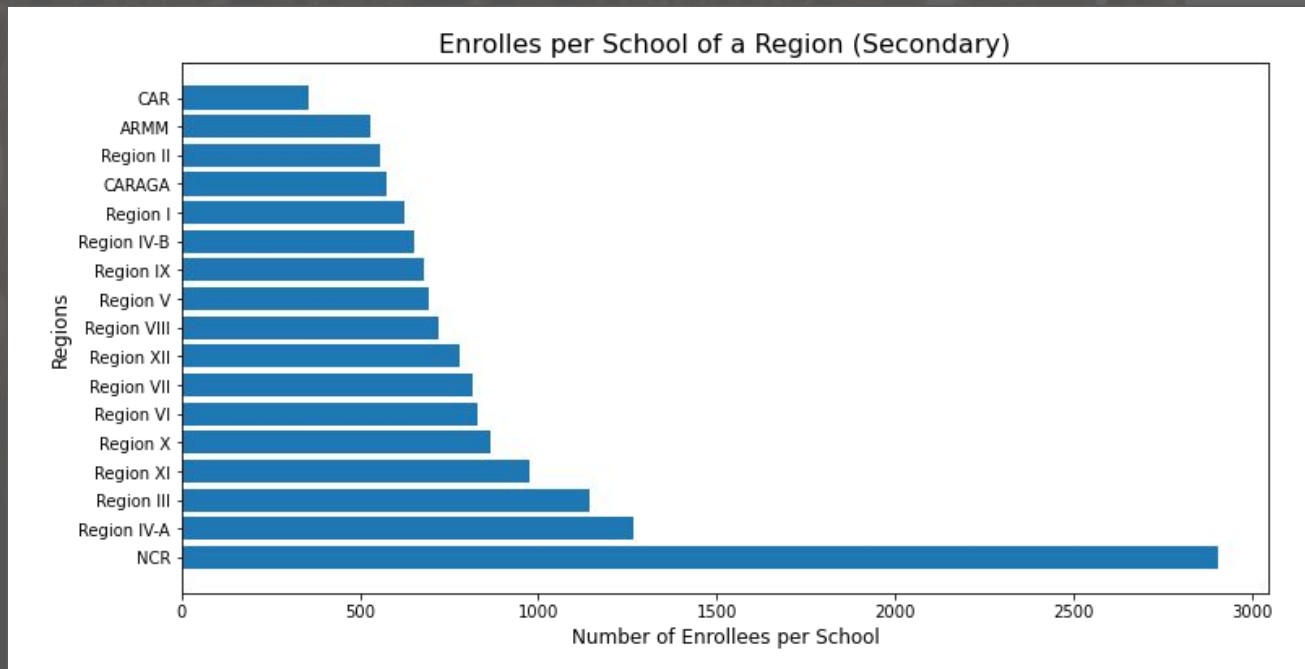
HIGHEST: NCR

2,903

enrollees  
per school per region

AROUND

8X MORE



An aerial photograph of a city grid, showing a dense pattern of buildings and streets. The image is overlaid with a dark, semi-transparent filter, making the colors appear muted and the overall tone dark. The text is centered in the middle of the image.

**WHERE SHOULD WE  
BUILD SCHOOLS THEN?**



# K-MEANS CLUSTERS

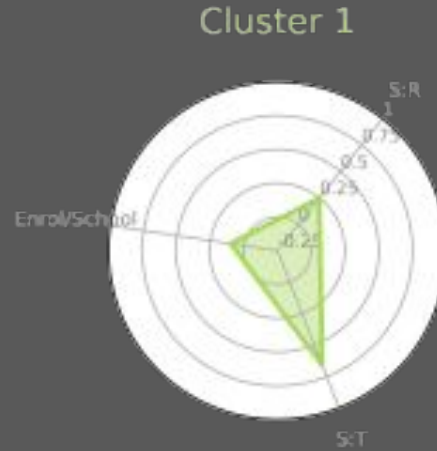
ELEMENTARY

$n\_clusters = 3$   
silhouette score = 0.48



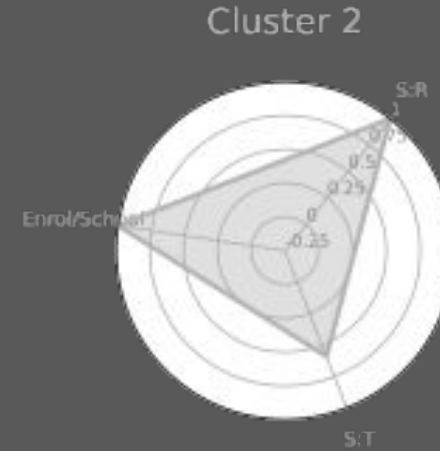
## BALANCED

Enough teachers and rooms  
for the number of students



## UNDERSTAFFED

Not enough teachers for the  
number of students



## OVER-CAPACITY

Not enough rooms for the  
number of students

# K-MEANS CLUSTERS

ELEMENTARY

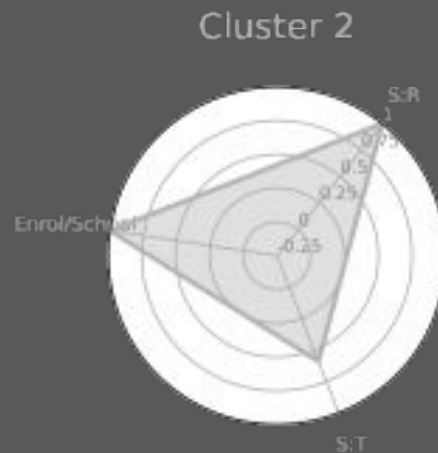
$n\_clusters = 3$   
silhouette score = 0.48



**BALANCED**  
12 Total



**UNDERSTAFFED**  
4 Total

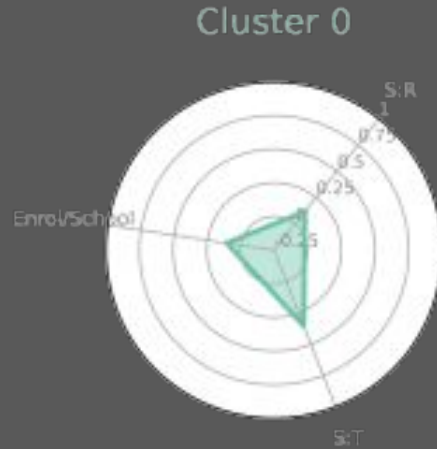


**OVER-CAPACITY**  
1 Total (NCR)

# K-MEANS CLUSTERS

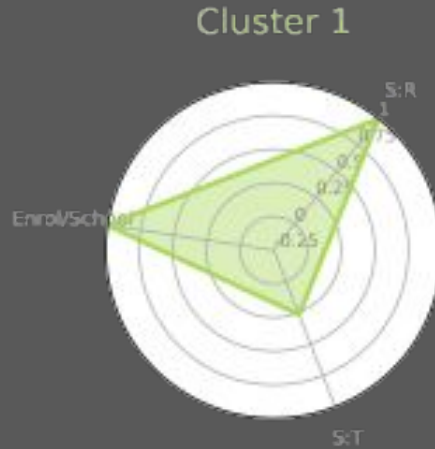
SECONDARY

n\_clusters = 3  
silhouette score = 0.605



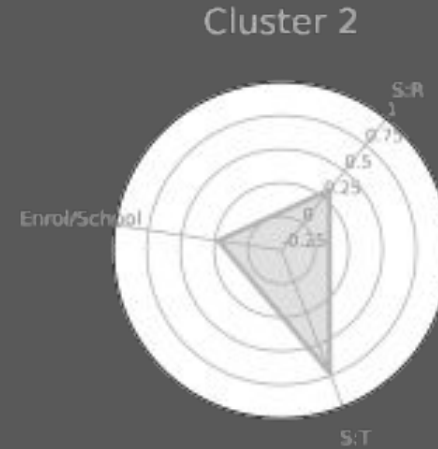
**BALANCED**

Enough teachers and rooms  
for the number of students



**OVER-CAPACITY**

Not enough rooms for the  
number of students



**UNDERSTAFFED**

Not enough teachers for the  
number of students

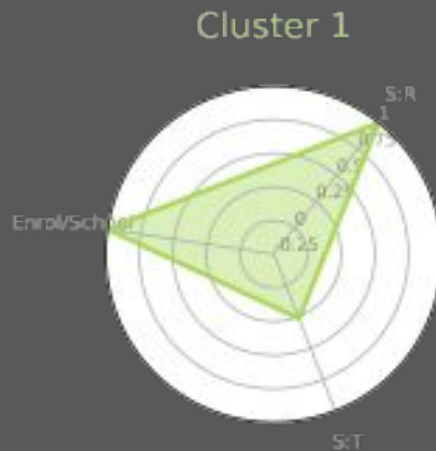
# K-MEANS CLUSTERS

SECONDARY

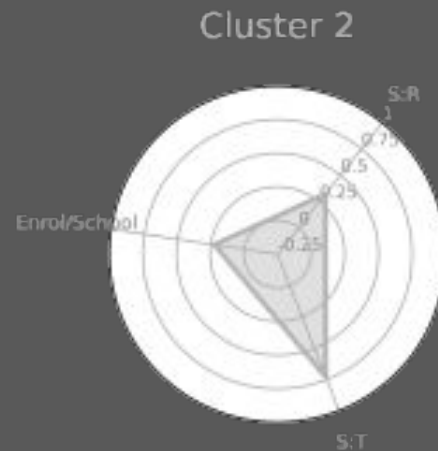
n\_clusters = 3  
silhouette score = 0.605



**BALANCED**  
15 Total



**OVER-CAPACITY**  
1 Total (NCR)

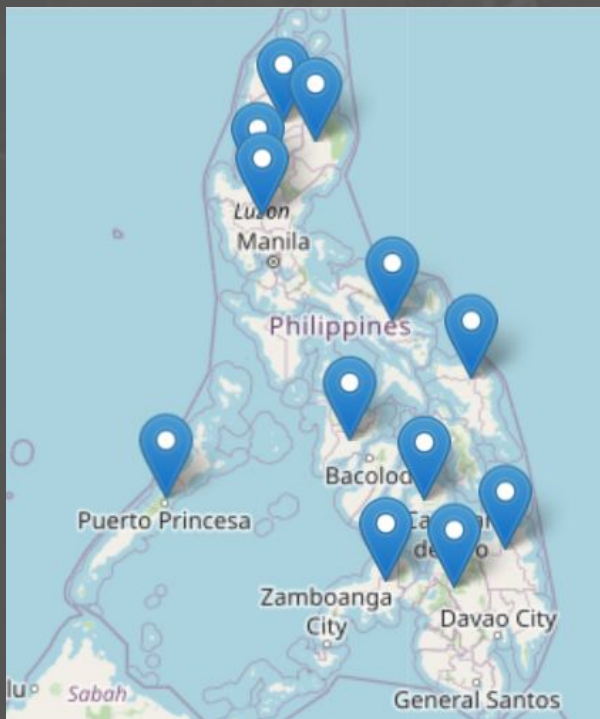


**UNDERSTAFFED**  
1 Total (ARMM)

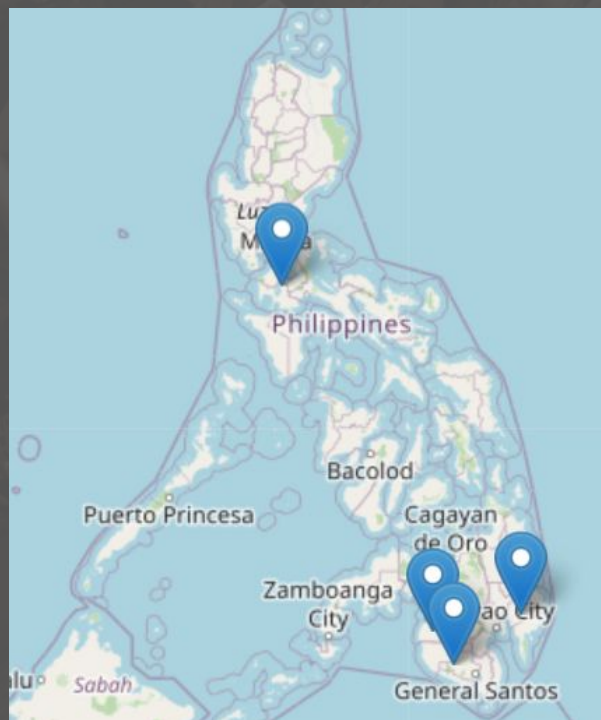
# THE MAP

Based on the data, we can now identify which regions need support when it comes to staff and facilities.

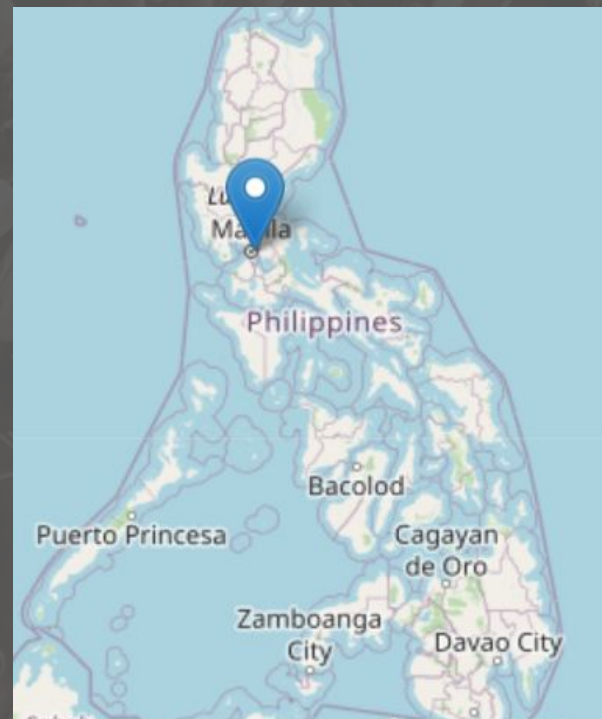
\*For future studies, we can explore increasing the granularity and using other ML algorithms.



**BALANCED  
ELEMENTARY SCHOOLS**



**UNDERSTAFFED  
ELEMENTARY SCHOOLS**



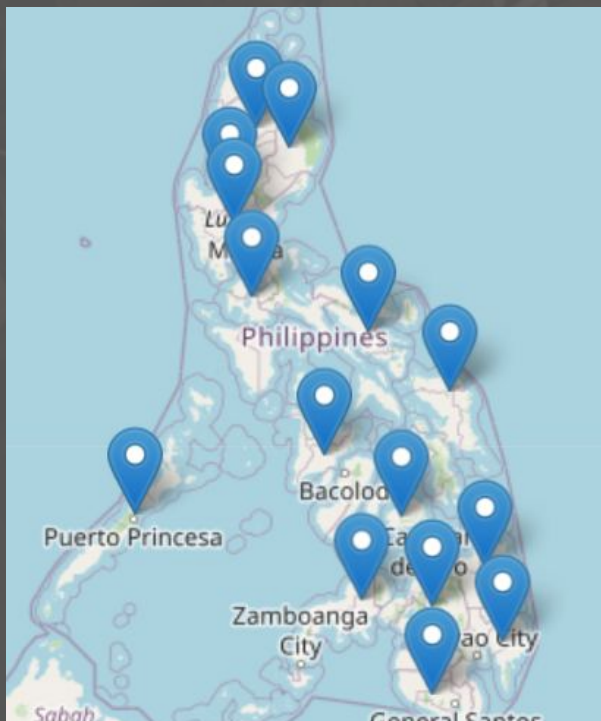
**OVER-CAPACITY  
ELEMENTARY SCHOOLS**



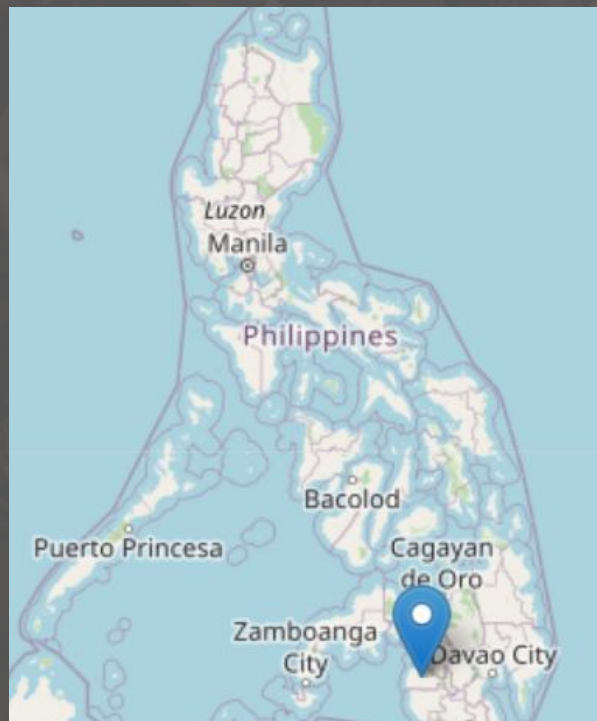
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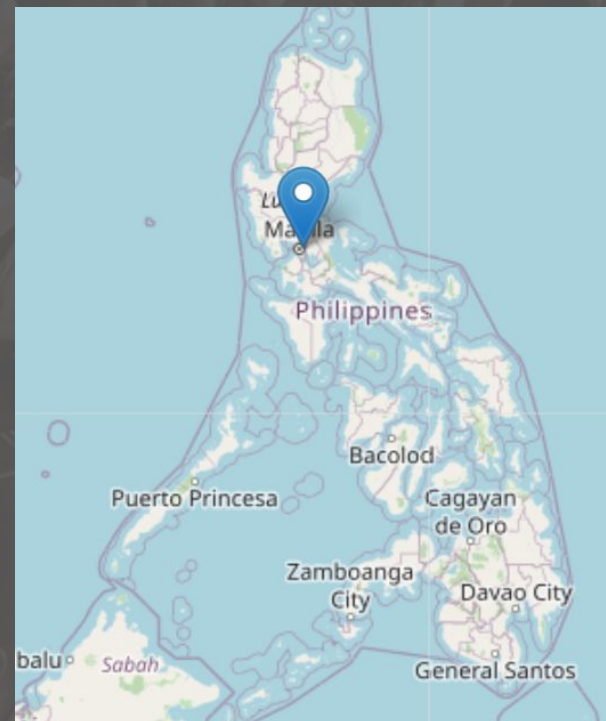
\*For future studies, we can explore increasing the granularity and using other ML algorithms.



**BALANCED  
SECONDARY SCHOOLS**



**UNDERSTAFFED  
SECONDARY SCHOOLS**



**OVER-CAPACITY  
SECONDARY SCHOOLS**

# A CAVEAT

Schools are focused on increasing their capacity (rooms) but may **not be paying attention to the number of teachers.**

Enrollees per School and  
Student-to-Room Ratio

**0.88** CORRELATION  
SCORE

Enrollees per School and  
School-to-Teacher Ratio

**-0.06** CORRELATION  
SCORE

Correlation Matrix of Region Features



A young child in a school uniform is smiling and writing in a notebook. The background is slightly blurred, showing other children in a classroom setting. The text is overlaid on the right side of the image.

# RECOS & NEXT STEPS

**Increase granularity of study** beyond just regions, including province, or even specific cities and schools using other ML algorithms.

Given that the regions who need help have been identified, there is merit in **studying how best to optimize the allocation of budget spend** and resources on the identified regions.

A young child in a school uniform is sitting at a desk, writing in a notebook. The child is looking towards the camera with a slight smile. In the background, other children are visible, also in school uniforms, sitting at their desks. The image has a dark, semi-transparent overlay on the right side, where the text is placed.

**WHERE DO WE  
BUILD SCHOOLS?**

A young boy with dark hair, wearing a white school uniform, is smiling broadly while sitting at a desk and writing in a notebook with a pen. He is looking towards the camera. In the background, other students are visible but out of focus. The entire image has a dark, semi-transparent overlay.

**HOW DO WE  
MAKE SCHOOLS  
BETTER?**





**QUESTIONS?**