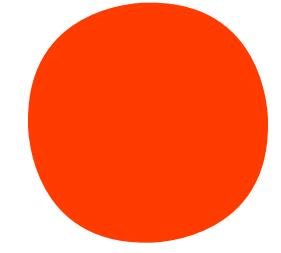


DATA VISUALIZATION

I. TIME-BASED DATA	2
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III. TREES & NETWORKS	11
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1. TIME-BASED DATA

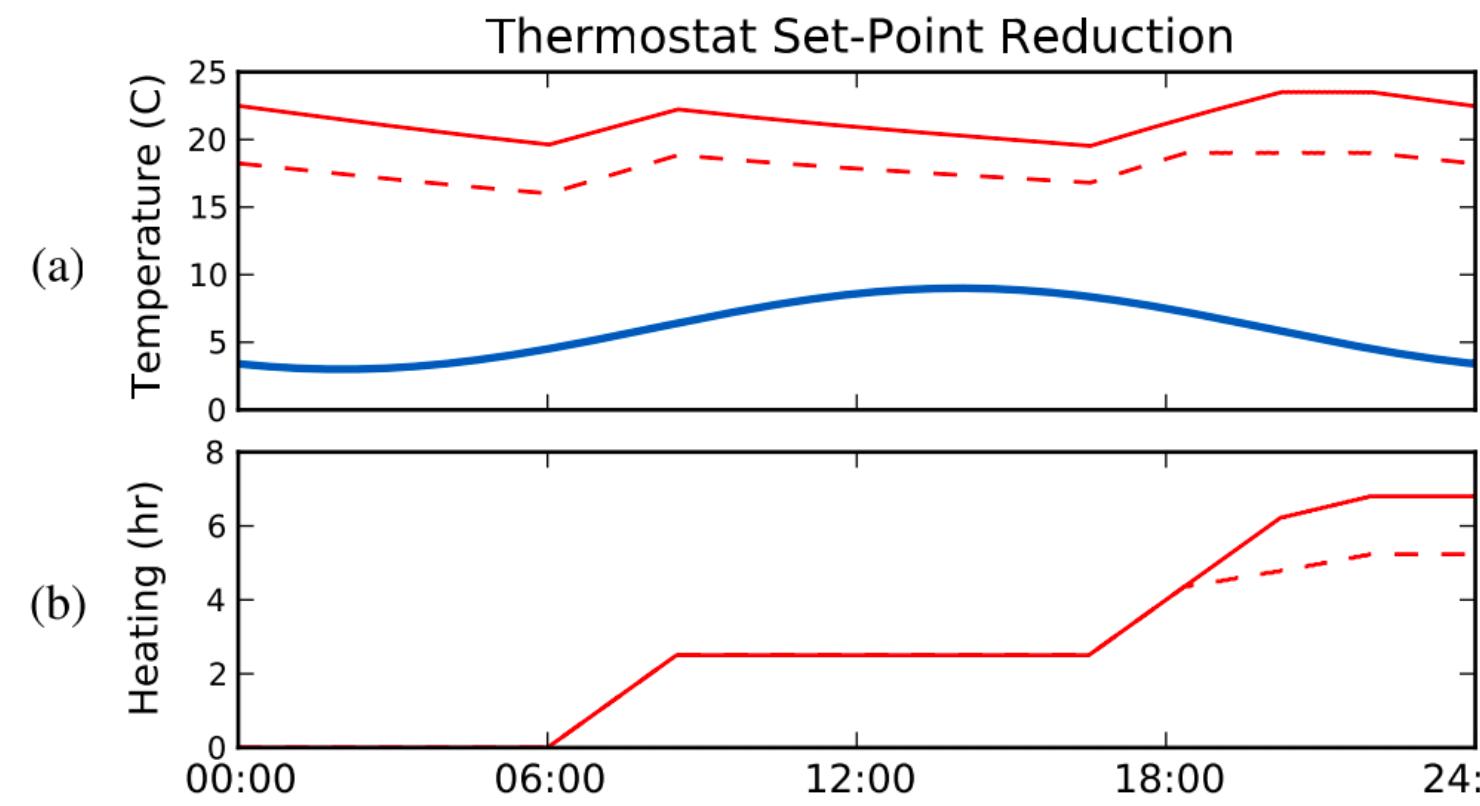
1.1 Real-time cost

1.2 Temperature in two rooms

1.3 Comparasion with average energy comsumption

■ LITERATURE

- Compared the users' set point of thermostat's temperature, which make users lower their set point.
- displayed the money the user saved helps reducing energy consumption.(Rogers 2012)
- Displaying real-time cost help decrease the energy cost (Shann 2016)
- Massive data task design: Overview/ Zoom in/ Filter/ Details/ Relate (Shneiderman 1996)



■ METHOD

1. Re-aggregate the data in different views (day, week, month), Calculate energy cost based on battery data.
2. Visually compared the users' energy consumption to the overall household lowest, average and highest consumption.
3. Use Line or bar Chart with dots to identify the max&min value (Nathan, 2011)



I. TIME-BASED DATA | Real-time temperature & cost display

■ HUMAN PERCEPTION

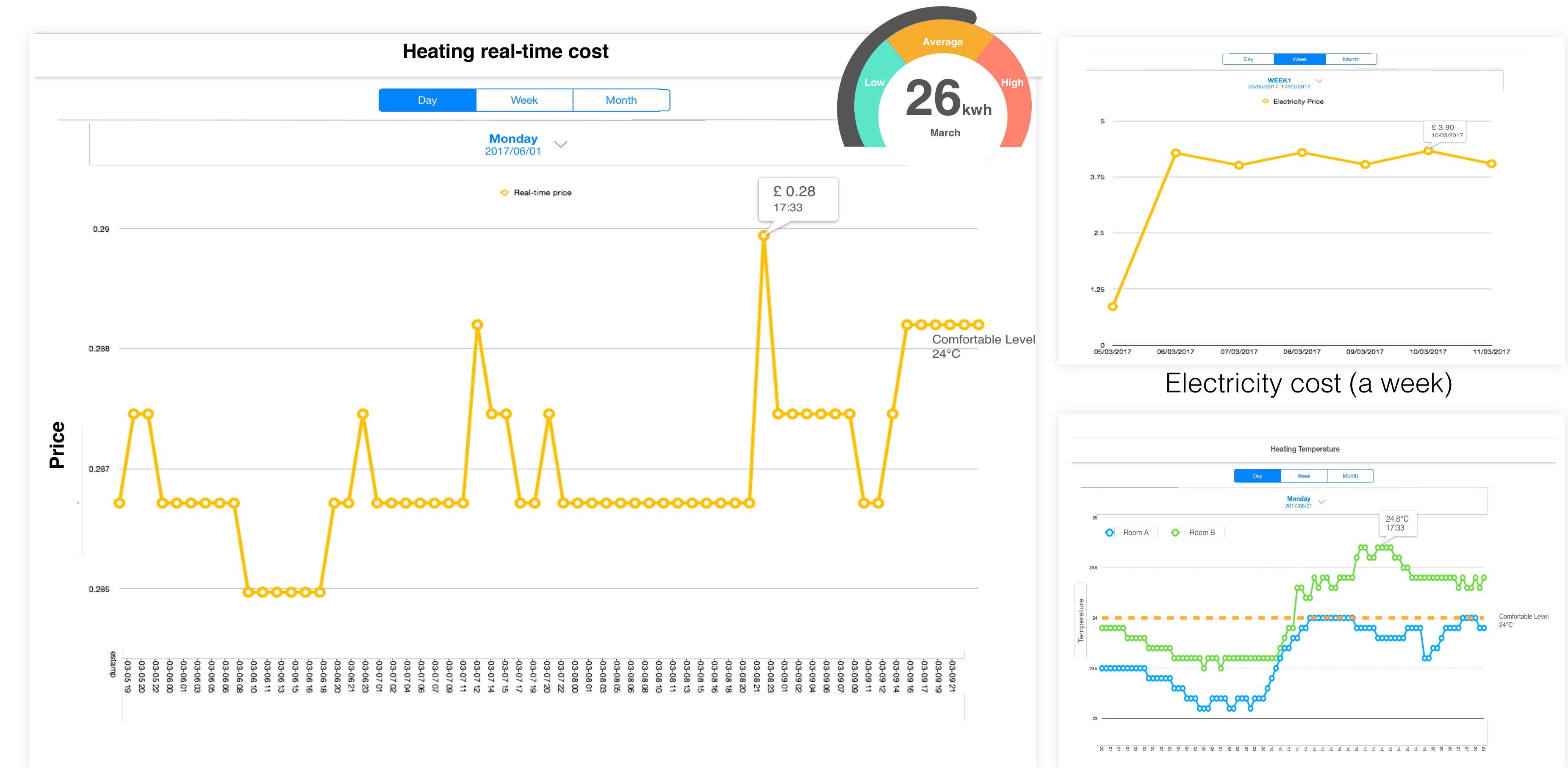
Electricity cost of heating:

Two axes were used to present information in three dimensions: cost, time and temperature.

Pie Chart:

High-contrast color - highlight the comparison. Using green, orange and red to represent different levels of electricity consumption.

Temperature in two rooms: green and blue are designed to distinguish temperature record from two rooms.



Real-time electricity cost of the heating (a day)

Heating temperature in two rooms

Q1: Did we waste energy?

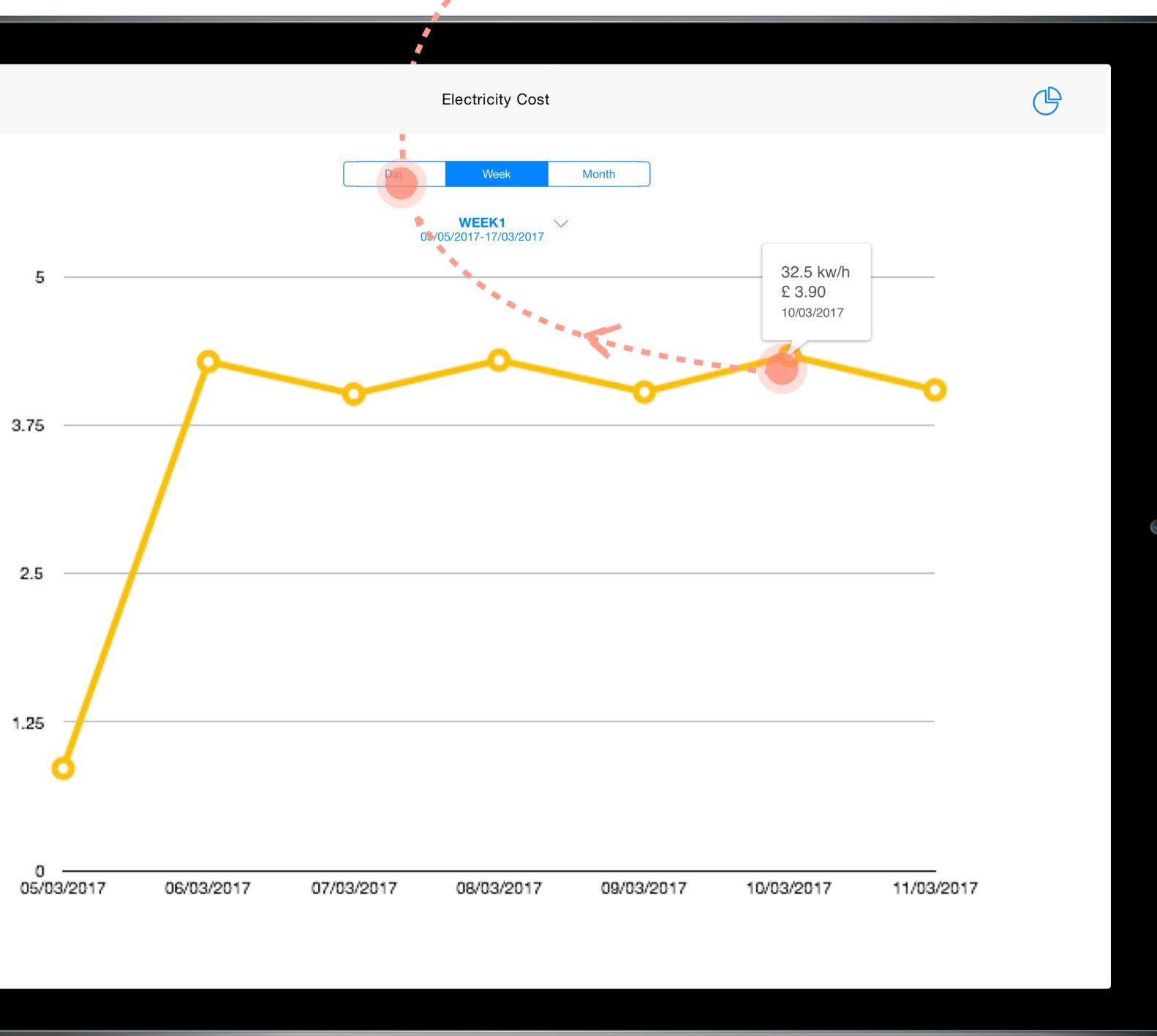
Q2: Is there any chance to save energy?

Q3: Are the heatings set to the comfortable level?

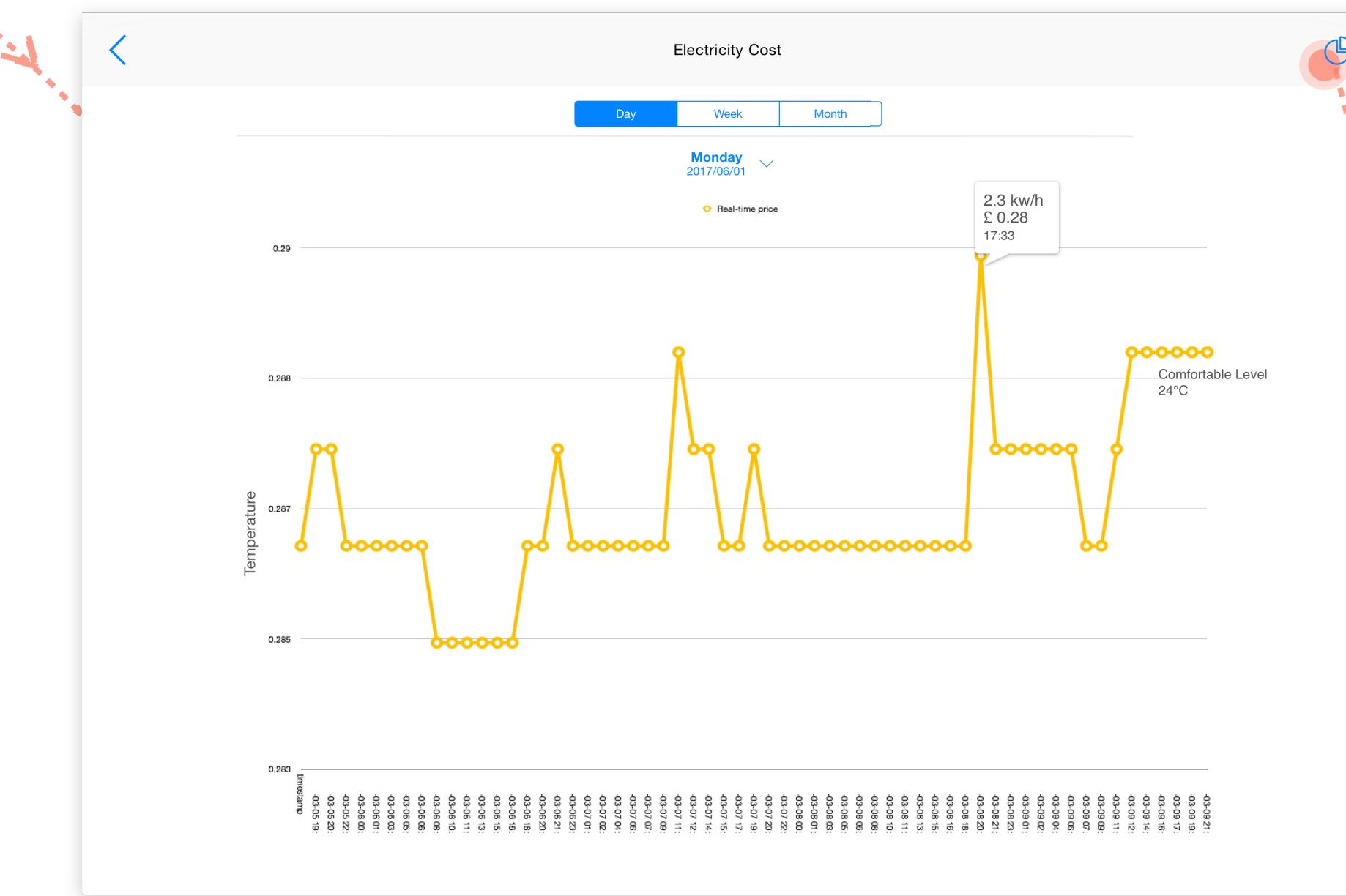
Q4: Is there a difference of temperature across the rooms?

■ INTERACTION (Device: Tablet)

It is designed to be displayed on tablets since it there would be more space to present both the overview of the cost and details clearly comparing to other device. However, other the data should also be available from other platform.

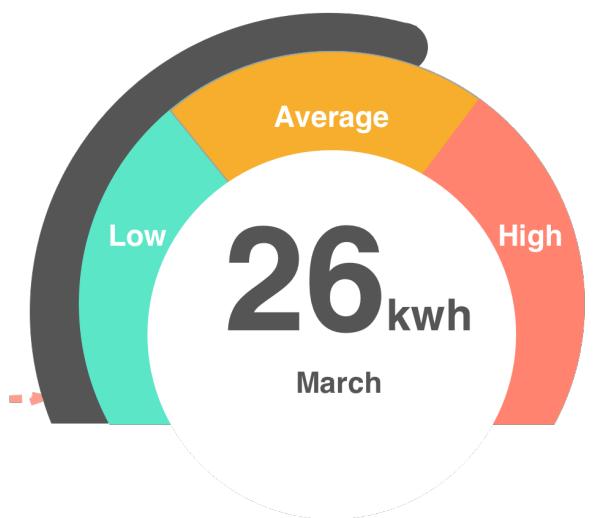


1. Users can **switch the view** between day, week or month.



2. Click on the dot, a message with detailed information, including corresponding temperature, time, and cost.

3. Click on the icon can lead users to the pie-chart view.



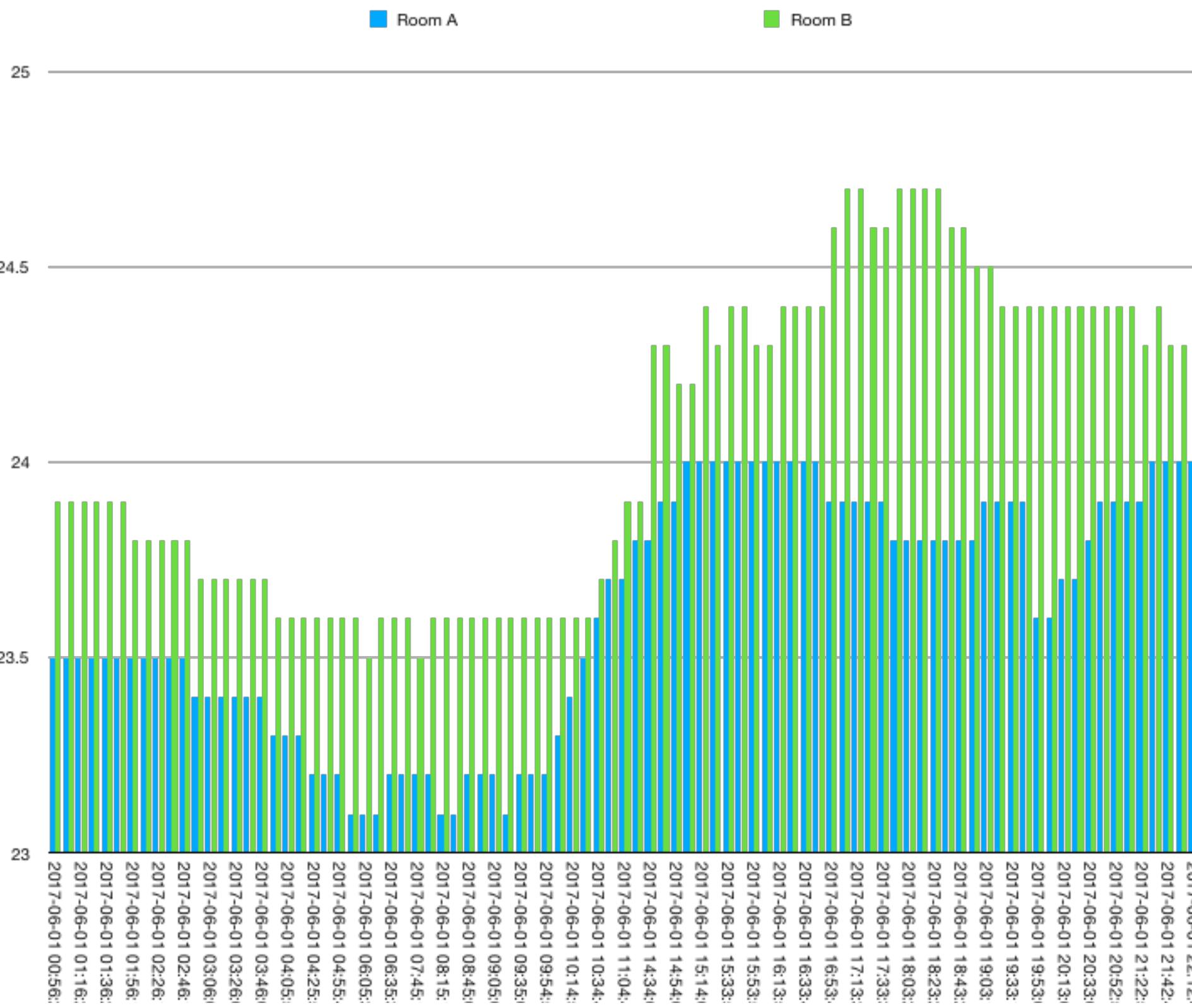
Comparison between the user's energy consumption and average household consumption.

Real-time electricity cost of the heating (a day)

Electricity cost (a week)

■ EVALUATION

When I plot the diagram of two-room temperature, I firstly tried bar chart. Whether line chart is better than bar chart, where the bar is too thin to be clicked. Which means there is no way to display the details. Therefore I changed to the line chart. However it was unknown that whether my deduction was correct. Hence, a evaluation comparing bar chart and line chart should be conducting.

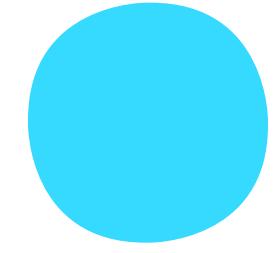


VS



Temperature in two rooms (Line Chart)

Temperature in two rooms (Bar Chart)



2. CATEGORICAL & HIERARCHICAL

- 2.1 Gender distribution in UCL departments
- 2.2 Gender balance in each department
- 2.3 The change of Gender balance over time

■ LITERATURE

There are three types of diagram can nicely display proportion data including pie chart, stacked bar chart and line chart. (Yau 2015)

■ METHODS

Since there is a great number of departments, stacked bar can better display an overview of the whole data, and answer the questions : which department are relatively the most or least genderbalanced (Yau 2015).

However more details can still be viewed after selecting one particular bar or department.

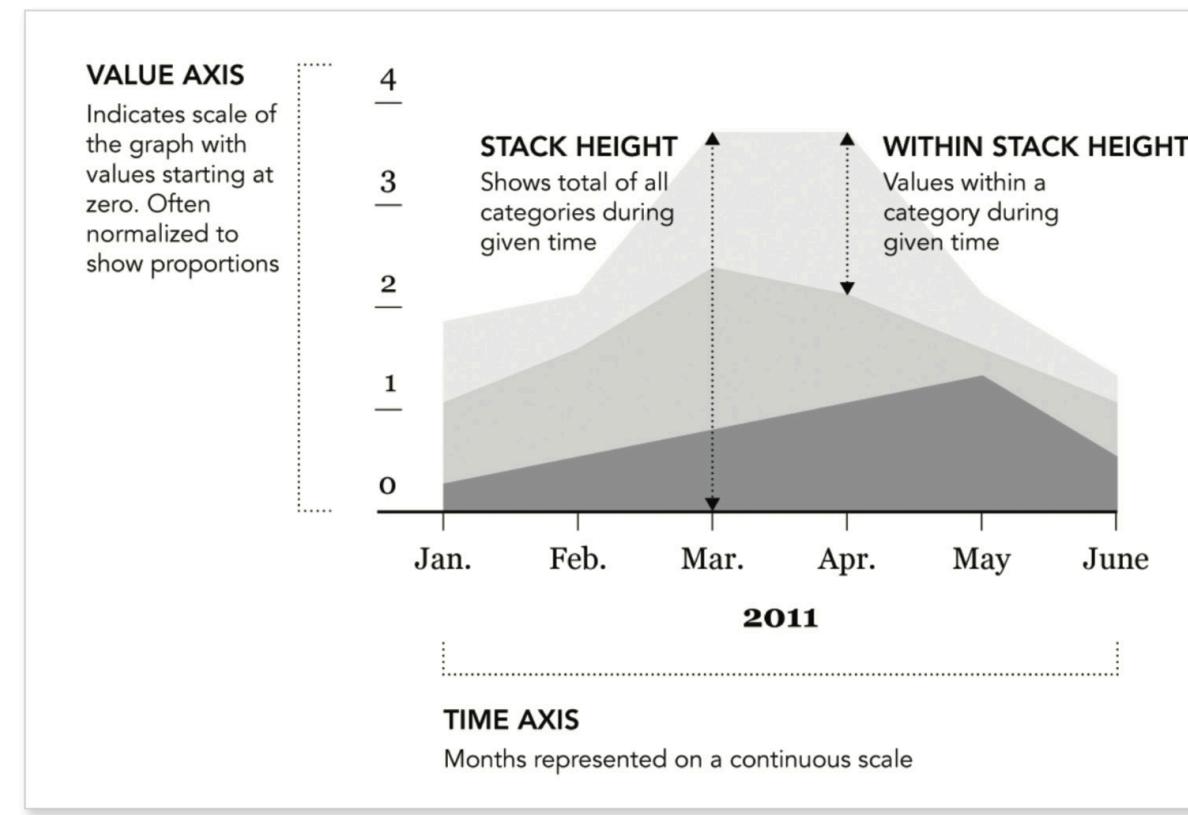


FIGURE 5-20 Stacked area chart generalized

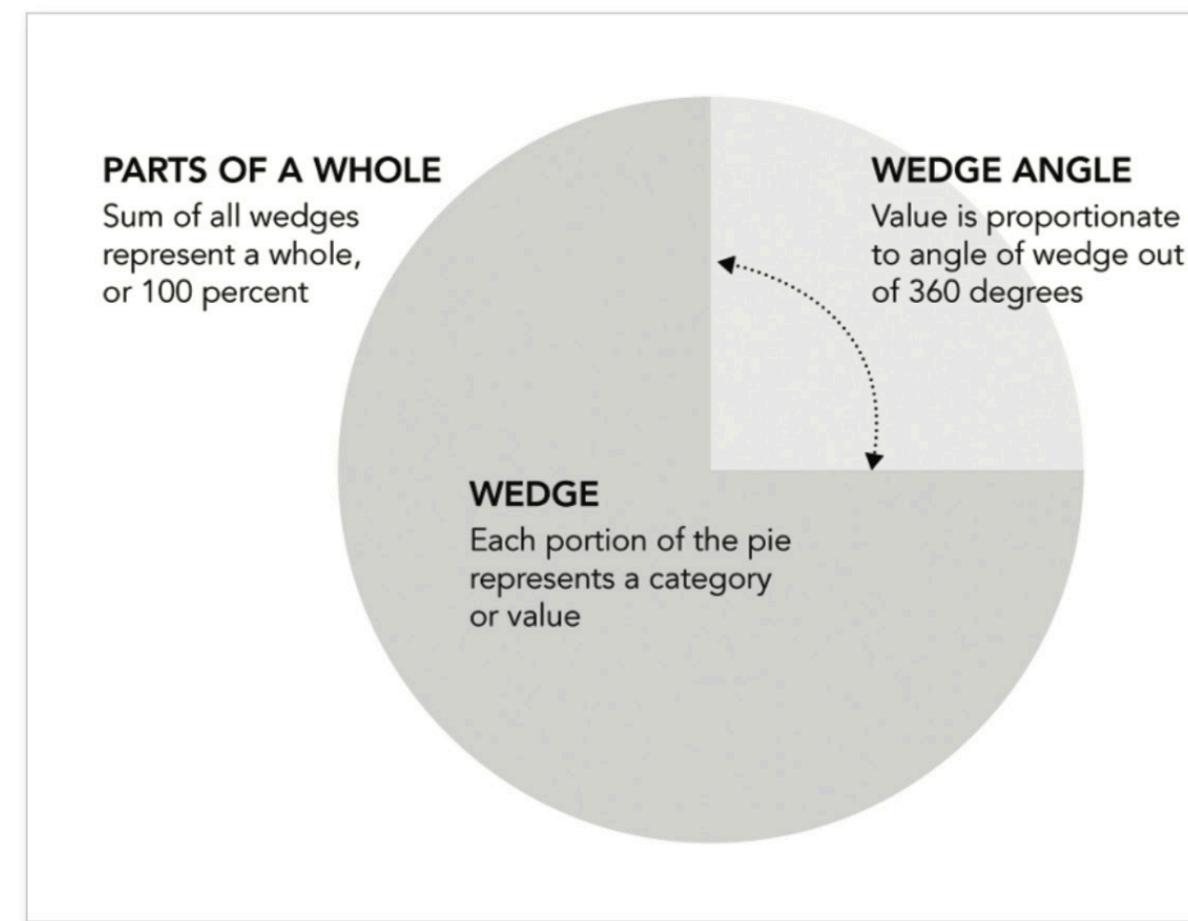


FIGURE 5-1 Pie chart generalized

APPROVAL RATINGS FOR BARACK OBAMA

Recent Gallup and CBS polls show a 52% approval rating for Barack Obama in race relations. It is the only issue out of the below thirteen where he has a majority approval. In eight of the thirteen, results show a majority disapproval.

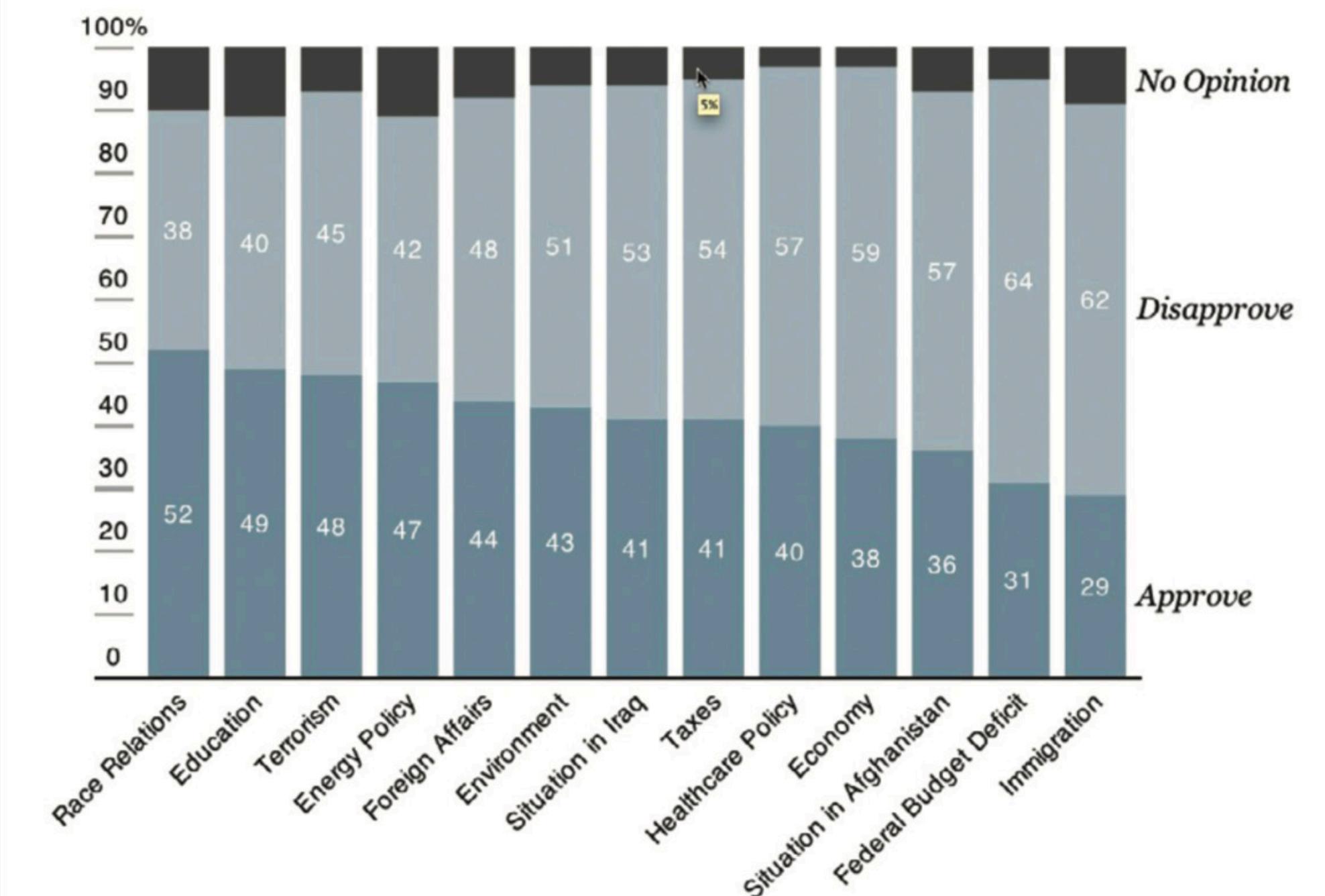


FIGURE 5-13 Interactive stacked bar chart in Protovis

II. CATEGORICAL & HEIRARCHICAL | Gender balance across department

■ HUMAN PERCEPTION

Different colors are used to represent male and female.

■ METHODS

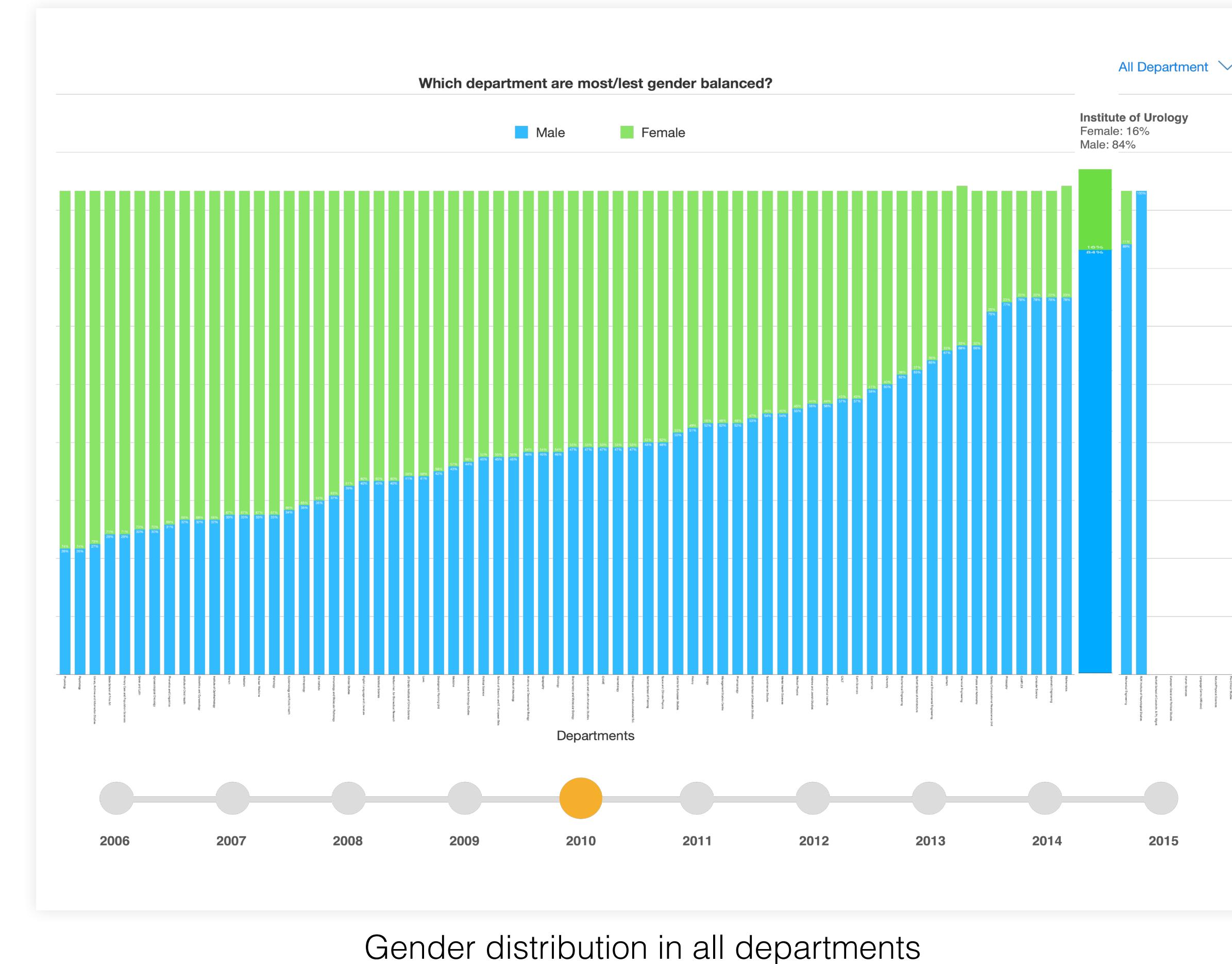
STACKED BAR chart

- extremes (max, min.).
- sort by numbers
- easily find the corresponding category

Pie chart.

■ EVALUATION

whether to show the ratio or real number of the female and male in each department. would compare the difference through experiment.



Q1: Which department are most/least gender balanced?

Q2: How has my department change over time?

Q3: How well does my department do in terms of gender balance?

II. CATEGORICAL & HEIRARCHICAL | Gender balance across department

■ INTERACTION (Device: laptop)

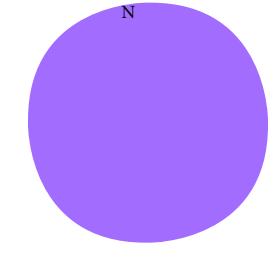
1. Users can click on the particular bar to check the corresponding department.



2. Users can also filter the department they want to see.



3. Click on the timeline can see the change over years.



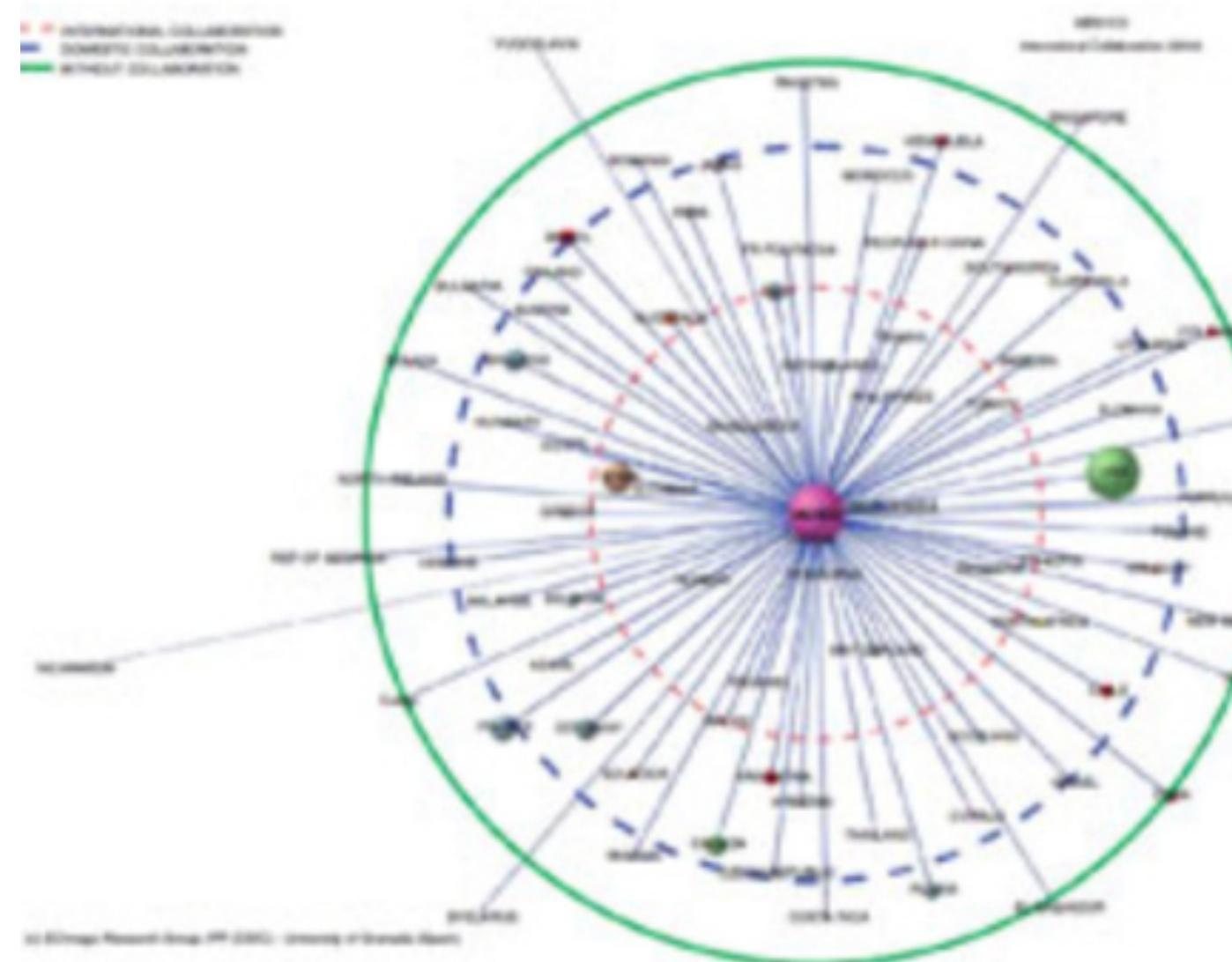
3. TREES & NETWORKS

3.1 UCLIC paper co-authorship

■ LITERATURE

Elementary Relation Seeking

- collaboration rate = node size
- impact factors = distance to others (Federico 2017)



Elementary Relation Seeking

■ METHOD

1. **Sort** the data based on the amount of collaborations.
2. **Divide** the value by the total collaborations, to calculate the frequency of collaborations, which decide the centrality position of the item.
3. The **size** of the oval represent the publications number, the bigger the circle is, the more paper the author has published.

	Abigail Selle	Aisling Ann C	Nicolai Marquardt
Abigail Selle	3	0	
Aisling Ann C	0	6	
Amid Ayobi	0	0	
Ana Javornik	0	0	
Ana Tajadura-J	0	0	
Aneesha Sing	0	0	
Ann Blandfor	0	2	
Ann Blandfor			
All	3	6	

■ HUMAN PERCEPTION

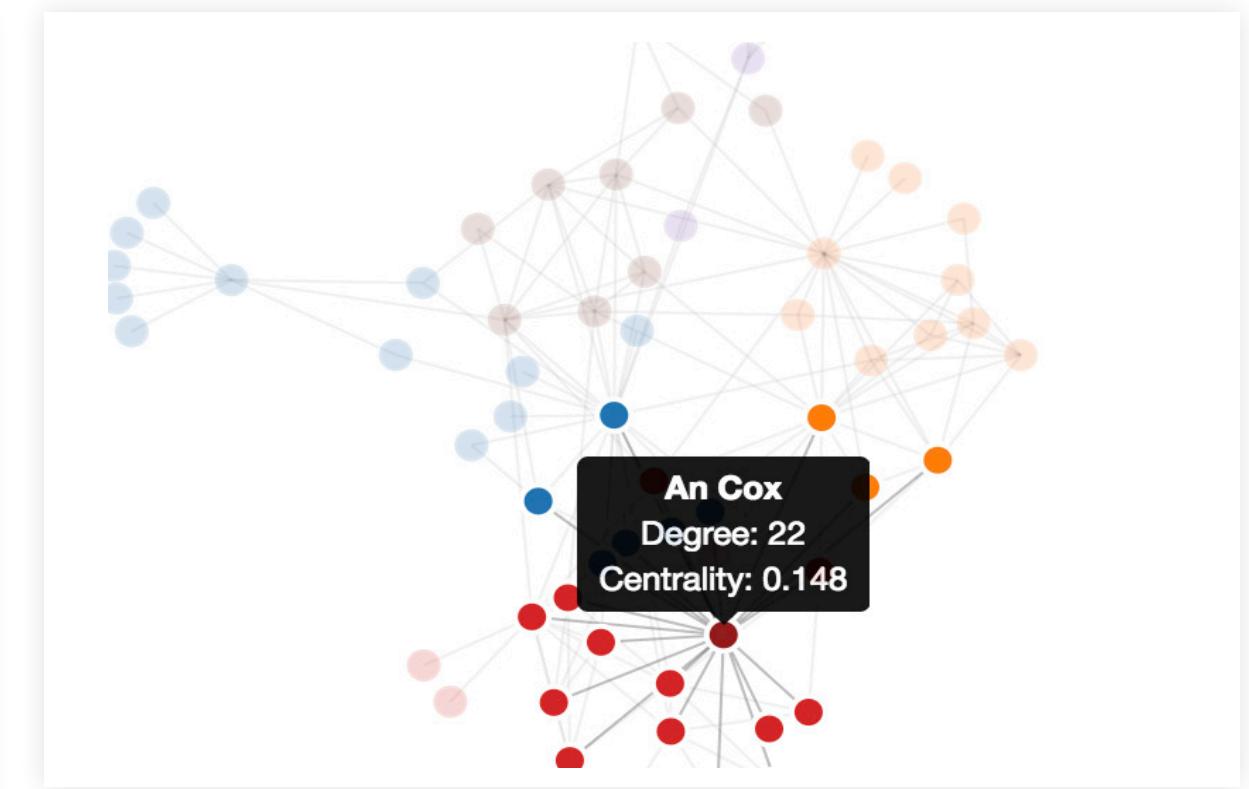
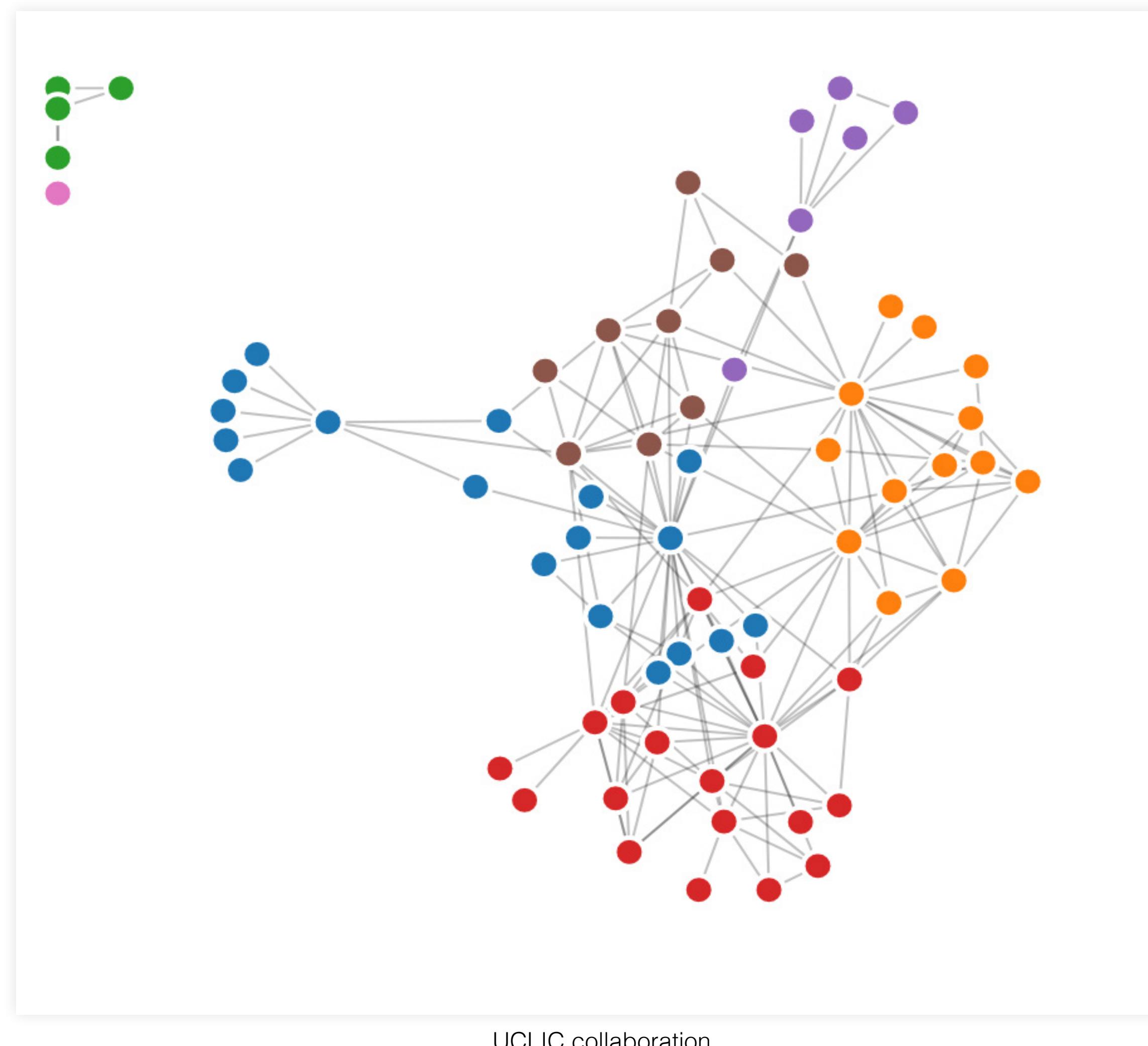
Dots representing Groups that collaborate frequently, **cluster closer** together.

They are assigned **different colors** to be distinguished from others.

□ EVALUATION

Is it necessary to make the **size** of the dot change based on the publish papers' number, or simply **label** the number would be better?

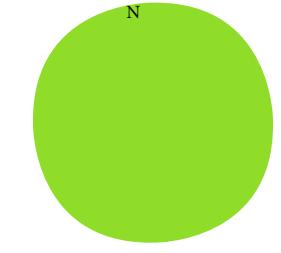
Experiment should be run to confirm the hypothesis. Compare the **accuracy and efficiency** users find the target in the two charts.



■ INTERACTION

Check information detail





4. MAP

3.1 Urbanization of Europe & Central Asia

3.2 Global land suitability

■ LITERATURE & METHOD

I used the point and color method suggested by Nathan and Yau (Yau 2015):

1. Find longitude & latitude.
2. Designed the map is plotted just by **point** or **color**.
 - 2.1. Point
 - 2.2. Color
 - 2.2.3. Sequential color scheme
 - 2.2.4. Diverging color scheme
 - 2.2.5. Qualitative color scheme

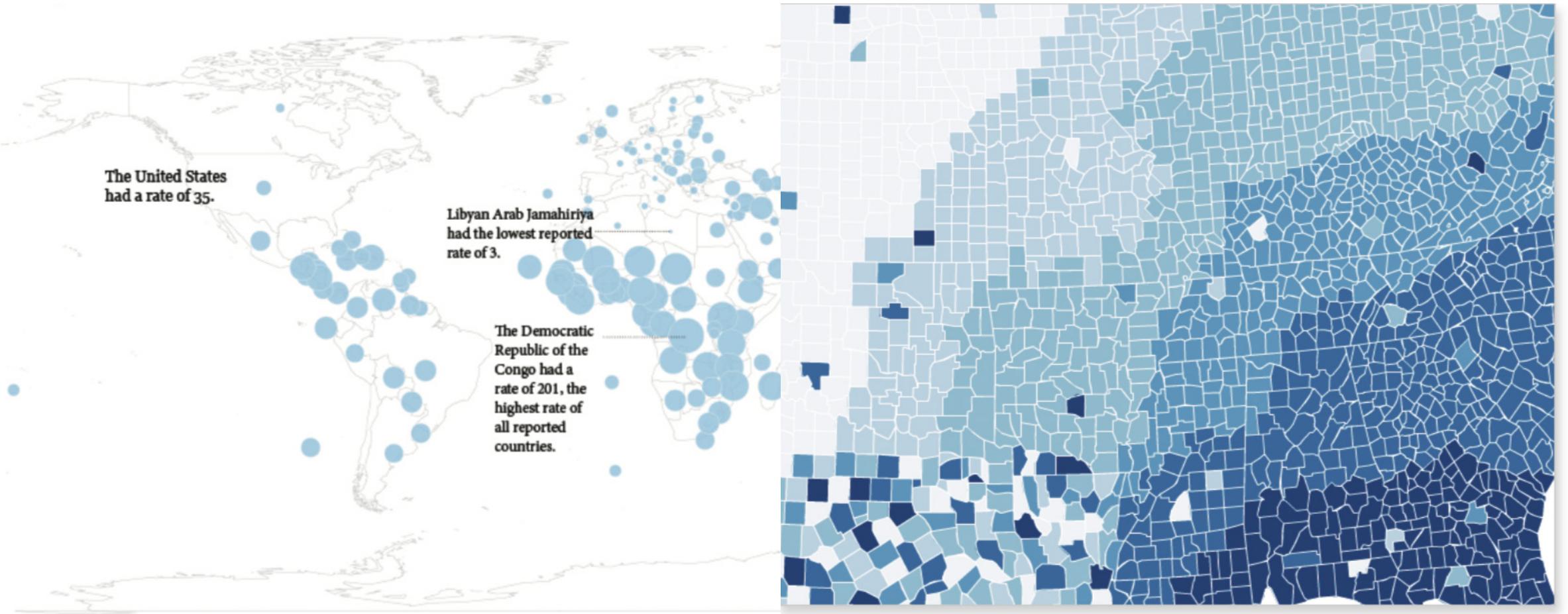


FIGURE 8-12 Sequential color schemes with ColorBrewer

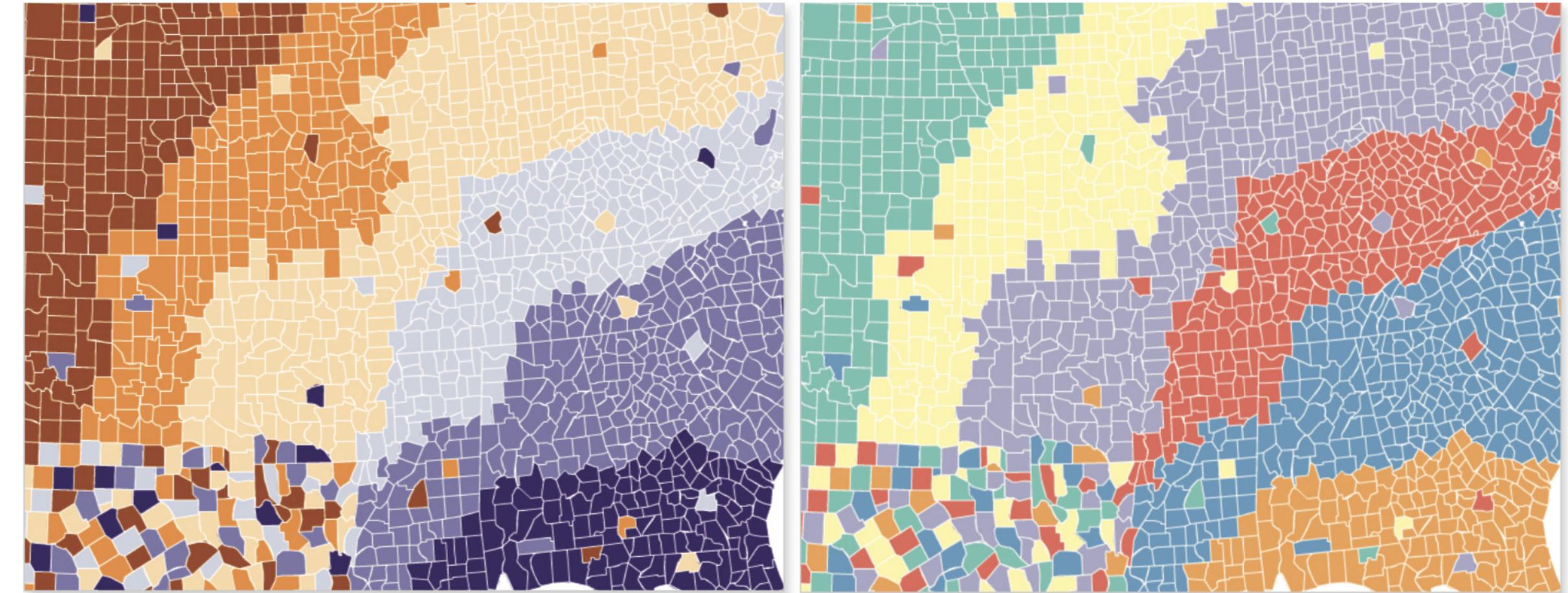


FIGURE 8-13 Diverging color schemes with ColorBrewer

FIGURE 8-14 Qualitative color scheme with ColorBrewer

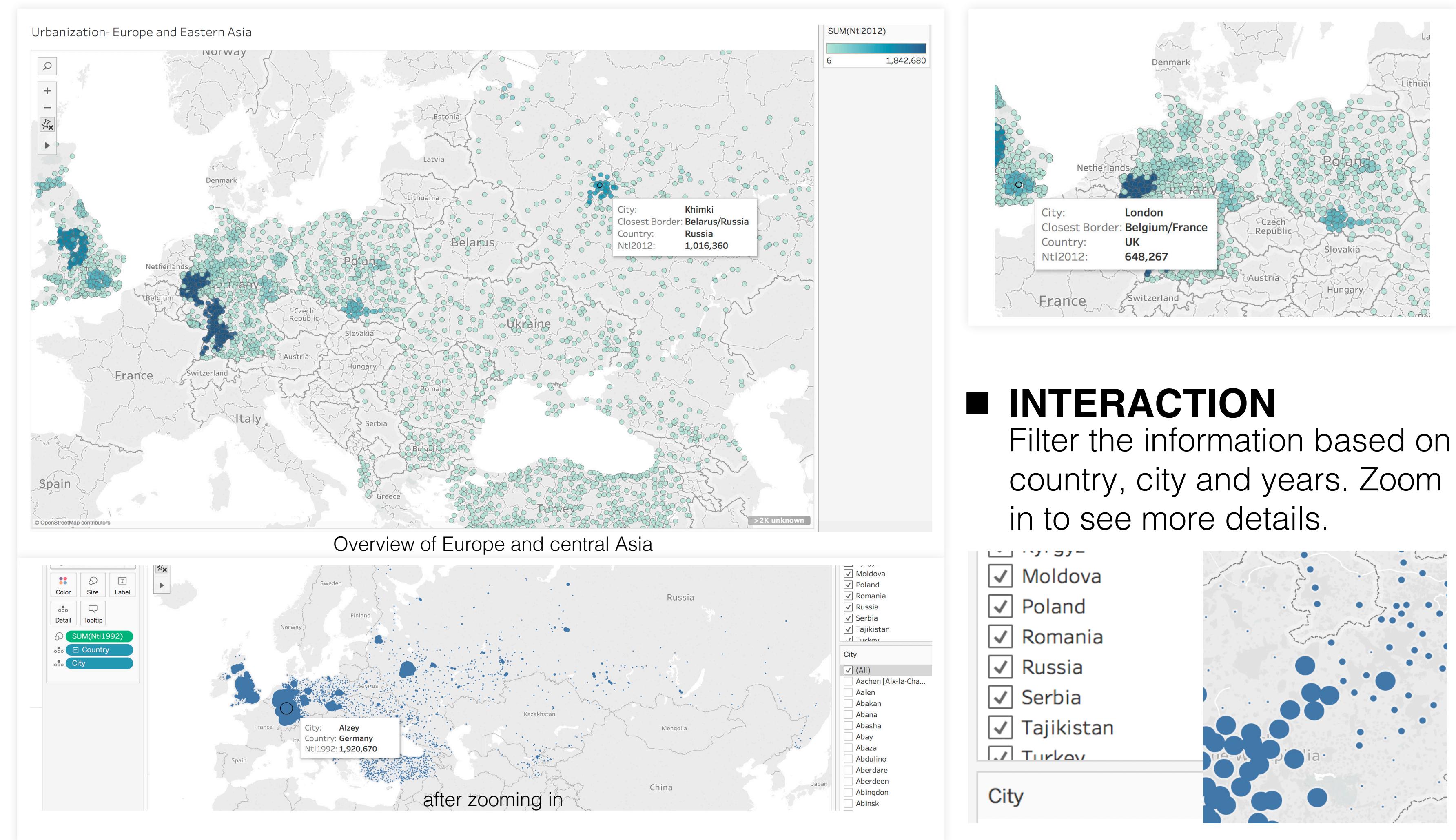
■ HUMAN PERCEPTION

Nighttime lights data can be used to map urban areas (Zhou 2015)

Sequential Color point: amount of Nighttime. The deeper the color is, the more nighttime light. Which means the areas are more urbanized.

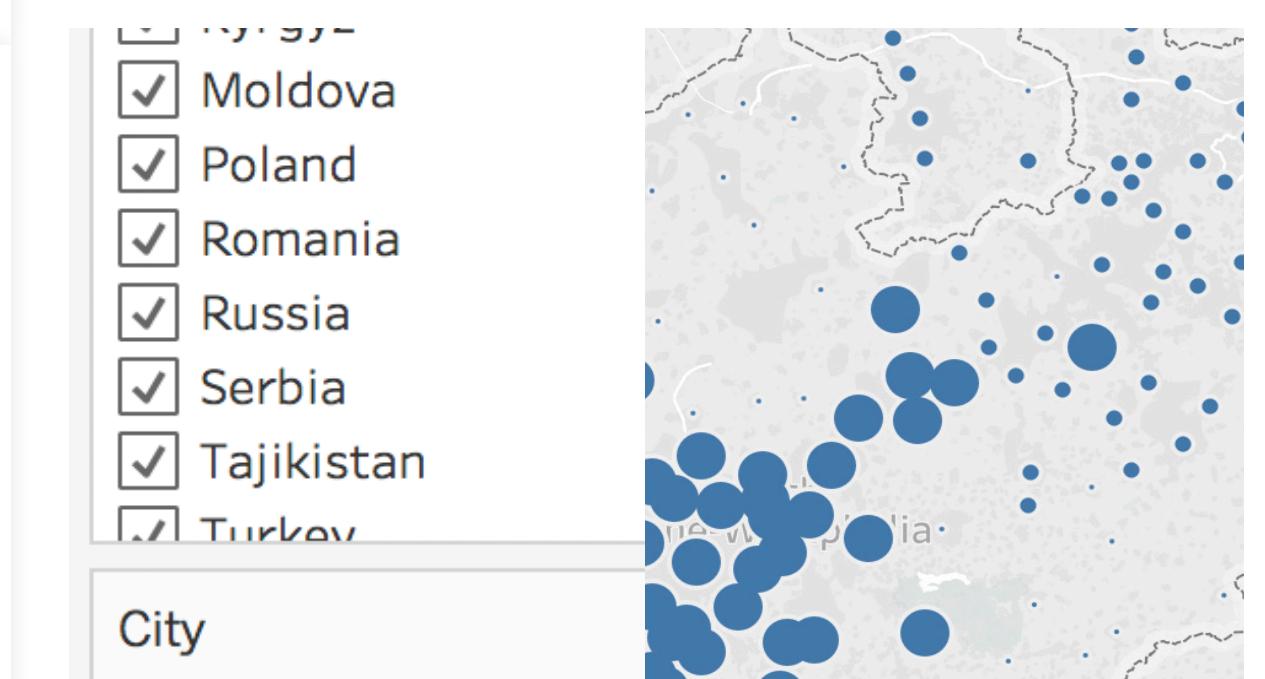
Generally, UK, Germany and Khimki in Russia are most urbanized areas where circles clustered.

Size: when users zoom in to see more details, they would be able to see the size difference.



■ INTERACTION

Filter the information based on country, city and years. Zoom in to see more details.



■ HUMAN PERCEPTION

Nighttime lights data can be used to map urban areas
(Zhou 2015)

Color & Size: Use color to represent different ecosystem, and size to represent the suitability of the land.

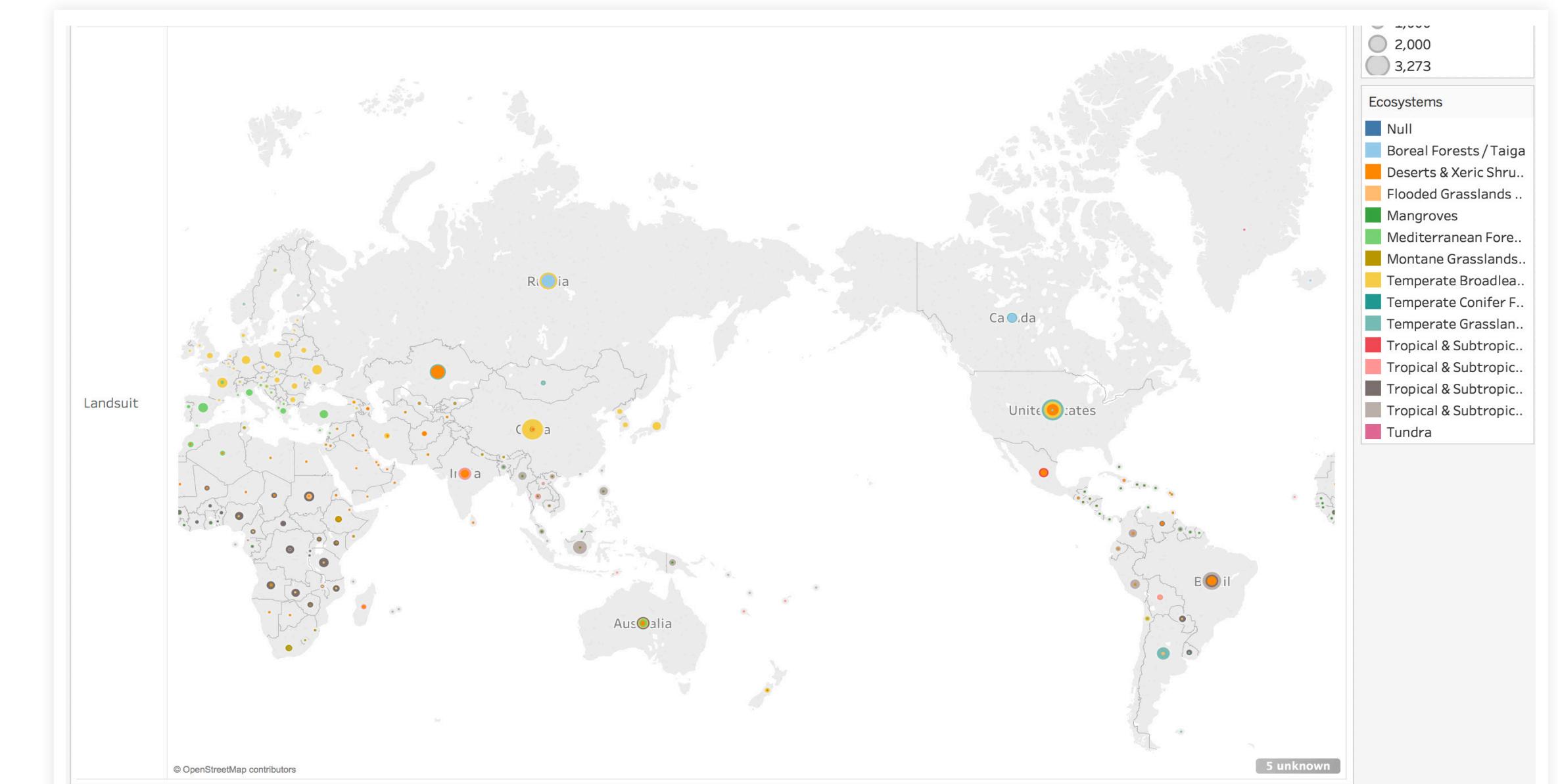
Sequential Color scheme: Landsuitability. Deeper blue means the land of the country is generally more suitable for living.

■ EVALUATION

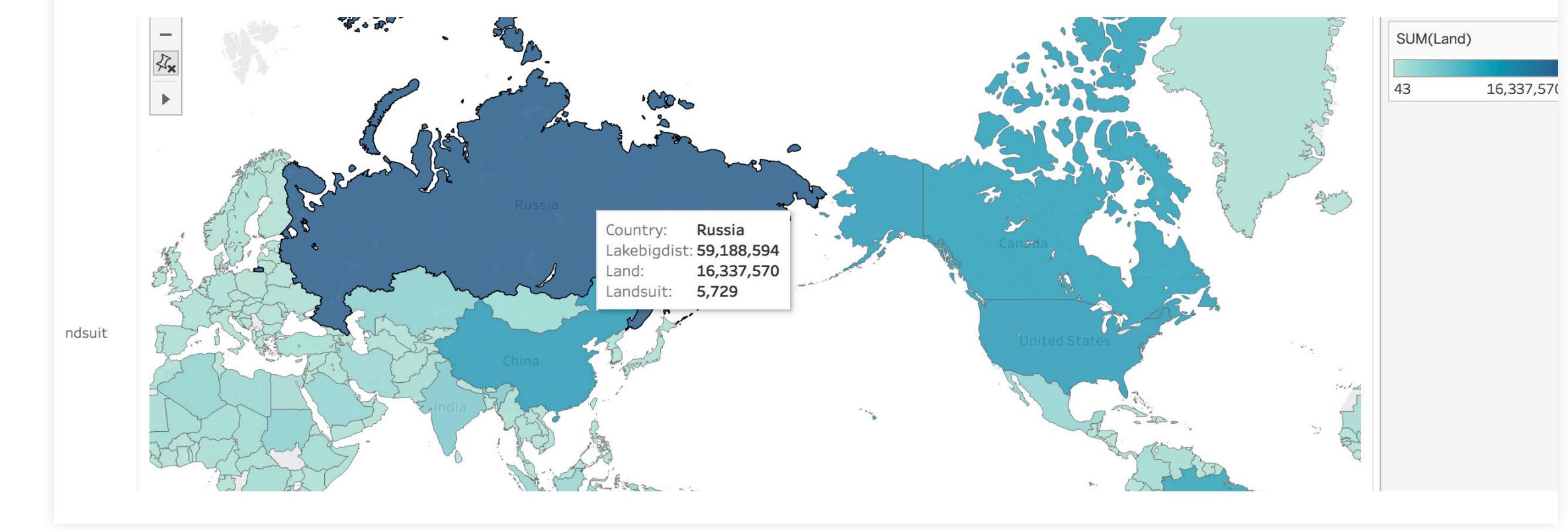
Figure 1 displayed more information with both ecosystem and land suitability, but figure 2 seems more intuitive. How to do trade-off between information load and usability, this problem worth exploring in the evaluation.

■ DISPLAY DEVICE

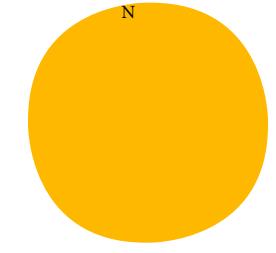
Public Display: displaying the data publicly can raise the awareness of the public and trigger their interest in the environmental issues around them.



Land Suitability & Ecosystem



Land suitability



5. CORRELATION

3.1 Urbanization of Europe & Central Asia

3.2 Global land suitability

LITERATURE

Nathan and Yau suggested three methods for correlation diagram: scatterplot, bubble, histogram, line chart(Yau, 2015). Here the scatterplot is used to map the relationship of unemployment rate between high-income countries, OECD/non-OECD high-income countries and developing countries.

1. X axis: high-income OECD/non-OECD countries, developing countries.
2. Y axis: high-income countries.
3. Find the relation.

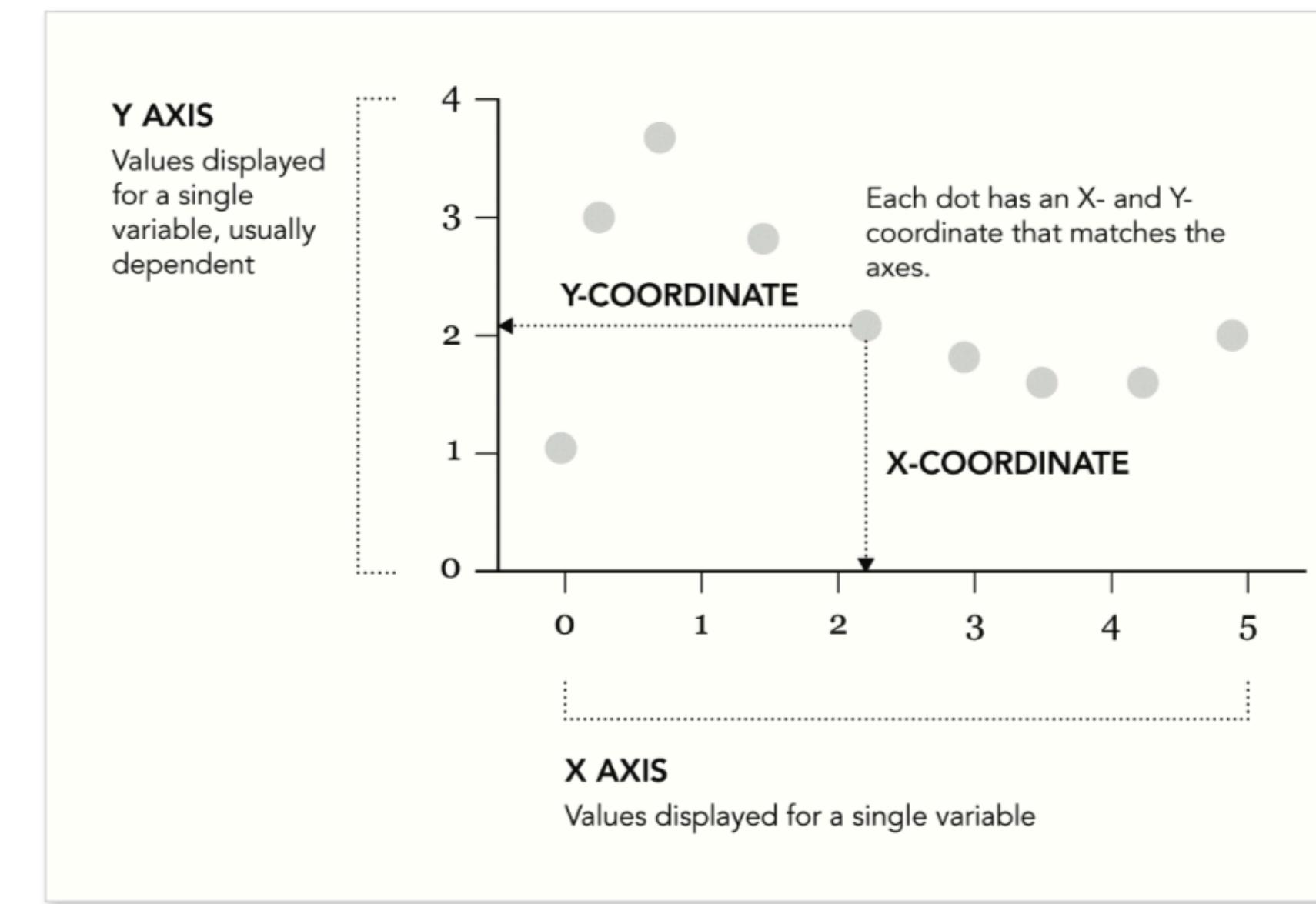


FIGURE 6-1 Scatterplot framework, comparing two variables

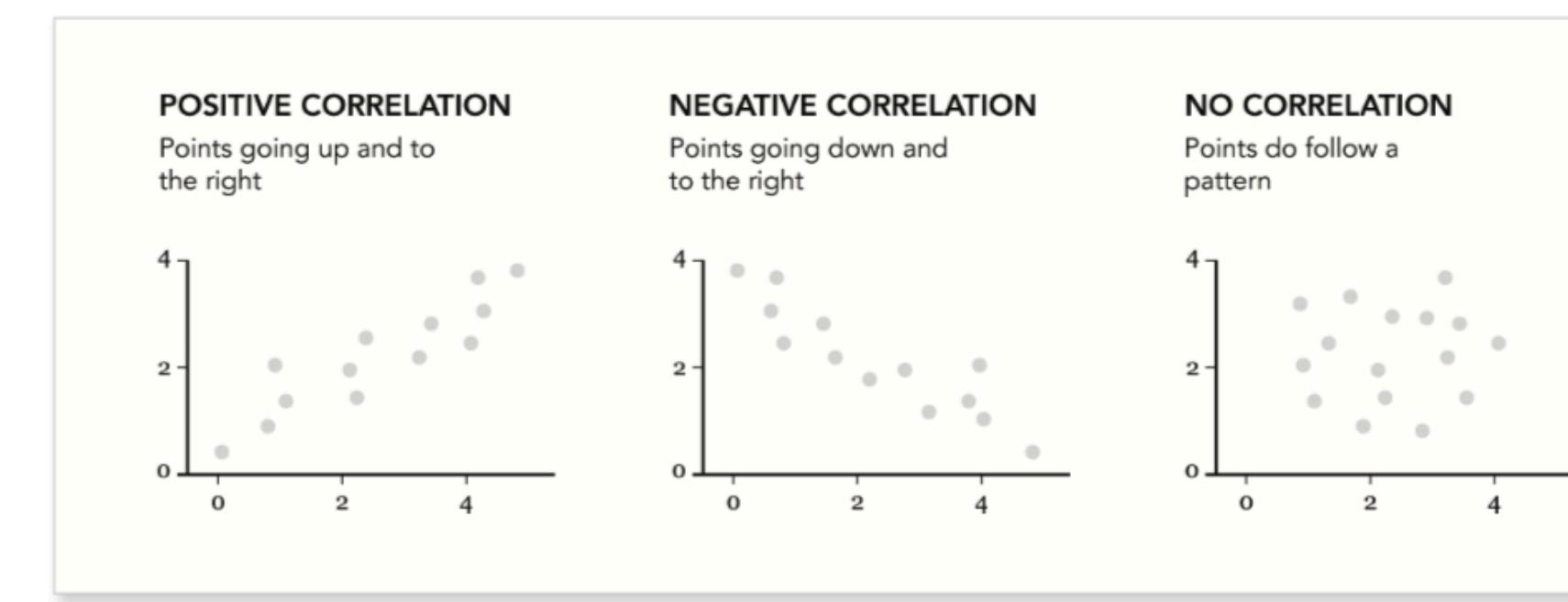


FIGURE 6-2 Correlations shown in scatterplots

■ HUMAN PERCEPTION

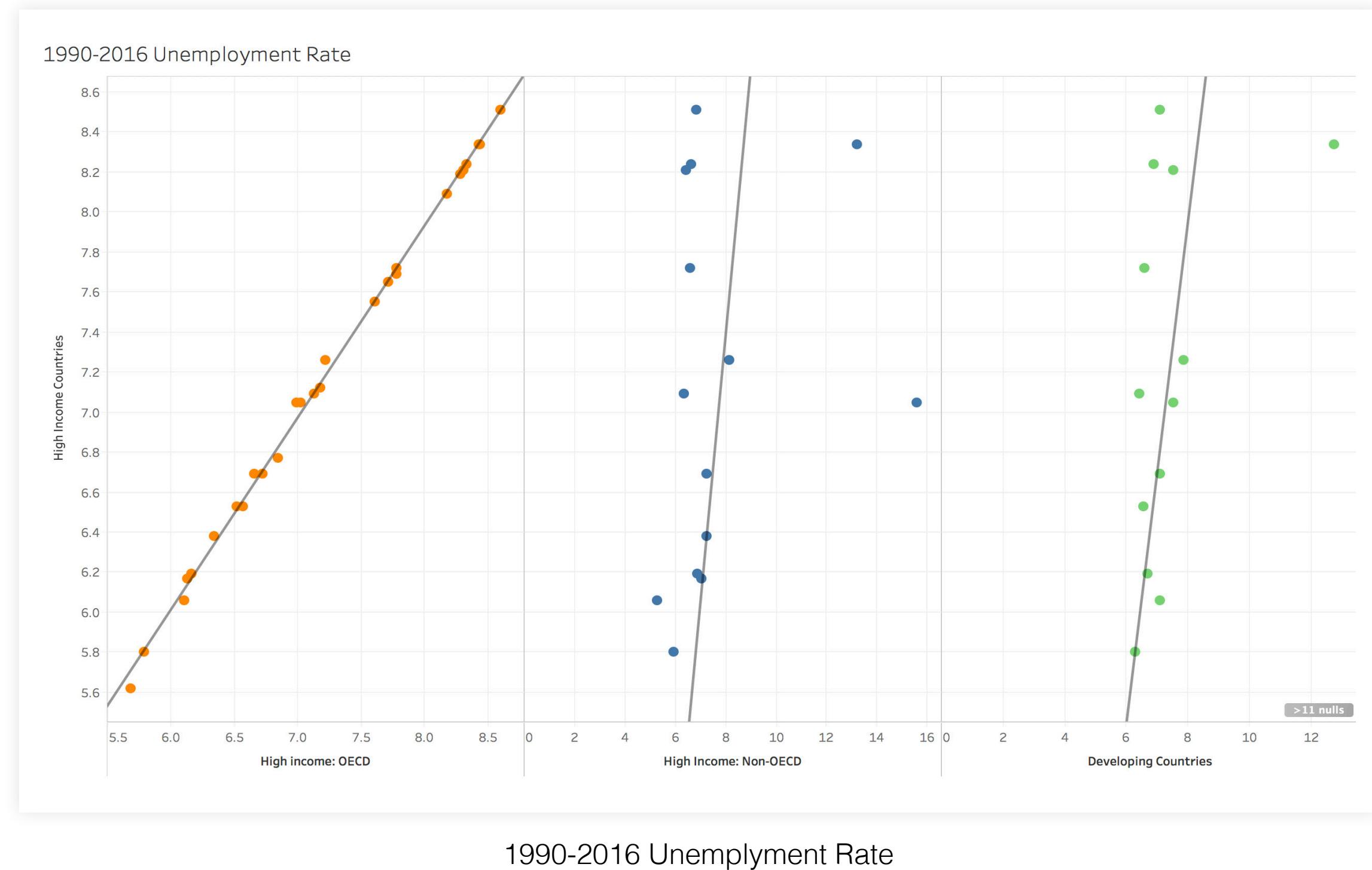
Use different colours to represent different relationship:

Orange: High-income countries and OECD high-income countries.

Blue: High-income countries and OECD high-income countries.

Green: High-income countries and developing countries:

Trend Line: it helps identify there is a linear positive correlation between OECD's unemployment and general high income countries.



Three countrys unemployment rate after filtering(Australia, US, UK)

■ INTERACTION

Check information detail



□ DEVICE

Website: the data is usually used to compare how the economical development connect iwth each others between areas. which is nice to be displayed on websit for analysts get access to it.

□ EVALUATION

It is worth exploring whether the website is the best option to display it.

V.REFERENCE

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