

# What is "Happiness"

2024 Spring AAT3019-01 Data Visualization Final Project

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## Defining Happiness

What do you think happiness is? Is it having a lot of money, always having something delicious to eat, living a comfortable life, or...? Not having to work? Everyone's definition of happiness will be different, so can we really define it?

It's not easy, but we decided to use data to find the things that are most relevant to the value of happiness, and the things that we might want to pursue first in order to be happy.

We looked at indicators that reflect quality of life in each country, as well as people's subjective ratings, to find the things that most closely correlate with happiness, and dare to define what "happiness" is.

## Clear Communication

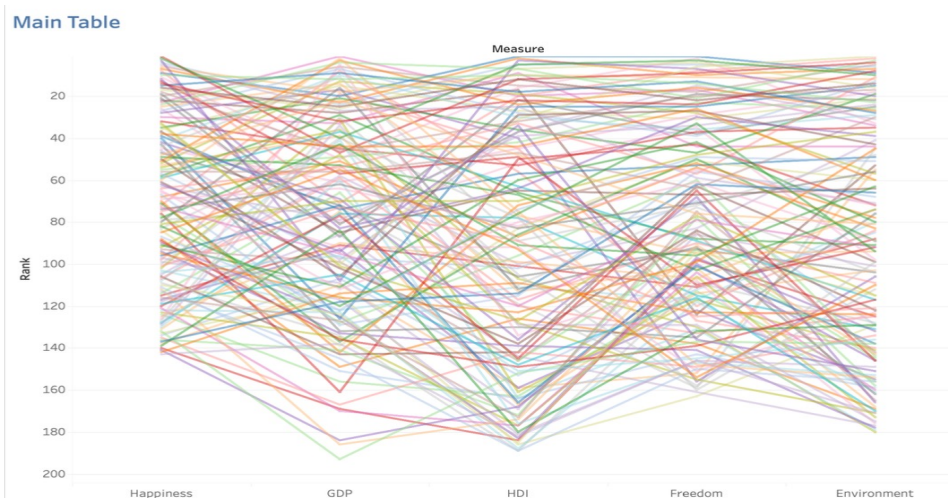
Find the index the most relevant to Happiness

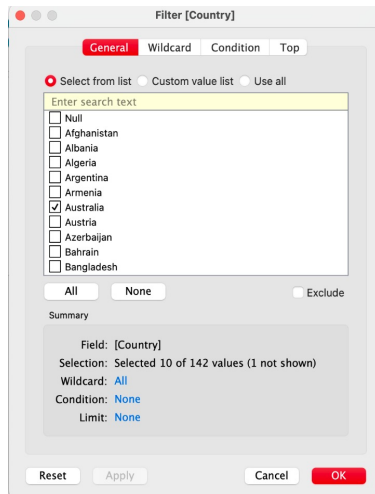
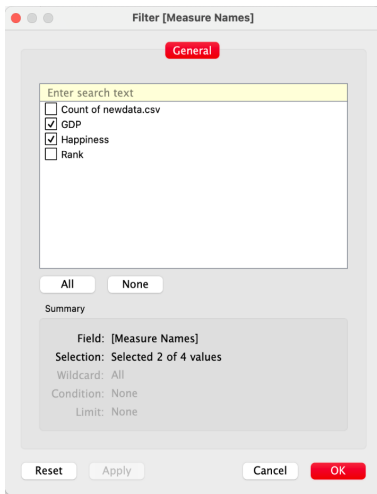
People always seek happiness and try to define it, searching for the best recipe. This question concerns individuals personally as well as society at large. Currently, scientists categorize happiness factors into three groups.

- 1) External factors beyond one's control (like birth and living conditions)
- 2) Factors related

to stable personality traits (some individuals are naturally predisposed to happiness); and 3) factors tied to personal achievements (such as goals set and relationships built). Yet, what creates the optimal balance among these factors? There is no definitive answer, so discussions about happiness continue to pique interest and provoke debates.

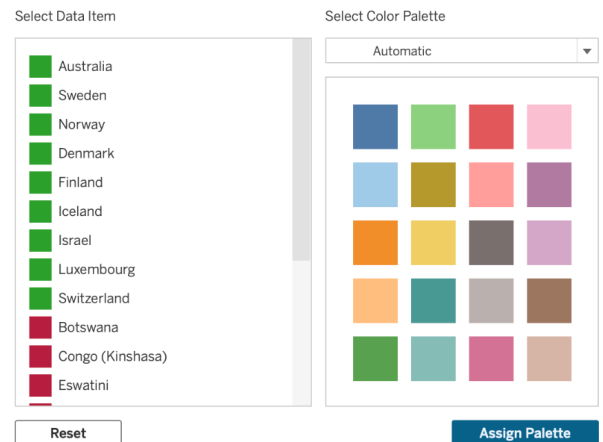
For visualizing the data, I chose the program Tableau because it offers a wide range of chart types, and the visualizations are highly interactive. To create the graphics, I used one dataset but was able to filter the countries and measures needed for each graphic using the 'Filter' function. Once I understood the principles of working with the tools, it was not complicated to create all the graphics.





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With the help of the 'Color' tool, I was able to adjust the color of every country (for tables 3-10), making it easier to compare the position of a country in each graphic. In the second graphic, I wanted to show the differences in ranks between the happiest and least happy countries in the other rankings, so I used only two colors to emphasize the contrast.



The happiness ranking utilized in this study is from the World Happiness Report (2024). This report measures how satisfied people are with the living conditions in their country. According to this data, the ranking of happiness within the same country greatly differs by age. However, we are focusing on the country ranking based on life evaluation, which is not significantly influenced by age. The main graphic provides information about all 143 countries we inspected. This interactive visualization allows us to compare the ranks of a country. To make a deeper analysis of the connection between the mentioned factors and happiness, we created a separate graph for the 10 happiest countries and the 10 least happy countries.

In the following paragraphs, I will briefly explain our conclusions based on the obtained graphics. It was hard to compare the rankings because some datasets include more countries and regions. The first comparison of Happiness and the Human Development Index (which includes factors like education, longevity, and a decent standard of living) shows a strong correlation between these two datasets. The top 10 happiest countries are known for some of the best living conditions, so their high positions in the HDI ranking are not surprising. Similarly, the least happy countries have the worst living conditions.

The next comparison of GDP and Happiness shows completely different results. The third happiest country in the world, Iceland, ranked 108th on the GDP index. Iceland is a small country with a population of less than 500,000 people. It lacks natural resources and has a small domestic market. However, its stable democracy and high level of human development make it one of the happiest countries in the world. On the other hand, the Democratic Republic of Congo, which ranked 139th in Happiness, placed 84th in the GDP ranking. Despite its mineral resources, the country is known for its economic hardship, poor healthcare system, corruption, and other factors that negatively affect the population.

The next graphic, showing the correlation between happiness and environmental performance, proves that nature indeed impacts our well-being. All the top 10 happiest countries, except for Israel, are in the top 25 of the Environmental Performance Ranking. The fact that a good environment affects our mental condition, level of stress, and mood changes has been scientifically proven, so it is no wonder that the happiest countries are also known for their natural environments.

The last comparison indicates the connection between happiness and freedom of individuals. What does the Freedom Index tell us about a country? The Human Freedom Index measures two main factors: economic freedom and personal freedom. From our perspective, freedom is one of the crucial aspects of a happy life. Again, all countries, except Israel, rank high in the freedom ranking. I assume that mandatory military service in Israel significantly limits the freedom of the Israeli population. Speaking about the least happy countries, some of these countries, like Afghanistan, are known for the strict rules that restrict the freedom of the population.

This analysis highlights the complex interplay between various factors influencing happiness, emphasizing the importance of human development, environmental quality, and personal freedom in contributing to a country's overall happiness.

#### [ Original Datasets ]

<https://worldhappiness.report/data/>

<https://datacatalog.worldbank.org/search/dataset/0038130>

<https://hdr.undp.org/data-center/human-development-index#/indicies/HDI>

<https://worldpopulationreview.com/country-rankings/freedom-index-by-country>

<https://epi.yale.edu/measure/2024/EPI>

## Unconventional Charting Type

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Can Happiness be detected? Let's try to figure it out

Defining and measuring happiness has always been subjective, but if we can detect happiness through facial expressions, we can develop more objective happiness measurement tools, which will increase the reliability of happiness research and allow us to more accurately assess an individual's well-being.

So we started with the question of whether happiness can be detected from people's facial expressions. We want to crawl the photos that come up when searching for hashtags like *#happiness*, *#laughter*, and *#joy* on Instagram and analyze the facial muscles in those data photos to create a data visualization of facial expressions.

### Crawling Data

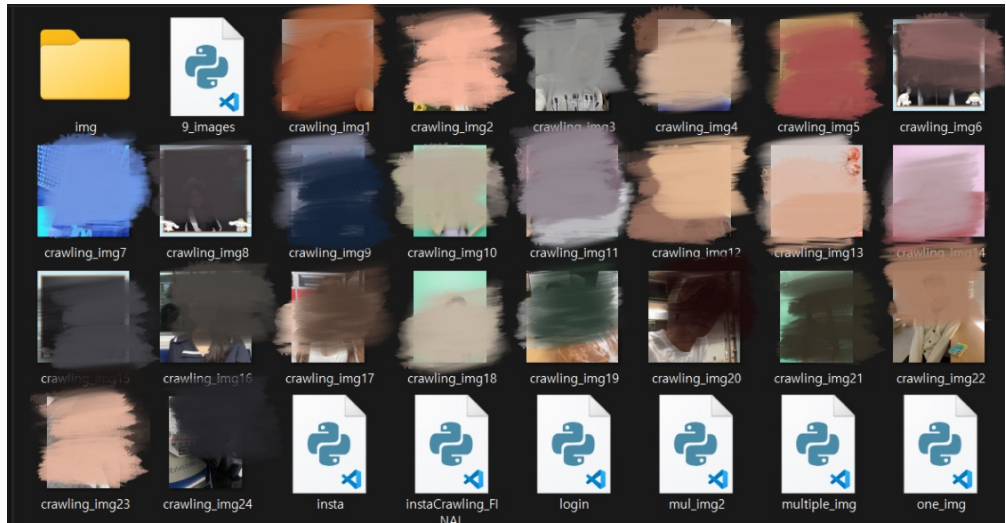
Using Google Chrome Webdriver and libraries such as BeautifulSoup and Selenium, we implemented a code that crawls images with the user's desired tags from Instagram. The code runs Chrome Webdriver to access Instagram with the Instagram ID/password written in the code, and automatically searches for the hashtag entered from the console window. In the html document of the hashtag search result window, I implemented the crawling of photos one after another by getting the value of the img tag of a specific div.

However, there is a limitation that this code can only crawl up to 30 images due to the limited number of hashtag photo search results when accessing Instagram on a PC.

```

crawling_img1.jpg
crawling_img2.jpg
crawling_img3.jpg
crawling_img4.jpg
crawling_img5.jpg
crawling_img6.jpg
crawling_img7.jpg
crawling_img8.jpg
crawling_img9.jpg
crawling_img10.jpg
crawling_img11.jpg
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crawling_img19.jpg
crawling_img20.jpg
crawling_img21.jpg
crawling_img22.jpg
crawling_img23.jpg
crawling_img24.jpg

```



```

from selenium.webdriver.common.by import By
from selenium.webdriver.common.keys import Keys
import time
from urllib.request import urlretrieve
import requests
from bs4 import BeautifulSoup
# Crawling Image Name
img_name = "crawling_img"
#----- login END -----
print("LOGIN START ***** ")
driver = webdriver.Chrome()
login_url = "https://www.instagram.com"
driver.get(login_url)
time.sleep(3)
driver.implicitly_wait(10)
login_id = driver.find_element(By.CSS_SELECTOR, 'input[name="username"]')
# ID
login_id.send_keys('본인의 인스타 아이디를 입력')
login_pwd = driver.find_element(By.CSS_SELECTOR, 'input[name="password"]')
# PASSWORD
login_pwd.send_keys('본인의 인스타 비밀번호를 입력')
driver.implicitly_wait(10)

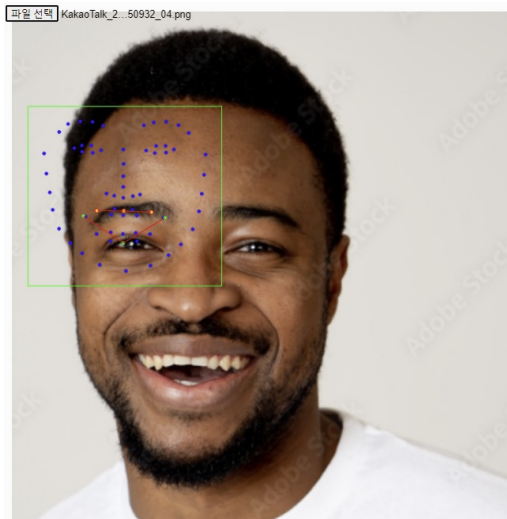
```

The full code can be found in the file; [instacrawling\\_FINAL.py](#)

## Facial Muscle Analysis

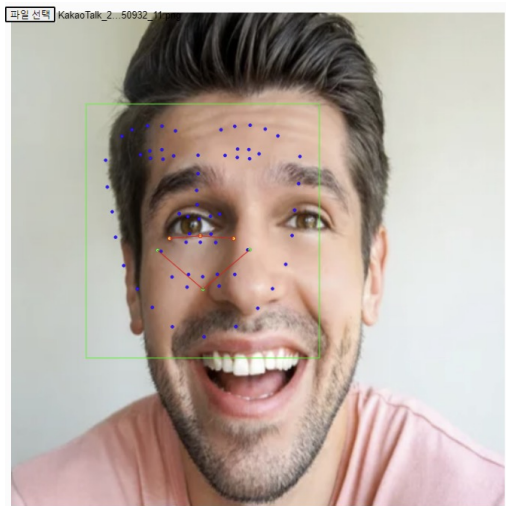
In the following paper, it was found that the facial muscle features that indicate an expression of joy are the upturned corners of the mouth, the spreading of the corners of the mouth, and the horizontalization of the upper lip. To analyze this, we implemented a code that analyzes the position of the eyes, nose, mouth, eyebrows, and face shape of the face and outputs the angle of the lip muscles when a photo is input using the ml5 library of p5js. When the code is executed, it receives a photo as input, displays the facial features of the photo on the screen, and outputs the angle between the three points of the lower lip and the angle between the three points of the upper lip. The following results show that the closer the angle of the lower lip is to 110 degrees, and the closer the angle of the upper lip is to 180 degrees, the more similar it is to a smiling expression.

Full Code; <https://editor.p5js.org/seoo00a/sketches/mpghfNbAG>



Console

```
FaceAPI model ready!
bottom angle: 114.85305285103411
top angle: 178.01683866123363
```



Console

```
FaceAPI model ready!
bottom angle: 99.00299279179652
top angle: 170.7882206766193
```

The result of the angle of upper lip (mouthBottomAngle.txt) and lower lip (mouthTopAngle.txt).

Average of upper lip angle; 172.8399482

Average of lower lip angle; 113.2497786

표 1. 표정별 특징점 위치 분석

표정	특징	특징점 변화
무표정	입술이 작음	P32 / P36 (수평)
화남	눈썹이 내려감	P3 / P4 (수직)
	눈썹이 볼림	P3 / P4 (수평)
	눈이 작아짐	P9-P13 / P15-P19 (수직)
기쁨	눈이 작아짐	P9-P13 / P15-P19 (수직)
	입꼬리 올라감	P20 / P26 (수직)
	입꼬리 벌어짐	P32-P36 (수평)
	웃음줄 수평	P20-P34 / P34-P26 (수직)
놀람	눈썹이 올라감	P3 / P4 (수직)
	눈이 커짐	P9-P13 / P15-P19 (수직)
	입이 벌어짐	P34-P38 (수직)

[Reference] [표정별 차이에 의한 특징 추출과 Backproagation을 이용한 얼굴표정 인식]

<https://www.dbpia.co.kr/pdf/pdfView.do?nodeId=NODE01482327>

## Whole Face Vertex Analysis

Implemented code to save the x, y coordinates of the vertices of the facial muscles analyzed by the ML5 library to a txt file, reload the saved txt file, and redraw the vertices at those coordinates. Implemented the code to save the image.

1) Save the facial muscle vertex coordinates as a txt file; <https://editor.p5js.org/se000a/sketches/sKZA0YIXa>  
Select the image file you want to analyze and press spacebar to save the coordinates to a txt file.

2) Draw the input txt file as vertex and save it as an image;

<https://editor.p5js.org/se000a/sketches/ef308H1Lb>

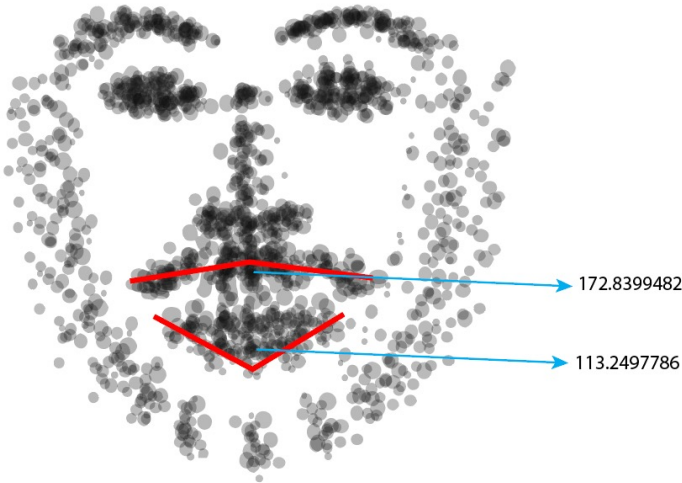
Select the vertex txt file you want to draw, an image of the vertex will be displayed on the screen, and pressing the spacebar will save the image as a file.



coordinates (35)	2024-06-21 오후 4:39	텍스트 문서
coordinates (34)	2024-06-21 오후 4:39	텍스트 문서
coordinates (33)	2024-06-21 오후 4:39	텍스트 문서
coordinates (32)	2024-06-21 오후 4:38	텍스트 문서
coordinates (31)	2024-06-21 오후 4:38	텍스트 문서
coordinates (30)	2024-06-21 오후 4:38	텍스트 문서
coordinates (29)	2024-06-21 오후 4:37	텍스트 문서
coordinates (28)	2024-06-21 오후 4:37	텍스트 문서
coordinates (27)	2024-06-21 오후 4:37	텍스트 문서
coordinates (26)	2024-06-21 오후 4:36	텍스트 문서
coordinates (25)	2024-06-21 오후 4:36	텍스트 문서



Result of running code to store x,y coordinates of a vertex and  
The result of running code that plots a point based on the input vertices and outputs an image.



By adjusting the transparency of the multiple vertex images, we created and lining them up in a row, we were able to see the expression on the face.

We were able to see that it was a human face, and that the angle of the mouth and the shape of the eyebrows and eyes indicated that it was a smiling face.

Therefore, we concluded that the emotion of happiness can be objectively detected through facial muscles, and we succeeded in visualizing happiness data in an interesting form.

# Analog Type

Redefine Happiness in our own way

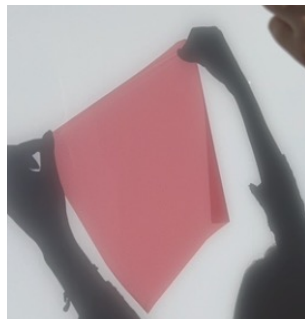
We looked at what factors influence happiness and whether that happiness can be truly felt and transmitted to others.

So, when are we happy?

Don't we all have times when we're happy and times when we're sad? What is happiness as we each define it? To explore and analyze the commonalities and differences, we decided to gather the values that we each think are important “what we need to be happy”, and we'll express them intuitively so that we can see our own redefinitions of happiness with light and color.

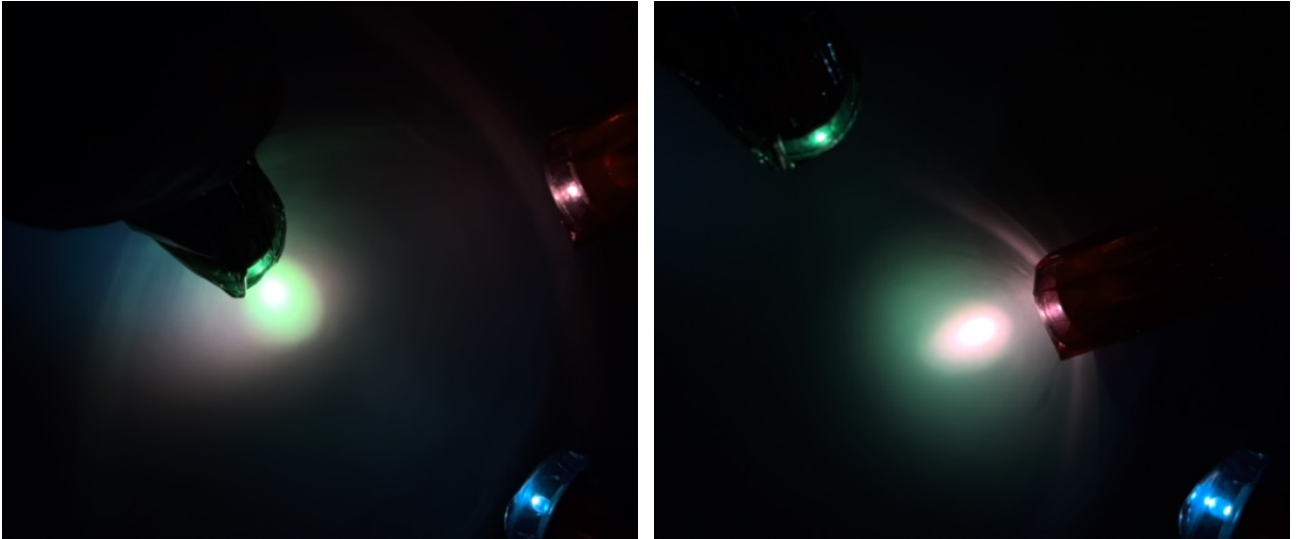
So, we decided to take advantage of the properties of light. Each light represents a different color, and when they overlap, new colors of light emerge, but no matter what color of light is gathered, the lightest color of light, white, eventually shines through.

Using cellophane, we wanted to represent the different values people hold based on the three primary colors of light: red, blue, and green. Then using flashlights, we layered these lights to create different colors, and finally created a white light that shines the brightest.



Based on this, we wanted to show that everyone's values are different, so it is impossible to set standards and define what is the most important value. Anyway, finally if we live our lives by fulfilling our values, no matter what they are, we can all reach to happiness, just as light are ultimately shining the brightest white light.

And by showing that the more you don't balance the intensity of the light (the greedier you are), the closer you get to a certain light, the more you will see a certain color of light rather than the brightest light, white, I wanted to show that happiness can be approached through the balanced pursuit of different values.



This is our redefinition of happiness.

## After finishing this project

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Throughout this project, we've explored, analyzed happiness in many different ways. We've tried to discover what influences the value of happiness, whether this subjective feeling of happiness can be objectively analyzed and detected by others, and what we think happiness is through this study. It was a meaningful project that gave me a good opportunity to think about it, and I got interesting and diverse conclusions.