Social Network Analysis of Climate Change

# **Hands holding a globe Description automatically generated with medium confidence**

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# 1. Introduction

Through a mix of technology and behavioral adaptation, human and natural systems adapt to the negative consequences of climate change, including changes in temperature extremes and unpredictability of weather (UNFCCC. Secretariat 1999). Especially, local economies and lifestyles are changing because of climate change (Collier, Elliott, and Lehtonen 2021).

Even today, climate change is a very crucial issue that concerns many practitioners, researchers, and so on.

Furthermore, when the discussion revolves around the environment, the talk is always about climate change. It might be difficult to know what to trust and how to protect our environment. For this reason, there is a need for people to explore the globe as a system of energy inputs and outputs to better comprehend climate change and global warming (Urban EcoLab 2021).

The primary goal of this study is to focus on the relationship between the environment and climate change by combining social network analysis (SNA) of climate change with sentiment analysis. This project starts with a quick overview of climate change. The notion of social network analysis is next discussed, followed by how the data is collected and analyzed. Then, it relates to the results and discussions gathered from the data. Finally, the conclusions are discussed.

# 2. Methodology

## 2.1 Social Network Analysis

In brief, Social Network Analysis (SNA) is a rather recent methodology based on graph theory and statistics for methodically studying, detecting, mapping, and quantifying relationships between actors (Putu et al. 2016; Janssen et al. 2006). It may be used to model, display, and evaluate interactions between people in groups and organizations when integrated with computer programs (Springer et al. 2011; Othieno 2014).

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## 2.2 Data Collection

Initially, most people know that **World Environment Day** is celebrated annually on June 5th (United Nations, n.d.), and how important this day is to focus the attention of the dangers posed by climate change to the environment. Wangari Maathai, emphasizes the importance of protecting the environment by saying "*The environment and the economy are really both two sides of the same coin. If we cannot sustain the environment, we cannot sustain ourselves*" (Kezang Choden, n.d.).

This project will use social network analysis to analyze Twitter discussions regarding the environment and climate change in order to assess people's feelings toward environmental protection.

Furthermore, this research will focus on tweets from throughout the world from May 27, 2022, to May 28, 2022, which is a period a few days before World Environment Day. It is expected that people will be likely more aware of environmental protection during this time period since there are some campaigns for information on climate change and ways to save the environment. However, because this project is focused mainly on climate change, the keyword to be used for the search will be “climate”.

Εspecially, Twitter conversation data is collected using R on the Twitter Developer Portal platform (through the Twitter API).

The main steps in case to collect the data are these:

1. Create a **developer account on Twitter**
2. Setup of the **R environment**
3. Use the **search\_tweets** function to collect data

## **2.3 Data Analysis**

This project uses social network analysis (SNA) using **Gephi** version 0.9.5 platform in order to build network graphs, run some analytics on them, and analyze relationships.

In this stage, the R program is used to collect and process the data as well as to conduct the data analyses.

Because there are hundreds of thousands of tweets in search of our variable keyword “climate”, it is chosen to keep the approximately 120,000 most recent observations from the current date 28 May 2022.

The tables below provide data information using RStudio.

Graphical user interface, text, application, email

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# Note: There are exactly **117492 observations** of **90 variables**, which will be used to conduct an analysis.

# Social Network Analysis using Gephi

# Import report to Gephi

# Number of Nodes: **70979**

# Number of Edges: **108824**

# Graphical user interface, text, application, email Description automatically generated

# The graph below distinguishes various groups/ communities using a colored graph.

# 

# This is how the whole graph seems, including the most important names.

# A picture containing snow, outdoor, nature, day Description automatically generated

# The focus will be on the most important interactions where it is also distinguished the number of nodes.

# A picture containing ground, outdoor Description automatically generated

# Here we can highlight the following communities, distinguishing them by color.

**Pink** community includes accounts like:

@MikeHudema is a Canadian activist who has worked with organizations such as Greenpeace and Global Exchange, etc.,

@ClimateBen a literature teacher or even

@ClimateHuman a NASA climate scientist who is called Peter Kalmus.

→ All of them are English speakers who briefly emphasize the immediate need to save our planet, protect it and not pollute it.

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**Green** community includes account like:

@FijiPm who is called Frank Bainimarama and is the Prime Minister of Fiji. He is dedicated to leaving the world on a better planet than he found it. In this community is very likely that there are people who speak English, Hindi, and Fijian, which are the three official languages of Fiji.

**Grey** community contains accounts like:

@GretaThunberg a young climate- and environmental activist with Asperger’s Born

@antonioguterres a Secretary-General of the United Nations

@Sammy\_Roth an Energy & environment reporter for the @latimes (Los Angeles Times).

→ All of them are also English speakers they have a huge audience that spread information about climate change and how we need to save the environment.

**Notice**!

It is clear that each community is connected on its own, either geographically, or with a common language, etc. Members of any community of color can get to know each other, such as in the green community, where activist Greta Thunberg had previously spoken to UN Secretary-General Antonio Guterres about immediate environmental protection. Therefore there is a high probability that they will interact with each other based on the same audience.

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