Social Network Analysis of Climate Change

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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 practioners, 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 in order 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)

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 attention of the dangers posed by climate change to the environment. According to 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 26, 2022 to May 27, 2022 which is a time period a few days before the World Environment Day. It is expected that people will be likely more aware of environmental protection during this time period, since there is 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".

Especially, 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:

   i.   Create a **developer account on Twitter**
   ii.   Setup of the **R environment**
   iii. Use the **search_tweets** function to collect data
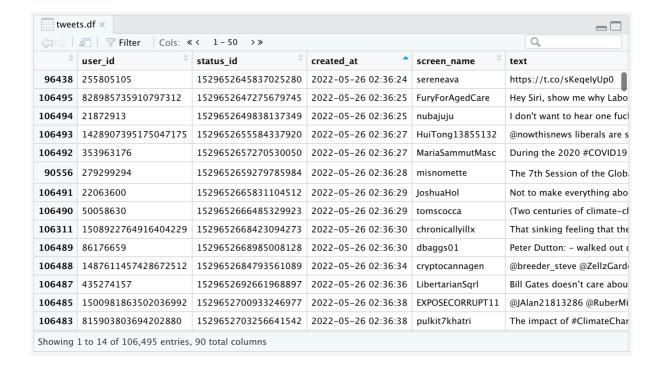
2.3 Data Analysis

This project uses social network analysis (**SNA**) using **Cytoscape** version 3.9.1 platform in order to build network graphs, run some analytics on them and analyze relationships.
In this stage, R programm is used to collect and process the data as well as to conduct the data analyses.

Due to the fact that there are hundreds of thousands of tweets in search of our variable keyword "climate", it is chosen to keep the approximately 100,000 most recent observations from the current date 27 May 2022.

The tables below provide data information using RStudio.

R ▾	🟦 Global Environment ▾		🔍
Data			
auth	Environment		🔍
token	Environment		🔍
TokenBigQueryKernel	Environment		🔍
▶ tweets.df	106495 obs. of 90 variables		▦
Values			
GET_USER_SECRET_ENDP…	"/requests/GetUserSecretRequest"		
KAGGLE_BASE_URL	"https://www.kaggle.com"		
KAGGLE_IAP_TOKEN	""		
KAGGLE_USER_SECRETS_…	"eyJhbGciOiJkaXIiLCJlbmMiOiJBMTI4Q0JDLUhTMjU2In0..SwipDOXR…"		
Functions			
get_user_secret	function (label)		📄

	user_id	status_id	created_at ▲	screen_name	text
96438	255805105	1529652645837025280	2022-05-26 02:36:24	sereneava	https://t.co/sKeqelyUp0
106495	828985735910797312	1529652647275679745	2022-05-26 02:36:25	FuryForAgedCare	Hey Siri, show me why Labo
106494	21872913	1529652649338137349	2022-05-26 02:36:25	nubajuju	I don't want to hear one fucl
106493	1428907395175047175	1529652655584337920	2022-05-26 02:36:27	HuiTong13855132	@nowthisnews liberals are s
106492	353963176	1529652657270530050	2022-05-26 02:36:27	MariaSammutMasc	During the 2020 #COVID19
90556	279299294	1529652659279785984	2022-05-26 02:36:28	misnomette	The 7th Session of the Glob
106491	22063600	1529652665831104512	2022-05-26 02:36:29	JoshuaHol	Not to make everything abo
106490	50058630	1529652666485329923	2022-05-26 02:36:29	tomscocca	(Two centuries of climate–cl
106311	1508922764916404229	1529652668423094273	2022-05-26 02:36:30	chronicallyillx	That sinking feeling that the
106489	86176659	1529652668985008128	2022-05-26 02:36:30	dbaggs01	Peter Dutton: – walked out c
106488	1487611457428672512	1529652684793561089	2022-05-26 02:36:34	cryptocannagen	@breeder_steve @ZellzGard
106487	435274157	1529652692661968897	2022-05-26 02:36:36	LibertarianSqrl	Bill Gates doesn't care abou
106485	1500981863502036992	1529652700933246977	2022-05-26 02:36:38	EXPOSECORRUPT11	@JAlan21813286 @RuberMi
106483	815903803694202880	1529652703256641542	2022-05-26 02:36:38	pulkit7khatri	The impact of #ClimateChan

Showing 1 to 14 of 106,495 entries, 90 total columns

Note: There are exactly **106495 observations** of **90 variables**, which will be used to conduct a detailed analysis later.

References:

Collier, Stephen J., Rebecca Elliott, and Turo-Kimmo Lehtonen. 2021. "Climate Change and Insurance." *Economy and Society* 50 (2): 158–72. https://doi.org/10.1080/03085147.2021.1903771.

Janssen, Marco A., Örjan Bodin, John M. Anderies, Thomas Elmqvist, Henrik Ernstson, Ryan R. J. McAllister, Per Olsson, and Paul Ryan. 2006. "Toward a Network Perspective of the Study of Resilience in Social-Ecological Systems." *Ecology and Society* 11 (1): art15. https://doi.org/10.5751/ES-01462-110115.

Kezang Choden. n.d. "We Take Care Our Nature (Https://Sdgs.Scout.Org/Project/We-Take-Care-Our-Nature)."

Othieno, Joseph Ojou. 2014. "Social Network Analysis of Climate Change Adaptation Communication in Makueni County."

Putu, Sang, Kaler Surata, Nyoman Utari Vipriyanti, and Ian Falk. 2016. "SOCIAL NETWORK ANALYSIS FOR ASSESSING SOCIAL CAPITAL IN BIOSECURITY ECOLITERACY."

Springer, Adam C, J E de Steiguer, A C Springer, and J de Steiguer. 2011. "Social Network Analysis: A Tool to Improve Understanding of Collaborative Management Groups." *The Journal of Extension*. Vol. 49. https://tigerprints.clemson.edu/joe/vol49/iss6/23.

UNFCCC. Secretariat. 1999. "Coastal Adaptation Technologies."

United Nations. n.d. "World Environment Day" (https://www.Un.Org/En/Observances/Environment-Day).

Urban EcoLab. 2021. "Center for Urban Resilience, 'Reading - Climate Change'. Module 03: Energy & Climate Change." (https://digitalcommons.lmu.edu/urbanecolab-module03/34).