Introduction

In a world dominated by evolving financial dynamics, the aspiration for Financial Independence and Retiring Early, often abbreviated as the FIRE movement, has emerged as a compelling response to the traditional notions of financial security and retirement. In an era characterized by increased financial volatility and the shifting landscape of work and wealth, many individuals are actively seeking innovative means to secure their financial future and potentially retire at an age much earlier than the standard retirement age of 60.

The FIRE movement, at its core, represents a profound shift in personal finance philosophy. It advocates for a lifestyle centred around disciplined savings, strategic investment, and conscious spending, with the ultimate goal of achieving financial independence and, subsequently, the option to retire early. Rather than deferring life's pleasures and freedoms until the twilight years, FIRE enthusiasts aim to seize control of their financial destinies now, enabling them to live life on their own terms, unrestrained by traditional retirement age constraints.

In a digital age where information is abundant and shared openly, the FIRE movement has found a robust online presence, becoming a driving force behind the exchange of ideas, strategies, and personal experiences. Social media platforms, like Twitter, Reddit and YouTube, have become the virtual epicentres of the FIRE community, providing a space for like-minded individuals to congregate, collaborate, and disseminate information.

This project embarks on an exploration of the online dimensions of the FIRE movement, harnessing the power of social network analysis to delve into the interconnected web of knowledge, advice, and inspiration that fuels the aspirations of those who endeavour to achieve financial independence and early retirement. By delving into the digital landscape, we aim to illuminate the intricate dynamics and influential figures shaping this modern financial revolution.

1.1 Investigation Areas

Below are the various research areas of the FIRE movement, all examined through the lens of social network analysis.

- **Community Structure and Subgroups**
    - How is the FIRE community structured on platforms like Reddit and YouTube?
    - Are there identifiable subgroups within the movement, and how do these subgroups perceive and approach the FIRE concept?
- **Sentiment and Emotional Analysis**
    - What are the prevailing sentiments and emotions expressed by users within the FIRE community on these platforms?
- **Prominent Topics and Discussions**
    - What are the prominent topics and do these themes and discussions within the FIRE communities on Reddit and YouTube differ?
- **Stock Market Investments**
    - Do individuals pursuing FIRE consider stock market investments as a significant part of their financial strategy?
- **Influence of Prominent Users**
    - Do prominent users within the FIRE community influence others through social network analysis?

- **Intra and Inter-Platform Interaction**
  - Do enthusiasts in the FIRE movement utilize various social media platforms for staying updated and connected?

1.2 Approach

The approach for this project involved a multi-faceted methodological framework to comprehensively analyse the FIRE movement within the online community, emphasizing Reddit and YouTube. We employed the methods and techniques described below:

- **Data Collection and Preprocessing**
  - **Scraping Data**: Data was collected from relevant subreddits on Reddit through Reddit API and from YouTube videos which were related to FIRE were fetched using YouTube API. This included posts, comments, video description, user profiles, and associated metadata. Data scraping was conducted using Python libraries, respecting the respective platforms' terms of use and guidelines.
  - **Data Preprocessing**: Preprocessing was done to remove duplicates, irrelevant information, and personal identifiers. Text data was tokenized, cleaned, lemmatized and organized for analysis.

- **Sentiment and Content Analysis**
  - **Sentiment Analysis**: Sentiment analysis was performed on textual data to identify user sentiments expressed in comments of Reddit posts and YouTube videos . VADER technique was used to classify sentiments into positive, negative or neutral categories.
  - **Topic Modelling**: Topic modelling technique Latent Dirichlet Allocation (LDA), was used to identify and categorize the most prominent topics and discussions within the FIRE communities. This allowed us to uncover the core themes of interest to participants.

- **Social Network Analysis and Influencer Identification**
  - **Network Construction** Network graphs were constructed to map connections among users and communities, their interactions, and information flow. Network nodes represent the community and its active users, and edges depict interactions between them.
  - **Network Metrics**: Key network metrics, included degree centrality and betweenness centrality, which were computed to assess network structure and user influence. NetworkX, a Python library, was used to facilitate these calculations and create network graphs.
  - **Influential User Detection**: We utilized network analysis and centrality measures to identify prominent users who play pivotal roles within the FIRE communities.
  - **Content Analysis of Influencers**: We analysed the content of these influential figures to understand how they shape the movement.
  - **Intra and Inter-Platform Interaction:** This analysis aims to understand how users within the FIRE movement utilize various social media platforms to stay updated and connected.

Data Collection

In this section, we will outline our approach to gathering the necessary data from Reddit and YouTube, ensuring that our dataset is representative and suitable for subsequent social network analysis, sentiment analysis, and content analysis.

2.1 Reddit Data Collection

- **Selection of Subreddits:** We carefully selected a set of subreddits relevant to the FIRE movement like "r/Fire" and "r/financialindependence". These subreddits served as primary sources of data for our analysis.

- **Data Scraping**: Data was collected using Python scripts equipped with Reddit API PRAW while adhering to Reddit's API guidelines. We targeted posts, comments, user profiles, and metadata for the time period of 30 days, ensuring a comprehensive snapshot of user interactions and discussions.

2.2 YouTube Data Collection

- **Selection of Videos**: We used top 30 videos on YouTube which were related to "financial independence retire early".

- **Data Scraping**: Video title, description, comments, and user profiles were extracted using Python scripts and YouTube Data API.

Upon completing the data collection process, we collected a total of more than 38,000 Reddit comments and 4,200 YouTube comments. This data revealed a substantial presence of individuals actively engaged in discussions related to FIRE across both social media platforms.

Pre-processing and Data Cleaning

The process of preparing our data for analysis encompasses several crucial steps, each designed to ensure the dataset's quality and relevance to our research on the FIRE movement. These steps contribute to data uniqueness, eliminate noise, and create a consistent foundation for our subsequent analyses. The following are the key elements of our data pre-processing and cleaning:

- **Identical Entry Removal**: One of the initial steps in data cleaning is the identification and elimination of identical entries. This process guaranteed the uniqueness of data points, preventing redundancy in our analysis.
- **Cleaning Unwanted Characters**: To enhance the quality of our textual data, we took measures to clean out unwanted characters, such as odd symbols, web links, user mentions, special characters, and numerical values. This process ensured that the text remains coherent and free of disruptive elements.
- **Removing Empty Rows:** Eliminating empty rows is vital for maintaining a focused dataset. Empty rows contain no relevant information and were removed to prevent any undue influence on our analysis.
- **Case Folding:** To ensure consistency and facilitate future analysis, all text data was converted to lowercase. This process, known as "case folding," standardizes the text, making it easier to work with.
- **Tokenization:** Textual data is further processed by breaking it down into smaller units, a process known as tokenization. This step was crucial for text analysis, as it transforms lengthy text into individual words facilitating further investigation.
- **Removing Stopwords:** Common words that carry little semantic meaning, known as "stopwords," were removed from the data. This helped us to eliminate noise and focus on words that were more informative and meaningful for our analysis.

- **Lemmatization:** To reduce repetition and maintain data consistency, words were simplified to their basic forms through lemmatization. This process ensures that variations of words are transformed into their root form, making the dataset more manageable.
- **Final Dataset Sanity Check:** Before proceeding with our analysis, we conduct a final check to ensure that our dataset makes sense and is devoid of any anomalies. This step ensures the dataset's overall quality and coherence.

The results of our data cleaning process indicated a significant reduction in the dataset's word count, highlighting the effectiveness of the cleaning steps in eliminating redundancies, irrelevant content, and noise. This reduction not only streamlines the dataset but also ensures that the remaining data is more focused and relevant for your analysis, making it a more manageable and meaningful dataset for your research on the FIRE movement.

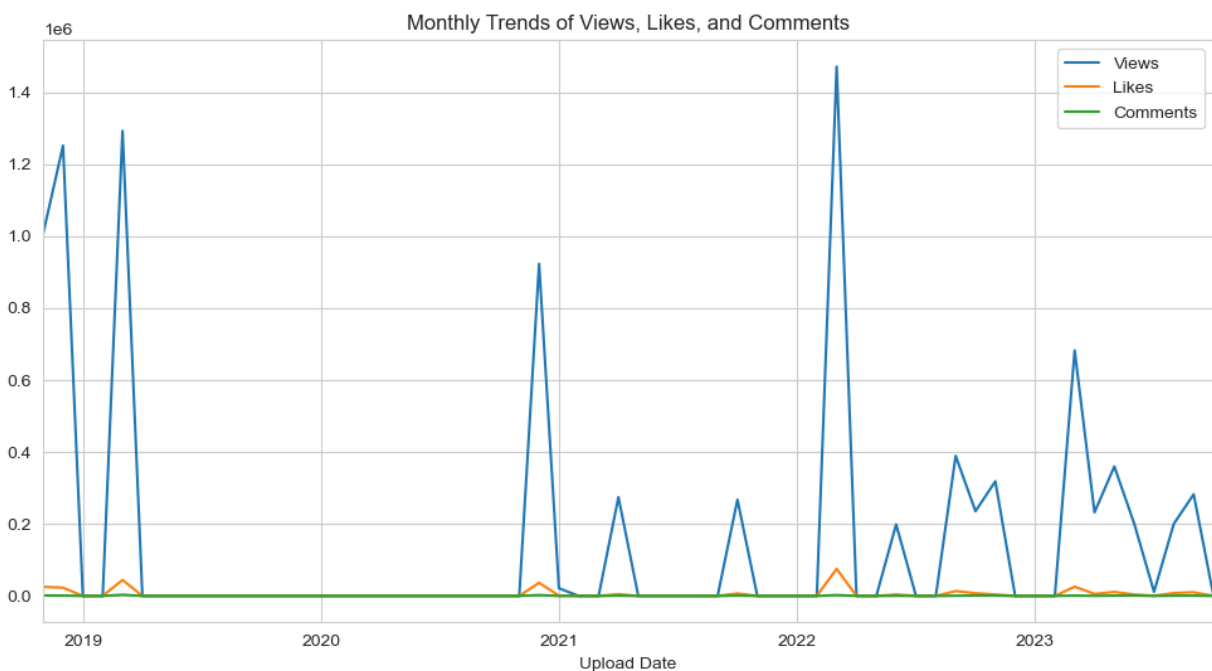## YouTube data Pre-Processing Insights

- **Time-series Analysis**

Figure 1: Time series plot of views, likes and comments.

To gauge the temporal trends in engagement for FIRE-related YouTube videos, we aggregated views, likes, and comments on a monthly basis. The resulting time series plot highlights the monthly dynamics of these metrics, offering insights into periods of notable engagement or shifts in audience interaction over time. It is evident from Figure 1, there was an increase in user engagement during the months of December and January in almost all the years, indicating that people tend to be more financially oriented as the new year begins.

- **Engagement Metrics Analysis**

Beyond sheer numbers, it's vital to understand the depth of audience interaction within the FIRE Movement. Hence, we computed the engagement rate for each video, defined as the sum of likes and comments divided by views. This metric shed light on the videos that, proportionally, captivated their viewers the most, prompting higher interaction.

Channel Name	Video ID	Title	Engagement Rate
AprendeHipnosis. Hipnosis para Desarrollo Personal	b_rOkt0sIH8	¿Qué es la libertad financiera y el retiro temprano? F.I.R.E. (Financial Independence Retire Early)	0.168142
Dividend Growth Investing	je3aPikVEh0	5 truths I wish I knew before starting F.I.R.E. (Financial Independence, Retire Early)	0.054825
Graham Stephan	-glfrfDLLTs	How To Retire In 10 Years (Starting With $0)	0.0527131
Our Rich Journey	fN9QnN_IC58	Master Your Money: The Ultimate Budget for Financial Independence and Retiring Early	0.0462204
Damien Talks Money	GxgY8fWhWY0	Why does everyone hate FIRE? (Financial Independence Retire Early)	0.0446972
Kuan Tian	UzBMiikbKuA	The secret to achieving financial independence and retiring early (FIRE) in Australia.	0.0432829
Daphna	eIGkz4HXBRU	I RETIRED EARLY: 7 MONEY HABITS that ACTUALLY made it happen	0.042769
The Plain Bagel	SEItn9Csitg	The Truth About FIRE – Is Early Retirement Actually Possible?	0.0421834
Dividend Growth Investing	PMz5yIzPHjo	The stages of F.I.R.E. (Financial Independence, Retire Early)	0.0396928
Finance With Sharan	GjfjqfqDzCg	STOP Working for MONEY	How to RETIRE in YOUR 30s	Finance With Sharan	0.038932

Table 1: Engagement Rate wise Top 10 YouTube videos

Sentiment Analysis and Insights

In this section, we conduct a comprehensive sentiment analysis of the data obtained from the FIRE community on Reddit and YouTube. Sentiment analysis reveals the emotional tone, polarity, and attitudes expressed within the discussions, posts, and comments related to the FIRE movement. By applying natural language processing technique, the Valence Aware Dictionary and sEntiment Reasoner (VADER) technique which is a lexicon and rule-based sentiment analysis tool specifically designed for social media text, we gained valuable insights into the sentiments of community members. We applied VADER to analyse tokens for each comment in our corpus.
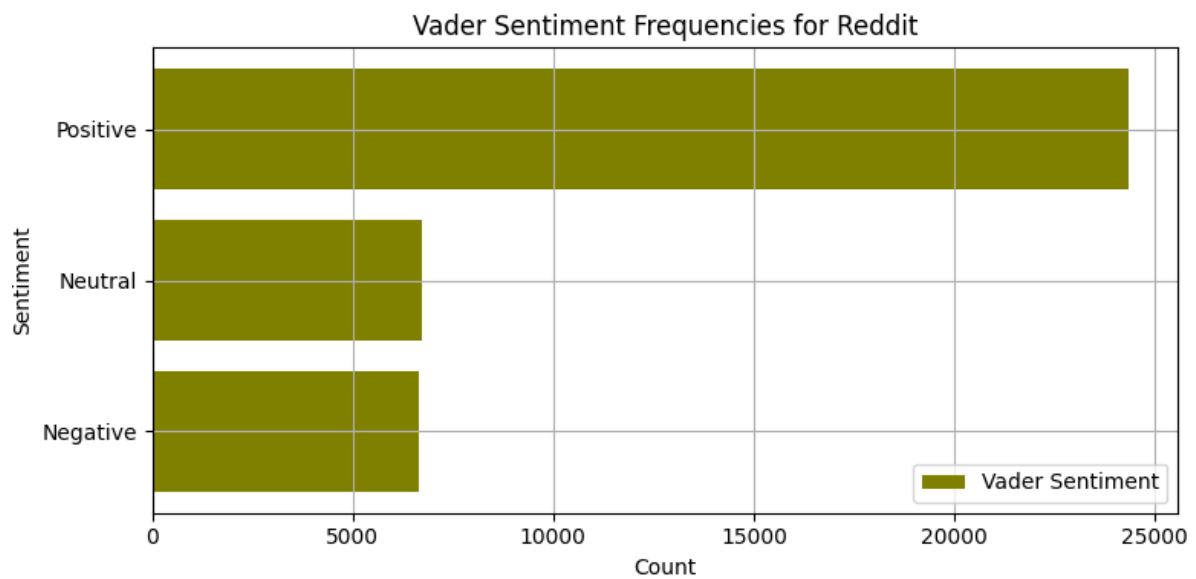
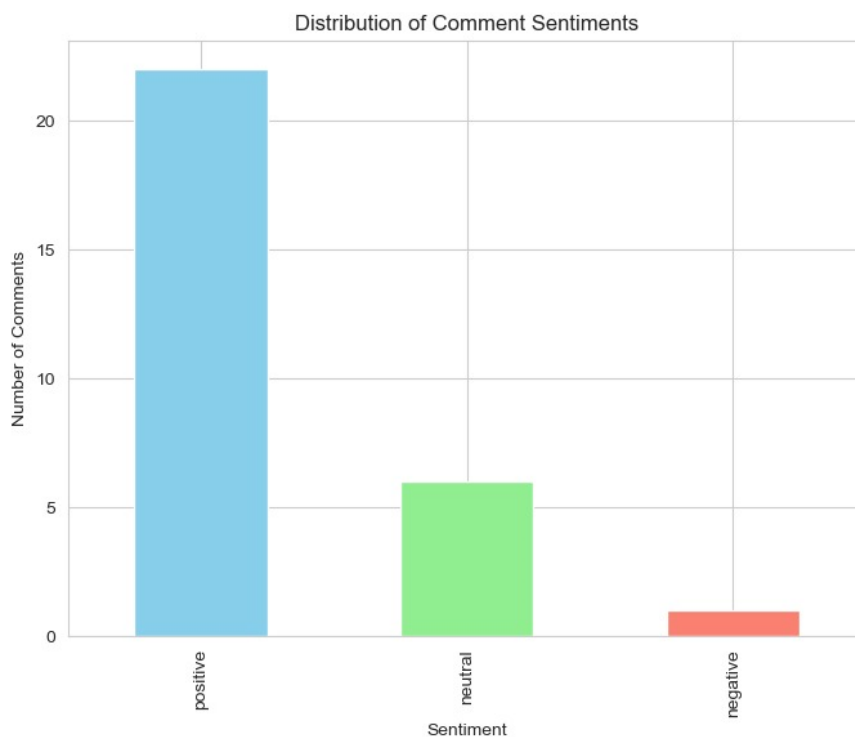*Figure 2: Sentiment Frequencies for the Reddit data.*

Figure 3: Sentiment Frequencies for the YouTube data.

Figures 2 and 3 provide a visual representation of the sentiments expressed within the FIRE community. The overwhelming prevalence of positive sentiment, as depicted in these figures, offers a compelling snapshot of the community's outlook on the FIRE movement.

The analysis of sentiments within the dataset revealed the following:

- **Positive Sentiment**: Positive sentiment overwhelmingly dominates the user discussions. Users express optimism, motivation, and enthusiasm in their conversations. Success stories,

strategies, and the allure of financial independence and early retirement are prominent drivers of this positive sentiment.

- **Neutral Sentiment**: Neutral sentiment represents a moderate portion of the discussions. It encompasses a spectrum of attitudes, from factual statements and discussions to mild expressions of interest.

- **Negative Sentiment**: Negative sentiment, while present, remains notably less prevalent. Users may express concerns, challenges, or scepticism, but these sentiments are relatively minor in comparison to the overall positive outlook.

YouTube Channel-wise Sentiment Analysis

Figure 4 displays the average sentiment scores for each channel, ranking them from the most negative to the most positive sentiment. This visualization offers insights into which channels are perceived more favourably or unfavourably based on their content's sentiment, aiding in understanding the emotional resonance of the content with its audience.
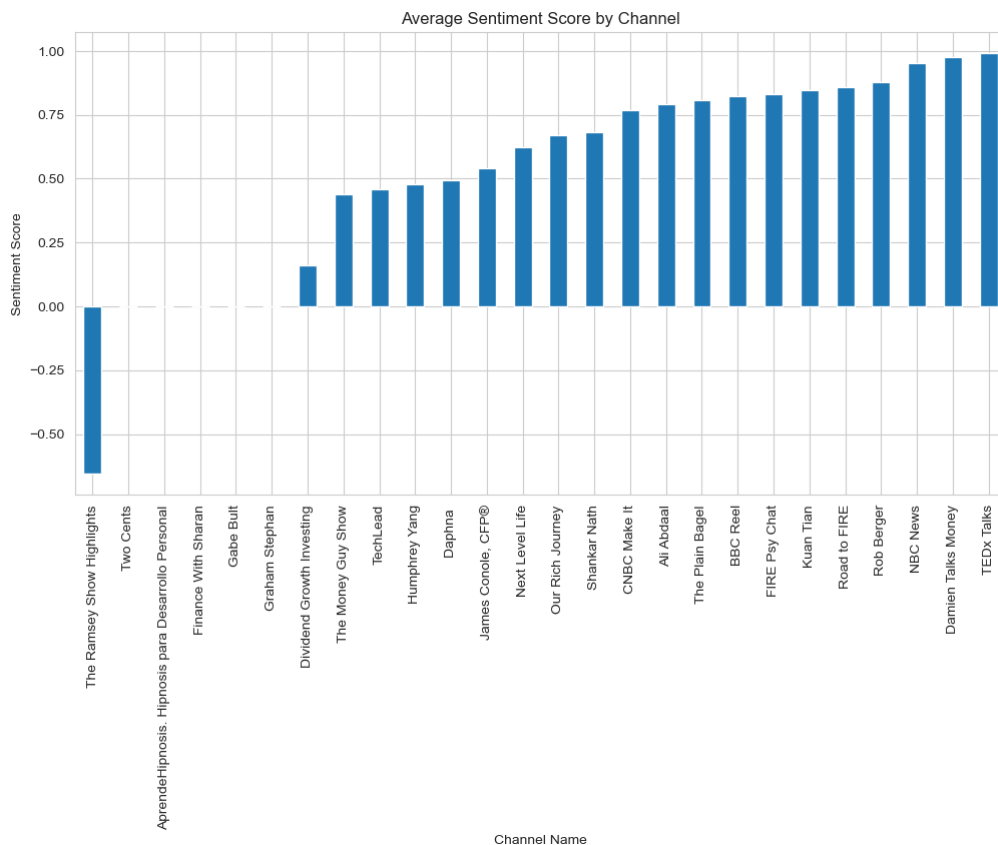

Figure 4: Sentiment Frequencies for the YouTube channels.

The overall sentiment analysis suggests that the FIRE movement resonates positively with the majority of the community. The allure of financial independence, early retirement, and the strategies shared by fellow members generate a prevailing sense of optimism and motivation. While challenges and concerns are voiced, they do not overshadow the overwhelmingly positive sentiment that characterizes the community's engagement with the FIRE movement.

Topic Modelling and Insights

Topic modelling plays a crucial role and provides a structured approach to understanding the most prominent subjects and areas of interest among Reddit and YouTube users. For our topic modelling analysis, we employed the Latent Dirichlet Allocation (LDA) technique. LDA is a probabilistic model designed to reveal latent topics within a corpus of text. By considering the co-occurrence of words, LDA helps us:

- Identify the dominant subjects discussed in the corpus.
- Group related discussions into coherent topics.
- Discover emerging trends and areas of interest.

Our LDA model was trained using Bag of Words (BOW) method. The BOW method involved representing text data as a collection of bigrams without considering their order. Each word was treated as a separate feature and the frequency of each word in the document was recorded. BOW provided a simple and effective way to create a document-term matrix for LDA modelling. Tokens which were earlier processed through cleaning were first converted to bigrams and then were used for creating BOW corpus.

5.1 Insights from the Reddit Data

Below are the insights derived from Reddit to provide an understanding of the subjects that resonate most strongly within the FIRE community on this platform. By applying the Latent Dirichlet Allocation (LDA) technique to the Bag of Words (BOW) method, we have uncovered latent topics that capture the essence of these discussions.
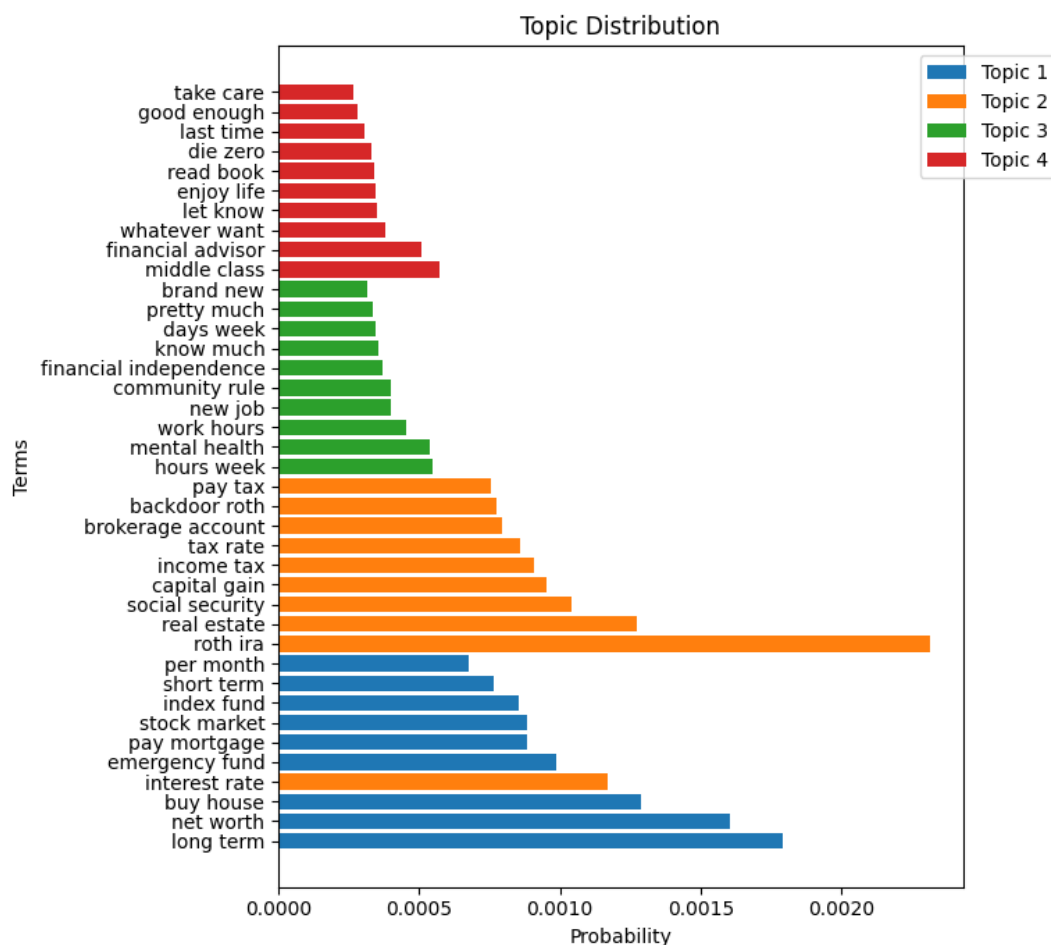

Figure 5: Probability of Top 10 Terms in 4 Topics generated from Reddit data.

In Figure 5, we can observe the significant terms that are being discussed in the selected subreddit communities. We have identified several key terms that enthusiasts frequently delve into, including 'stock market', 'Roth IRA', 'long term' and 'real estate'. Particularly, the prominence of 'stock market' as a central topic has prompted us to conduct a more in-depth analysis to explore its significance in our research agenda.

Topic ID	Topic Name	Terms	Interpretation
1	Financial Planning & Investment	'long term', 'net worth', 'buy house', 'interest rate', 'emergency fund', 'pay mortgage', 'stock market', 'index fund', 'short term', 'per month'	This topic revolves around long-term financial planning and strategies. Keywords such as "stock market" and "index fund" suggest discussions about wealth accumulation and investments. The emphasis on "emergency fund" highlights the importance of financial safety nets.
2	Taxes & Retirement Accounts	'roth ira', 'real estate', 'interest rate', 'social security', 'capital gain', 'income tax', 'tax rate', 'brokerage account', 'backdoor roth', 'pay tax'	Discussions in this topic are focused on different types of retirement accounts, taxation implications, and strategies to manage post-retirement finances. "Backdoor roth" indicates advanced strategies to leverage tax advantages.
3	Work-Life & Community	'hours week', 'mental health', 'work hours', 'new job', 'community rule', 'financial independence', 'know much', 'days week', 'pretty much', 'brand new'	This topic sheds light on the balance between professional and personal well-being. Terms like "hours week" indicate discussions about work-life, while "financial independence" ties back to the core theme of FIRE. "Community rule" may indicate shared best practices.
4	Life Philosophies	'middle class', 'financial advisor', 'whatever want', 'let know', 'enjoy life', 'read book', 'die zero', 'last time', 'good enough', 'take care'	Centered on life values and philosophies, this topic discusses societal norms, personal aspirations, and maximizing life experiences. "Read book" might point towards members recommending insightful reads to enhance understanding of life values.

Table 2: Topic Interpretation table for Reddit data.

- Orange nodes: Users who have commented in the subreddit.
- Green nodes: Terms (bigrams) from the topics in Table 2.
  Edges connect the users with the keywords they have used in their comments.
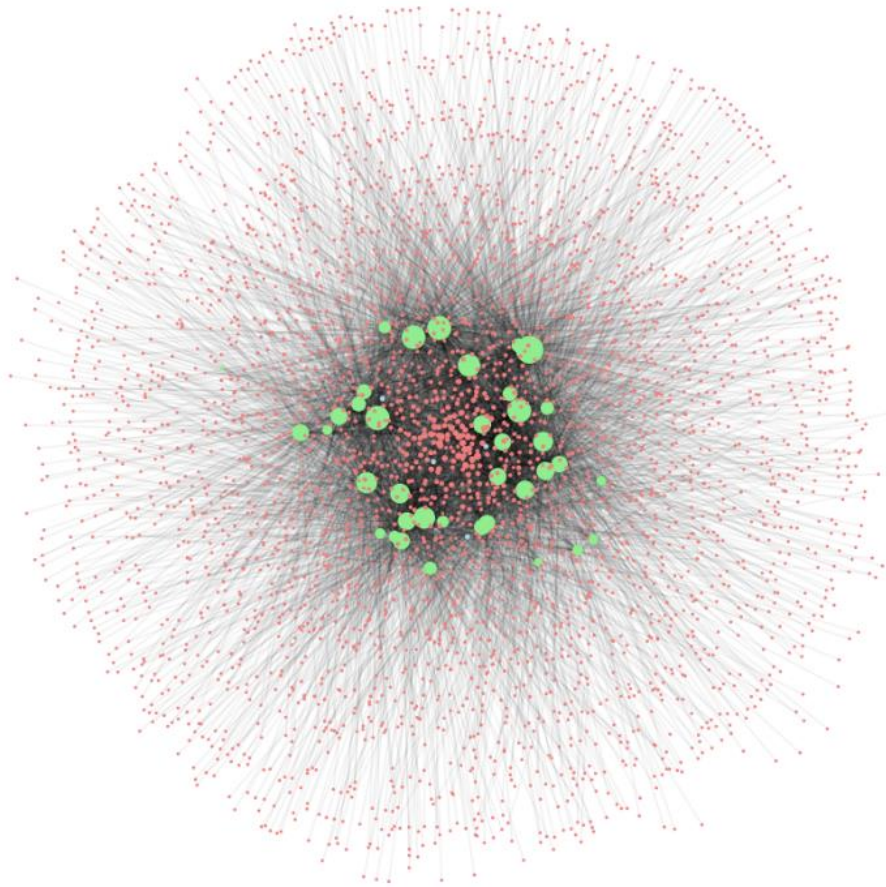

Figure 6: Network graph from Reddit data for users and the bigrams they used.

Many users within the FIRE Reddit community have engaged in discussions using multiple terms when posting comments. This observation is visually represented in Figure 6, where we can see a network of nodes denoting different terms. The size of the green nodes corresponds to the number of edges connected to each node. Larger green nodes indicate that a higher number of users are actively discussing or mentioning the associated topic or concept.

5.2 Insights from the YouTube Data

Here are the insights derived from YouTube to offer a comprehensive understanding of the videos that resonate most effectively with the FIRE movement.

We conducted topic interpretation by analysing keyword clusters generated through Latent Dirichlet Allocation (LDA) while applying TF-IDF (Term Frequency-Inverse Document Frequency) weighting. Visual representations like word clouds and LDA visualizations were used to examine these clusters. This process allowed us to identify the underlying themes or subjects within the YouTube data.

Topic ID	Topic Name	Terms	Interpretation
1	Financial Independence Tools & Recommendations	channel, recommend, book, smartly, fi, freedom, fire, calculator, level	Content related to financial independence, tools/resources recommendations, and the FIRE movement.
2	Australian Superannuation & International Finance	richard, que, de, home, superannuation, allocation, una, super, aud	Discussion about the Australian superannuation system and possibly content in Spanish or about Spanish countries.
3	Investment Strategies & Personal Interviews	portugal, lacey, market, interview, explain, investment, deposit, number	Content on investment strategies, market dynamics, personal interviews, and budgeting tools.
4	Financial Coaching & Investment Types	coaching, dividend, favourite, seven, pursuing, schedule, psy, mil, try	Pertains to financial coaching services, dividend investments, and strategies or assets.
5	Media & Financial Entertainment	cnbc, news, nbc, ramsey, show, cent, dianne, find, guillermo, two	Relates to financial news or shows by networks like CNBC or NBC, possibly mentions of Dave Ramsey and others.

Table 3: Topic Interpretation table for YouTube data

In the topic modelling of YouTube data, several prominent topic terms emerged, including 'FIRE,' 'freedom,' 'investment,' 'market,' and 'superannuation.' These terms suggest that the discussions within the FIRE community on YouTube often revolve around financial independence and early retirement ('FIRE'), the pursuit of personal freedom, various investment strategies, the stock market, and retirement planning, possibly focusing on superannuation or other retirement savings vehicles. This indicates a strong interest in financial and lifestyle-related topics within this community, aligning with the core principles of the FIRE movement.
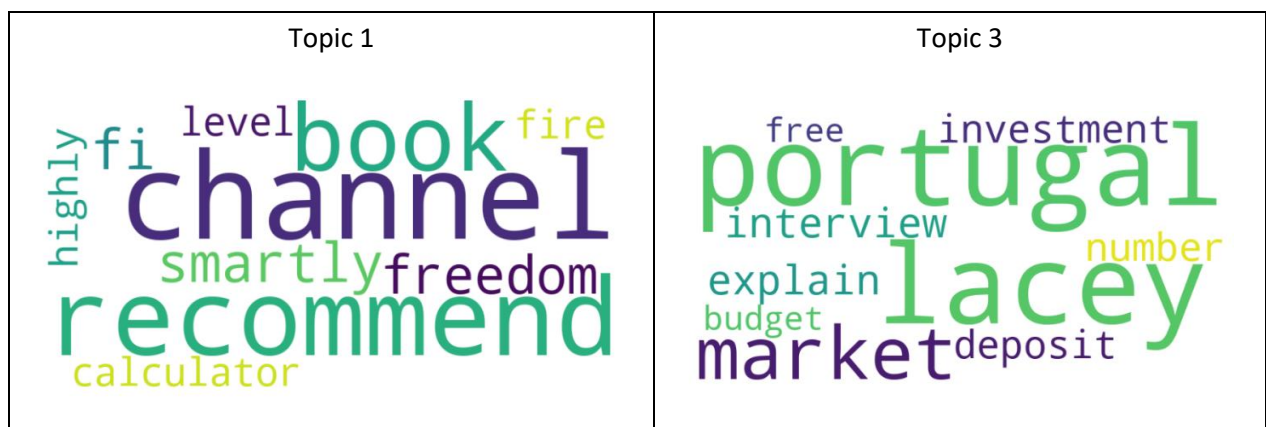

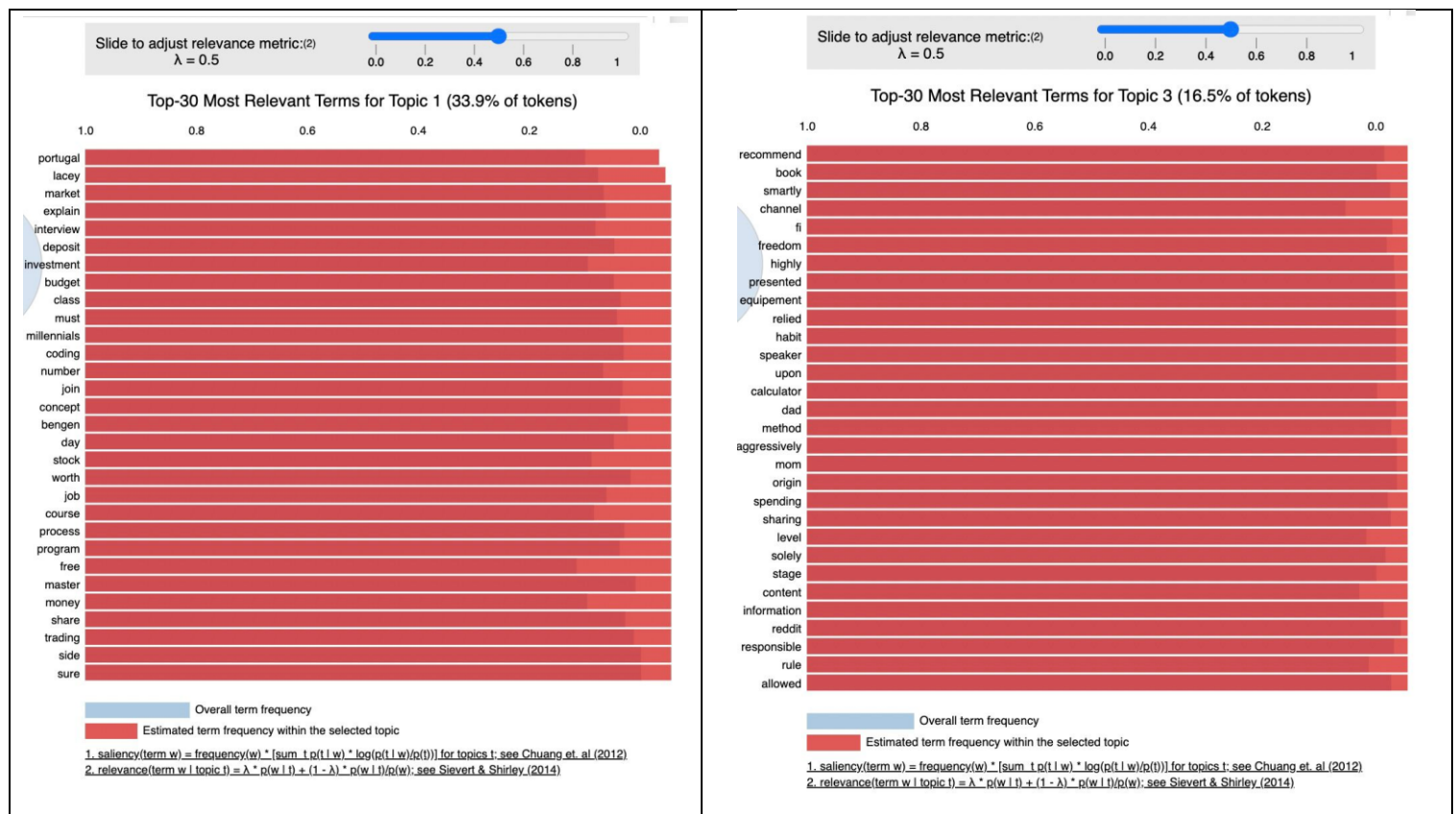*Figure 7: Word Cloud for Topic 1 and Topic 3*

Figure 8: TDA Visualization for Topic 1 and Topic 3

5.3 Comparison between Reddit and YouTube Topics

This section provides an insightful comparison between the topics that take center stage on both platforms.

- Both Reddit and YouTube discussions emphasize the importance of the stock market and investment strategies within the FIRE community.
- Reddit delves into specific financial tools like Roth IRAs and real estate, while YouTube highlights broader concepts like 'FIRE' and 'freedom.'
- Both platforms reflect a focus on long-term financial planning.
- 'Superannuation' appears uniquely in the YouTube data, suggesting a particular focus on retirement planning and financial security.

This comparison reveals some overlap in topics between Reddit and YouTube within the FIRE community, with each platform also having its unique emphasis and areas of discussion.

Social Network Analysis - Reddit

6.1 Network Structure

The social network within the FIRE community is a complex web of relationships and interactions. To capture the essence of this network, we have defined nodes and edges, where each node represents a user, and edges signify connections or interactions between users. This network structure allows us to uncover the intricate dynamics that define the community's online presence.

In addition to our original Reddit's data, our analysis extends to two more subreddits, "r/stocks" and "r/FinancialPlanning" as they were related to the topics discussed in the original data. The inclusion of these additional subreddits provides a broader perspective on the network of user interactions, enabling us to explore user networks more comprehensively. Therefore, from hereon, we have studied data from four subreddits – "r/Fire", "r/financialindependence", "r/stocks" and "r/FinancialPlanning".

We began by finding users who are active in at least two of these subreddits and we found over 6200 users who connect these different parts of the FIRE community. From there, we dug deeper, identifying users who have posted the most comments in each subreddit (Figure 9) and those who are highly engaged across all four subreddits (Figure 10).
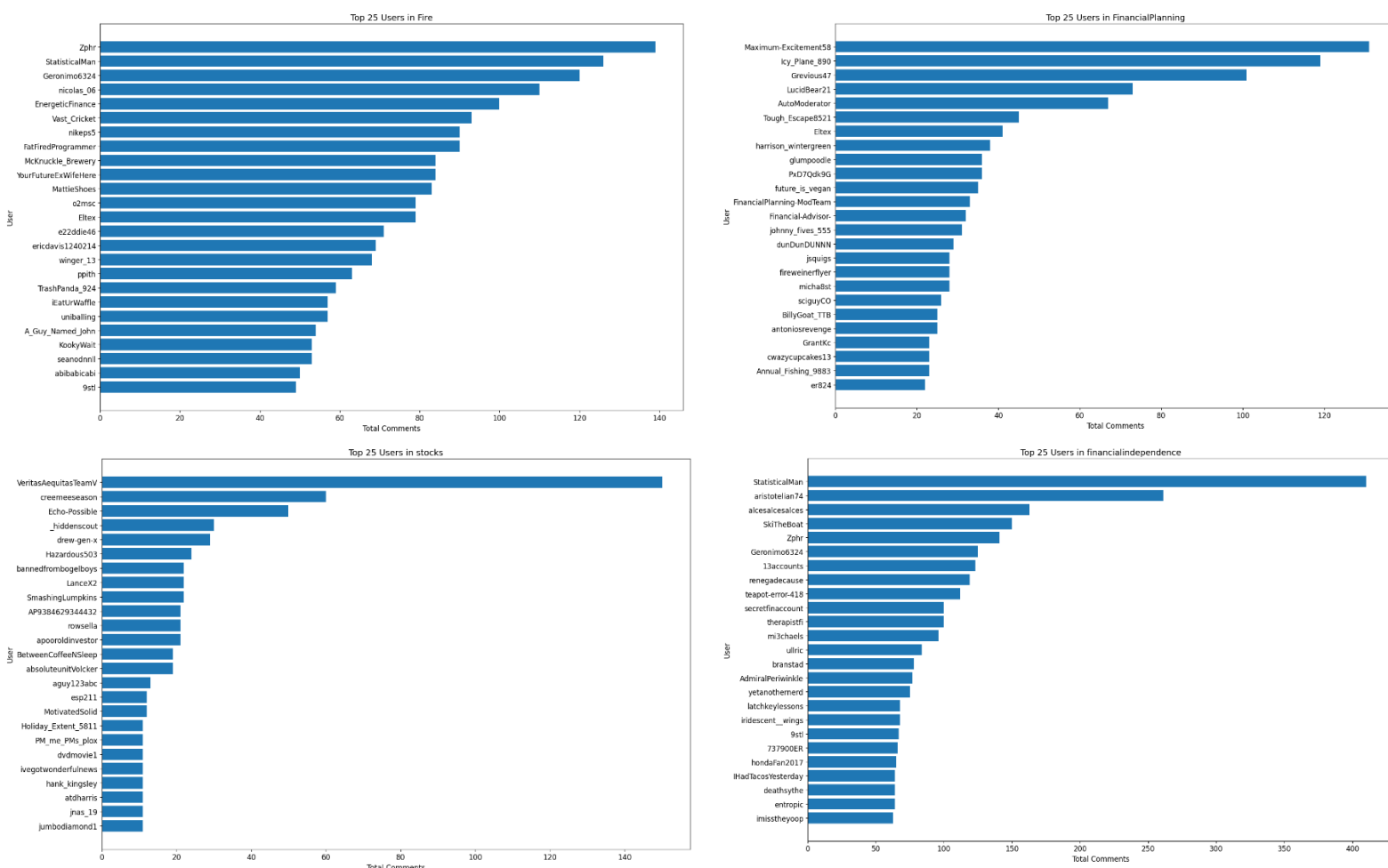

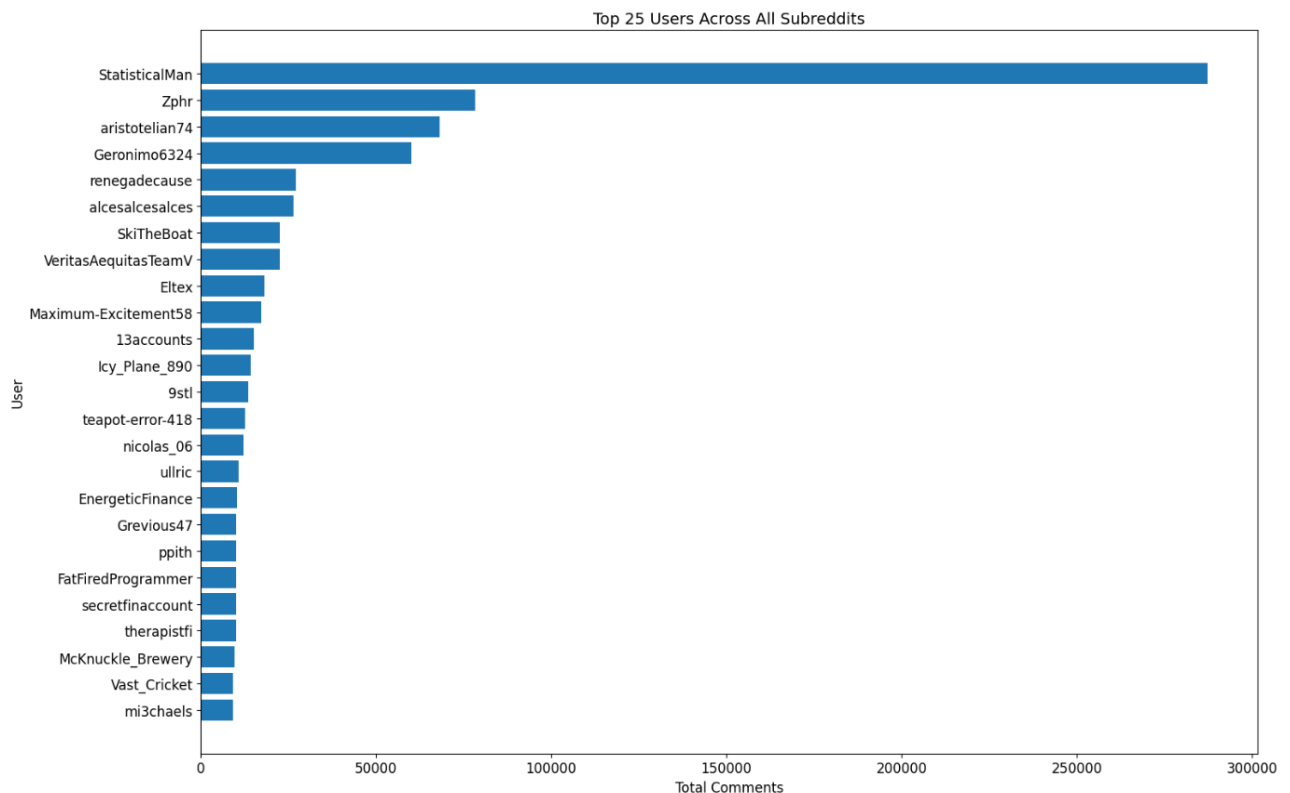*Figure 9: Top 25 users who commented most in each subreddit.*

Figure 10: Top 25 users who commented in all the four subreddits combined.

In addition to finding the active users across subreddits, we created a network graph that visually shows how users connect and interact. This graph helps us see the relationships, key contributors, and the flow of information in the FIRE community's online world.

The network graph (Figure 11) analysis uncovered a noteworthy phenomenon within the FIRE community on Reddit. It demonstrated a substantial number of users who actively participated in both the "FIRE" and "Stocks" subreddits, signifying a pronounced connection between discussions on financial independence, early retirement, and those centered around stock market investments. This finding strongly suggests that stock market strategies hold a prominent and integral role within the financial approach of the FIRE community. Users frequently engaging in both areas of discussion potentially highlight the stock market as a key means for them to realize their financial goals and expedite their path to financial independence and early retirement.

Furthermore, the network graph goes beyond showcasing connectivity; it offers a unique lens to identify influential users. Those who actively participate across diverse subreddits, such as "FIRE" and "Stocks," not only display a wide range of interests but also demonstrate a deeper understanding of the subject matter. These individuals, often found at the intersections of these subreddits, might be considered as thought leaders or influencers within the FIRE community. Their ability to bridge conversations and share insights across different financial realms positions them as valuable resources for guidance, significantly impacting discussions, and guiding the community's financial strategies. This underscores the importance of identifying and engaging with these influential figures for those pursuing FIRE.
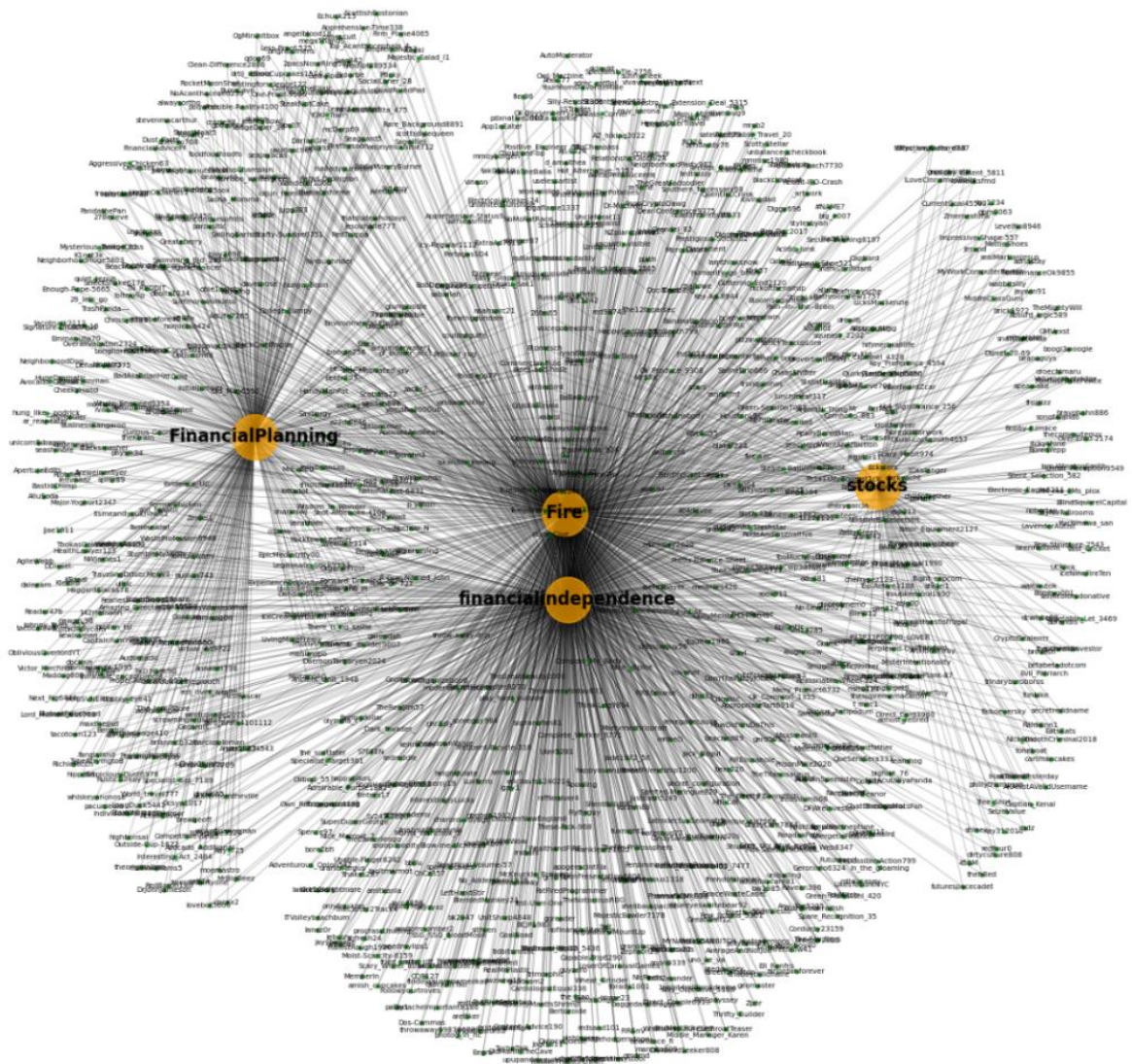
Figure 11: Network graph showcasing the interactions between subreddits and users who are active in at least two subreddits.

6.2 Influential Figures

To identify the influential figures within the FIRE community's social network, we employed a multi-step approach.

- **Degree Centrality and Betweenness Centrality**: Our analysis began with the calculation of two key centrality measures: degree centrality and betweenness centrality. Degree centrality tells us how many connections a user has, while betweenness centrality reveals the extent to which a user acts as a bridge between other users in the network.

- **Users with Maximum Degree Centrality**: These centrality measures allowed us to pinpoint users with the most connections. By identifying the user with the maximum degree centrality, we uncovered key influencers within the community, users who are actively connected to many others (Table 4).

User	Degree centrality	Connected to number of subreddits
TrashPanda_924	0.000263	4
Alternative-Plant-87	0.000197	3
seanodnnll	0.000197	3
Atriev	0.000197	3
fp011k	0.000197	3

Table 4: Users with Maximum Degree Centrality

- **Arranging Data by Degree Centrality and Comments**: To further identify influential figures, we organized the data in descending order based on degree centrality and the number of comments posted by users. This approach gave us a clearer view of who the most active and interconnected users were.

	comment_author	total_comment_count	num_commented_subreddits
2391	StatisticalMan	536	2
6476	Geronimo6324	245	2
1847	Eltex	135	3
17398	9stl	116	2
26104	ullric	104	2
985	McKnuckle_Brewery	98	2
616	Vast_Cricket	96	2
14789	e22ddie46	82	3
3630	ericdavis1240214	78	2
26423	AutoModerator	75	2
1638	KookyWait	74	3
2564	A_Guy_Named_John	72	3
32511	IHadTacosYesterday	70	2
152	TrashPanda_924	66	4
1322	seanodnnll	63	3
5203	Commercial_Rule_7823	59	3
17582	SnarkConfidant	59	2
16171	ApricotsAndBeans	56	3
6986	glumpoodle	55	3
4076	goodsam2	53	2
1161	esp211	52	3
12949	tryingtogetfi	51	3
14686	HonestOtterTravel	51	2
727	FujitsuPolycom	51	2
25744	PxD7Qdk9G	51	2

Table 5: Top 25 users with the highest total comment count from the top 1000 users according to centrality

- **Creating a Network Graph**: With this sorted data, we constructed a network graph (Figure 12) that specifically focused on the most influential users. This graph visually represents the connections and interactions among these key figures, providing insights into their role in shaping the community's discourse.
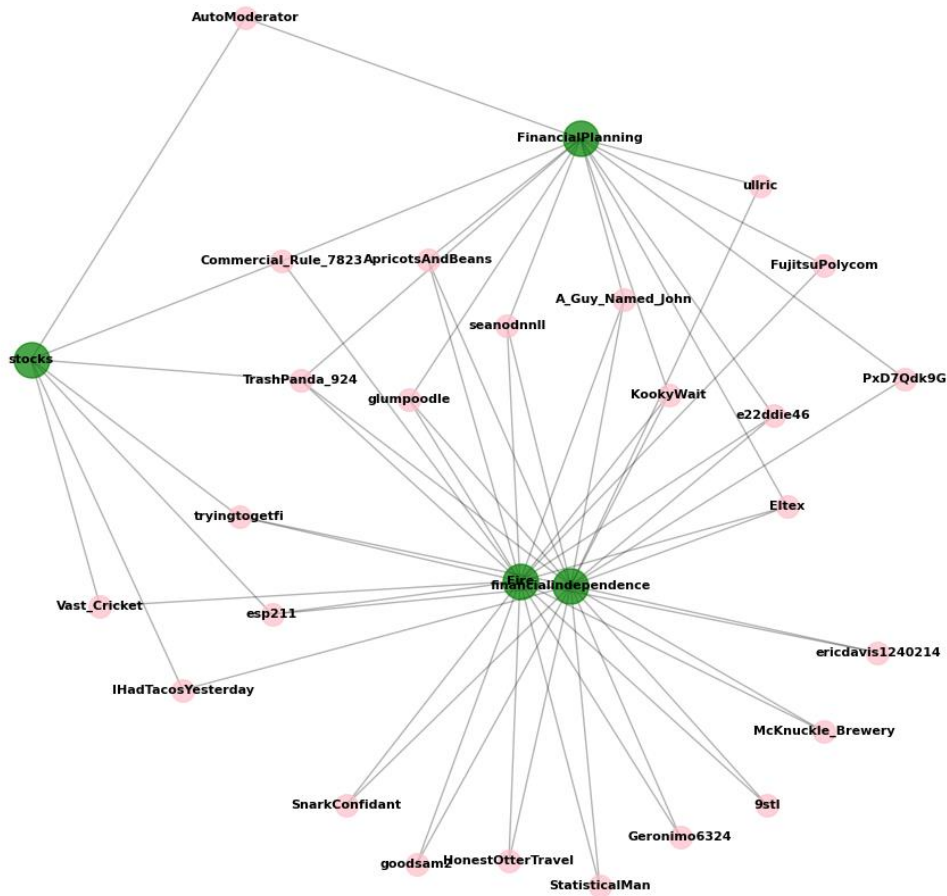
Figure 12: Network graph with nodes of the four subreddits and the Top 25 users .

6.3 Influencers' Data Exploration

Our exploration of influential figures within the FIRE community extended to a deeper dive into their data. This phase allowed us to understand not only who these influencers are but also the substance of their contributions.

- **Selection of Top Influencers' Data**: We focused on the comments and interactions of the top 25 influencers (Table 5), narrowing our analysis to their data. This selection gave us a concentrated view of the content generated by these key figures.

- **Sentiment Analysis**: Within this dataset, we conducted sentiment analysis to discern the emotional tone of the comments made by these influential users. This analysis helped us understand the prevailing sentiment within the discussions led by these influencers.
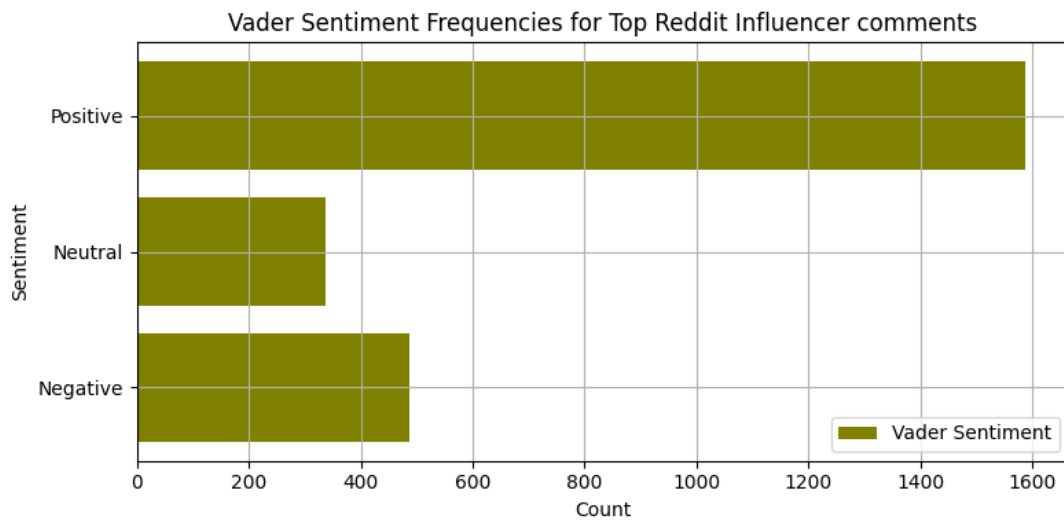
Figure 13: Sentiment Frequencies for the Top users in all subreddits.

- **Topic Modelling and Relevant Subtopics**: By employing topic modelling techniques that incorporated bigrams, we identified the central themes and topics within the content generated by influencers. Our exploration led to the discovery of the specific terms and subtopics that gained prominence among the influencers. This insight illuminated the key areas of interest and the conversations that captivated their attention.
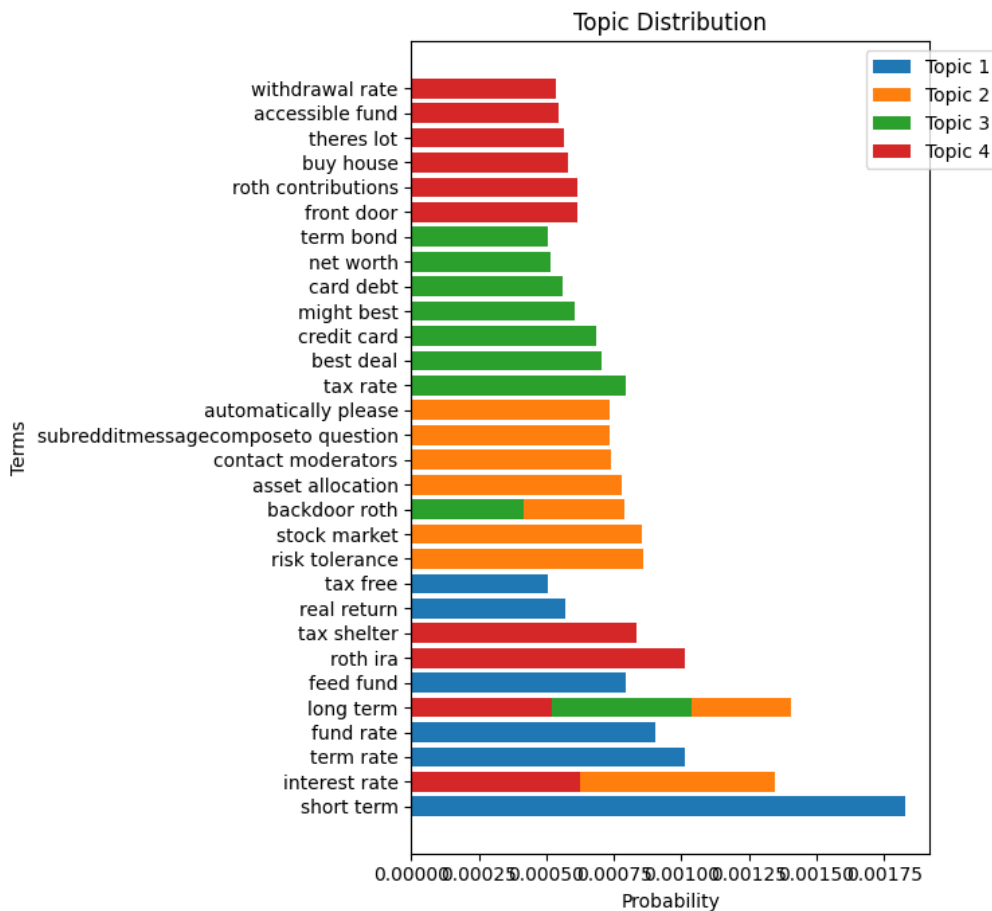

Figure 14: Probability of Top 10 Terms from 4 Topics generated from the data of Top Reddit users.

The identification of key terms such as "short term," "long term," "Roth IRA," "real return," "stock market," and "risk tolerance" among the top 25 influential users in our analysis provides valuable insights into the priorities and interests of these community leaders within the FIRE movement. Their engagement with diverse investment strategies, including both short and long-term approaches, reflects a nuanced approach to financial planning. The significance attached to "Roth IRA" highlights the importance of tax-advantaged retirement accounts, a key element in the journey toward financial independence and early retirement. The emphasis on "real return" underscores the commitment to investments that preserve and grow wealth beyond inflation. Furthermore, the repeated focus on the "stock market" affirms the pivotal role equities play in FIRE strategies. Additionally, their discussions surrounding "risk tolerance" indicate a keen awareness of the need to assess and manage the potential risks associated with their investments. Collectively, these findings reveal a comprehensive and well-rounded approach to financial planning and investment strategies within the FIRE community, championed by its influential figures.

- **In-Depth Comment Analysis**: To gain a more profound understanding, we extracted the most positive and negative comments related to a chosen subtopic. These comments were scrutinized to unravel the underlying sentiment, key insights, and contributors to the discourse. This in-depth analysis helped us grasp the nuances of user sentiments and perspectives.

A part of the most positive comment by a top user "StatisticalMan" who is active on two subreddits:
"Rates are set by supply and demand. Yes the treasury is the seller. Short version is the Treasury announces an auction. We are issuing $50B worth of new 30 year bonds on Nov 1. People put in bids. One person might bid 4.7%, another 4.8%, etc. When the auction closes the Treasury looks at the first $50B worth of bids ranked lowest to highest and that highest rate say 4.731% becomes the rate for the entire $50B. Everyone who wins gets 4.731%. Everyone who bid higher than 4.731% doesn't get a bond at all. So when bidding people are essentially saying I want AT LEAST this interest rate or higher."

What we can infer from the comment:
The comment appears to be an accurate and informative explanation of how government bond auctions work, and the user is knowledgeable about financial markets and investment principles, specifically in the context of government bonds.
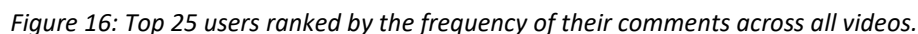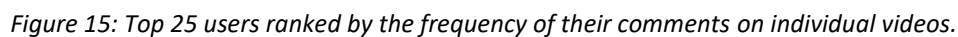
By undertaking this process, we not only uncovered the influential figures but also dived into the content they produced, allowing us to gain a more comprehensive understanding of their impact on the FIRE community's discussions and the dynamics of the movement.

Social Network Analysis - YouTube

7.1 Network Structure

Building upon the methodology used for Reddit, we extended our social network analysis to YouTube. The overall process and analytical techniques remain consistent, ensuring continuity in our research. However, the platform-specific observations and visualizations provide unique insights into the dynamics of online communities and engagement patterns on YouTube. In this section, we present

our findings and visual representations specific to the YouTube platform, highlighting the distinct characteristics of this social network.

Our analysis of the social network structure on YouTube begins with the identification of top active users. We examined users who had posted the highest number of comments and engage extensively within the Top 30 YouTube videos.

Figure 15: Top 25 users ranked by the frequency of their comments on individual videos.

Figure 16: Top 25 users ranked by the frequency of their comments across all videos.

Alongside the identification of active users, we crafted a network graph depicting the interactions between YouTube videos and users who have commented on at least two videos, which offers a visual representation of the connections and interactions within the YouTube-based FIRE community.

The data extraction from 29 YouTube videos centered around "Financial Independence, Retire Early" (FIRE) and the subsequent creation of a network graph (Figure 17), highlighting 570 users who actively

commented on more than one video, unveils a vibrant and cohesive community within the FIRE movement on YouTube. This substantial number of engaged users indicated not only a shared interest but also a diverse range of perspectives and experiences within the FIRE community. These active commenters were more than just spectators; they served as essential contributors, sharing knowledge, providing insights, and guiding fellow community members. Their presence signifies the dynamic growth of the FIRE movement on YouTube, emphasizing that it's not just a passive viewership but an interactive and evolving platform where discussions about financial independence and early retirement continue to thrive and expand.

- Yellow nodes: YouTube Videos
- Green nodes: Users who have commented on the Videos.
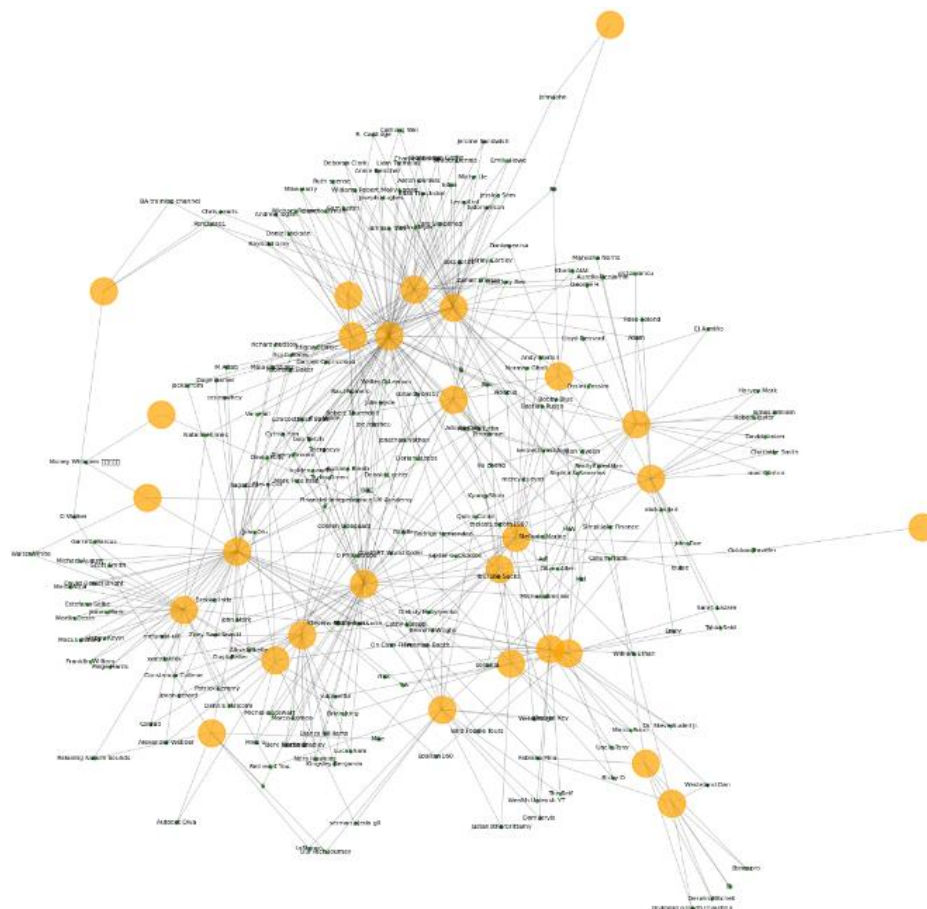 Edges connect the users with the videos they have commented on.

Figure 17: Network graph showcasing the interactions between YouTube videos and users who have commented on at least two videos.

7.2 Influential Figures

We then casted a spotlight on influential figures who drive discussions and inspire engagement. We began by identifying users with the highest levels of activity and influence within the network.

To pinpoint these influential voices, we employed quantitative metrics, calculating both Degree Centrality and Betweenness Centrality for all users. This process allowed us to distinguish the Top 25

users with the highest overall comment count from among the top 1000 users according to centrality metrics.

- Pink nodes: YouTube Videos
- Green nodes: Top 25 Users
  Edges connect the users with the videos they have commented on.
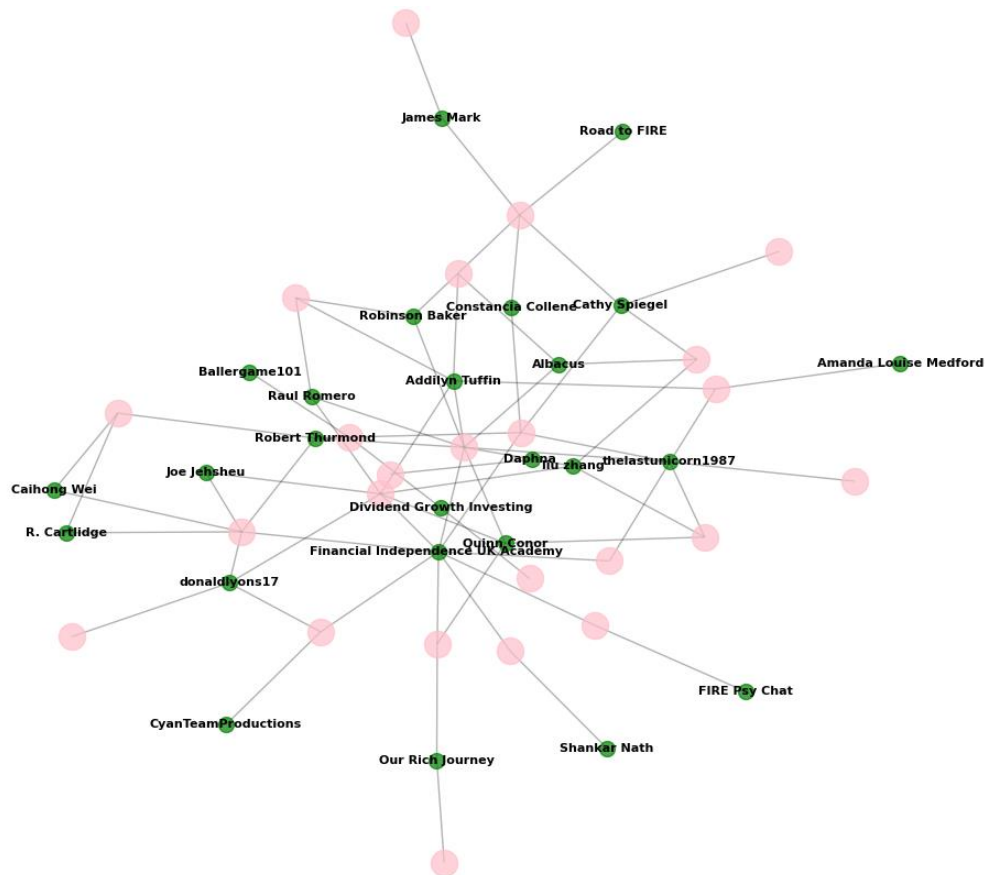

Figure 18: Network graph for the Top 25 users .

User	Degree centrality	Connected to number of nodes (videos)
Financial Independence UK Academy	0.003054	9
On Cash Flow	0.002036	6
thelastunicorn1987	0.002036	6
Addilyn Tuffin	0.001697	5
Cathy Spiegel	0.001357	4

Table 6: Users with Maximum Degree Centrality

Among these influential figures, "Financial Independence UK Academy" stands out prominently, demonstrating their noteworthy impact within the FIRE community on YouTube.

7.3 Influencers' Data Exploration

Our exploration focused on the most influential figures in the YouTube-based FIRE community, examining their contributions. We analysed their comments after preprocessing, uncovering a predominantly positive sentiment (Figure 19) that characterizes the community.
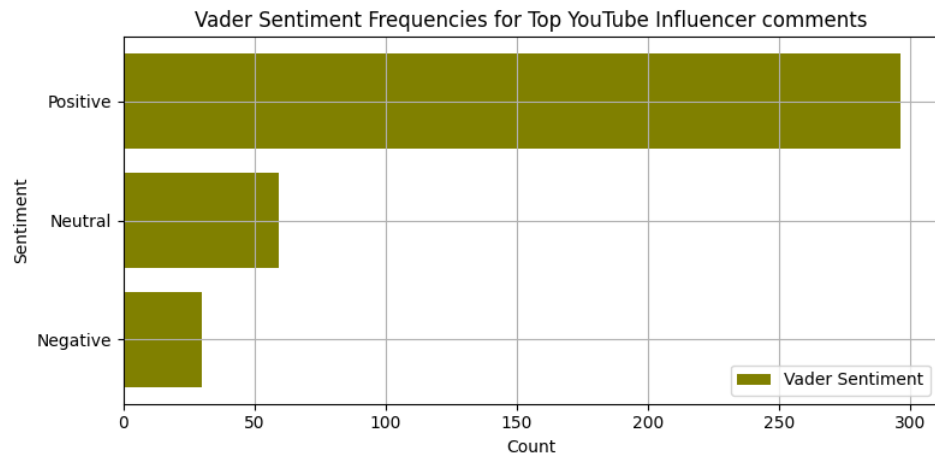

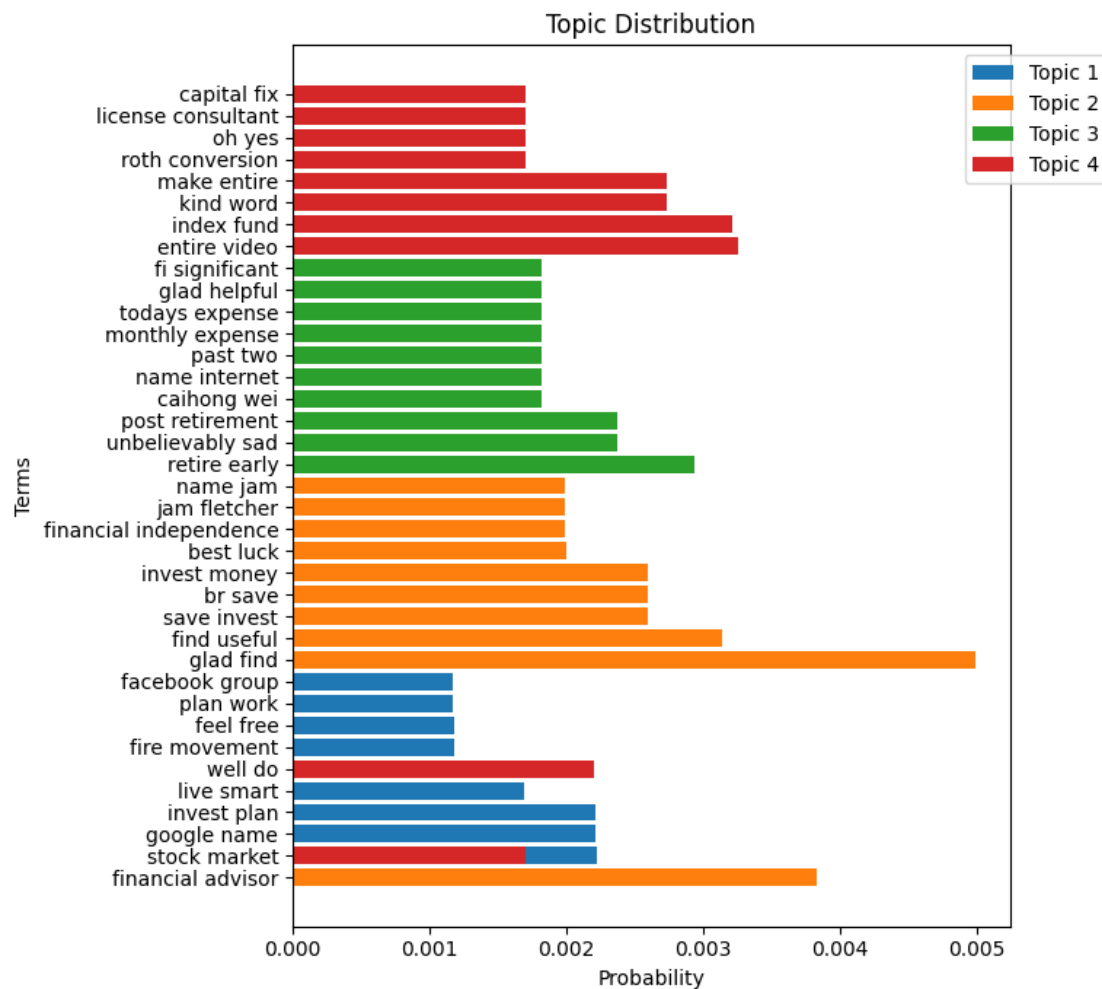*Figure 19: Sentiment Frequencies for the Top users.*

Figure 20: Probability of Top 10 Terms from 4 Topics generated from the data of Top users.

The topic modelling results (Figure 20) from the comments of the top 25 YouTube influencers in the FIRE community, which include terms like "stock market", "financial independence", "financial advisor", "investment plan" and "glad find" reveal a comprehensive picture of the priorities and interests of these influential figures. Notably, the repeated mention of "stock market" underscores its continued prominence as a key element within the FIRE financial strategy. Simultaneously, the recurring reference to "financial independence" aligns with the core principles of the FIRE movement, indicating that these influencers are actively guiding others toward achieving financial autonomy, often through strategies that involve the stock market. The inclusion of "financial advisor" raises interesting considerations. While it may not necessarily imply that these influencers are licensed financial professionals, it does emphasize their significant role as trusted sources of financial guidance and insights within the community. These influencers play a mentorship role, sharing valuable advice and strategies with their audience. Lastly, the presence of "investment plan" highlights a calculated and strategic approach to financial planning within the FIRE community.

Furthermore, we identified the most positive comments and analysed them to gain a deeper understanding of user sentiment and the themes that resonate within the YouTube-based FIRE community.

A part of the comment by a top user "Shankar Nath" who had maximum numbers of comments:
"This video perfectly captures the essence of the FIRE movement! The strategies and insights shared here are incredibly valuable for anyone seeking financial independence and early retirement. I appreciate how it emphasizes the importance of intentional living, frugality, and smart investing to achieve long-term financial goals. The FIRE movement is truly empowering, offering a path to break free from the traditional 9-5 grind and live life on your own terms. Kudos to you for shedding light on this life-changing concept!"

What we can infer from the comment:
The comment reflects a strong endorsement of the FIRE movement, acknowledging its core principles, the value of the content, and the potential for life-changing empowerment that it offers to individuals seeking financial independence and early retirement.

OBSERVATION
During our data analysis, we identified a highly influential YouTube channel with the highest centrality score, further uncovering the same username on LinkedIn, affiliated with 'FireAcademy UK.' This cross-platform presence underscores a comprehensive approach to audience engagement. The presence of hashtags such as #financial, #financialfreedom, #financialeducation, and #financialindependence on the LinkedIn profile indicates a strong focus on financial matters, particularly financial education and the pursuit of financial freedom and independence – central themes in the FIRE (Financial Independence, Retire Early) movement. This influencer plays a significant role in guiding and educating the FIRE community, evident from their prominence on YouTube and alignment with FIRE principles.

A part of the most positive comment by "Financial Independence UK Academy":
"Wow, this video is a game-changer! The step-by-step guide on how to retire in 7 years starting from zero is truly enlightening. It's amazing to see how frugal living, smart investing, and side hustles can lead to financial independence at a much earlier age than traditionally expected. The concept of house hacking is particularly intriguing. It's inspiring to see how one can take control of their financial future and not wait until 65 to enjoy life. Can't wait to apply some of these strategies!"

What we can infer from the comment:
The comment by "Financial Independence UK Academy" radiates unwavering positivity, labeling the video as a transformative revelation. It applauds the step-by-step guide for achieving early retirement

from scratch, highlighting the pivotal roles of frugal living, astute investments, and side hustles. Of particular interest is the concept of "house hacking," which captivates the user's imagination. The comment exudes inspiration, asserting that one need not wait until age 65 to savour life's joys, showcasing the empowering message of achieving financial independence and enjoying life earlier.

Figure 21: LinkedIn account of "Financial Independence UK Academy"

The YouTube-based social network analysis unveils the intricate relationships and interactions that shape the FIRE community on this platform. By identifying key figures, analysing the network structure, and exploring content engagement, we gain valuable insights into how the community operates on YouTube.

Inter-Platform Network Analysis

Our exploration extended beyond individual platforms as we ventured into inter-platform network analysis. By scrutinizing user interactions across Reddit and YouTube, we discovered three common users who bridge both platforms. Leveraging this insight, we created a network graph that intricately weaves together four subreddits, top YouTube videos, and these common users.
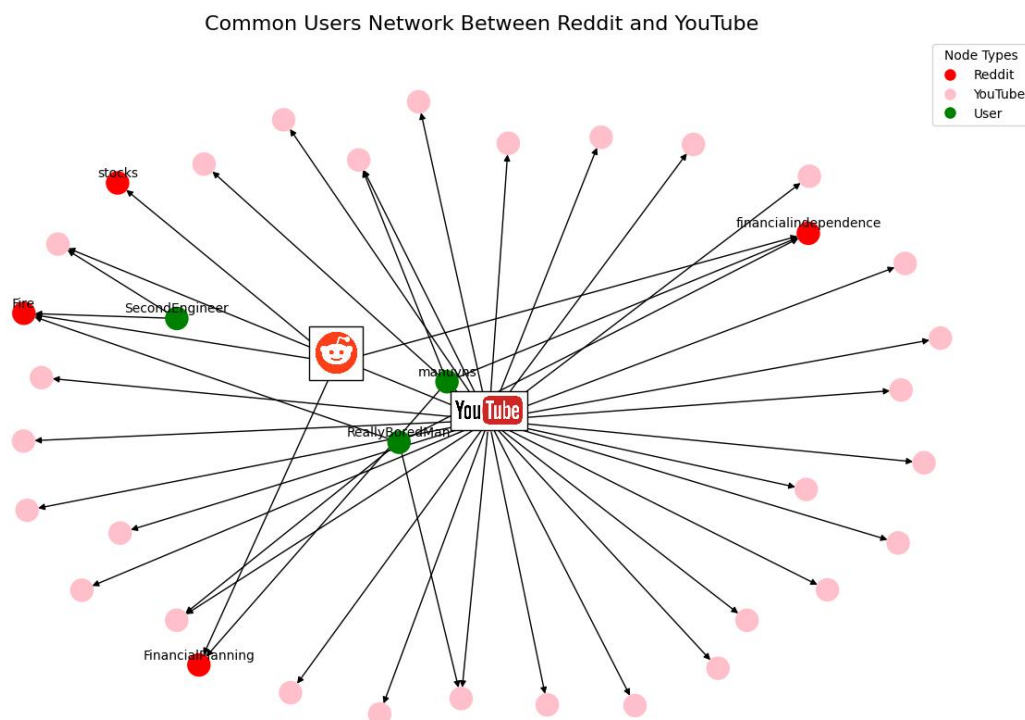

Figure 22: Network Graph between subreddits, YouTube videos and the common users.

This inter-platform network graph presents a snapshot of the inter-connectedness between Reddit and YouTube in the context of the FIRE movement. It reveals common users who actively engage on both platforms, highlighting cross-platform interactions. The connections between subreddits, top YouTube videos, and common users illustrate shared interests and themes that transcend platform boundaries.

Conclusion

In a world where many people aim for financial freedom and retiring early, our analysis provides a comprehensive examination of the FIRE (Financial Independence, Retire Early) movement. We set out with the central question of whether individuals pursuing FIRE consider stock market investments as a significant element of their financial strategy, and our findings resoundingly confirm this notion. The presence of terms such as "stock market," "investment plan," and "financial advisor" among the top YouTube influencers in the FIRE community underscores the profound significance of the stock market in their financial strategies. It is not merely a peripheral consideration but a central pillar upon which their aspirations are built.

The 'how' behind this narrative reveals the active involvement of influential figures who take on roles akin to "financial advisors" within the FIRE movement. These individuals are not just content with their own journey; they actively share insights, knowledge, and strategies related to the stock market, serving as mentors and guides. Their engagement transcends YouTube, extending across various social media platforms, reinforcing their pivotal influence.

The 'why' is multifaceted. FIRE enthusiasts recognize that the stock market offers a dual benefit, catering to both short-term objectives and long-term financial independence. This comprehensive approach underscores the movement's commitment to financial education. The inclusion of hashtags such as #financial and #financialfreedom signifies a dedication to learning and growing within this dynamic landscape.

Beyond the movement, we delve into the broader public sentiments toward FIRE. The responses are a varied tapestry, encompassing admiration and scepticism. Some individuals view FIRE with admiration, recognizing its potential to bring about financial transformation. Others, however, approach it with a degree of scepticism, questioning the feasibility and practicality of the movement. This diverse spectrum of reactions emphasizes the intricate web of perspectives and emotions surrounding the FIRE movement.

In sum, our analysis provides a holistic view of the FIRE journey, painting a vivid picture of the prominent role of the stock market in the strategies of those pursuing financial independence and early retirement. Influential figures serve as beacons of guidance within the community, and the commitment to financial education shines through. Additionally, our exploration of public sentiments adds an extra layer of depth, highlighting the real-world impact of the FIRE movement on financial strategies and perceptions.