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Unleash these Memes!
How brands can extract topics from user-generated images

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Introduction

As defined by Dawkins in the book *The Selfish Gene* (1976), a meme is "a piece of information or cultural phenomenon that spreads person to person until it becomes part of general consciousness". Over the years, and thanks to the rise of social media, the concept of "Internet memes" was born. We can define an Internet meme as a type of idea that is spread via the Internet in the form of images or videos, mainly for humorous purposes.

Nowadays, Internet memes have become an integral part of Internet culture, as every user can create, share, imitate and transform them. However, memes are not just humor: researchers show that they are considered to be a source of new information, and that they could influence the audience to form an opinion (Rasheed et al. 2020). Memes are also used to further political messages and ideologies (Ling et al. 2021); for example, they have been used by the Reddit page WallStreetBets to incentivize the purchase of GameStop stocks (January 2021), or by Myanmar protesters to attract attention and signal their non-violent intentions (February 2021).

Managerial Relevance and Problems

Digital content marketing is an important vehicle for fostering consumer awareness, engagement and trust toward the brand (Hollebeek and Macky 2018). However, social media is a highly competitive landscape, and companies need to understand how to

produce appealing content that consumers will share. For this purpose, memes could be very effective in gaining the attention of users, and could be used by managers in their marketing strategy. For example: in 2017 Gucci launched the "That Feeling When Gucci" campaign, which commissioned artists to create memes about Gucci.

The results were astonishing: over 120 million of total reach, and 1,986.005 likes. In fact, the "#TFWGucci" memes outperformed every other past content made by Gucci.

Memes are also a way to identify and understand trends, and can be used by marketers to monitor users' perception of brands, products and social issues. For example, in 2020 Microsoft identified a viral meme that compared the design of its new gaming console (the Xbox Series X) to a fridge, and produced an ironic video in which they presented an actual "Xbox Series X Fridge".

With this example in mind, we could assume that managers and marketers should actively analyze memes about their brand, identify the most viral ones, and find out how to respond. If memes criticize certain aspects of the brand/product, how should managers react? Should they take note and remedy? Should they ironically respond as Microsoft did in the example? Or do as if nothing had happened?

Furthermore, viral user-generated memes can help the brand to reach a massive number of people at virtually no cost. For example, consider the Netflix movie "Bird Box" released

in 2018. After its release, memes about this movie became viral, and people claimed to have watched it "just to understand the memes". As a result, Bird Box registered the best-ever debut (45 millions of views in the first week) and has become one of the most watched movies ever on Netflix. It is important to note that Netflix, differently from the Gucci example, have not asked anyone to realize these images. Therefore, is it possible for managers to implicitly induce users to produce memes?

Previous Research and Research Gaps

Previous researches have analyzed memes and their potential from various points of view. Murray et al. (2013) have provided a general overview of the original Dawkins' concept of "meme", and analyzed its use in marketing. Jimenez et al. (2020) realized that memes can distill difficult concepts into easily accessible formats. Other researches have analyzed how memes impact the user's perception of brands and social issues. For example, Rasheed et al. (2020) realized that memes are now the primary news source for youths, and studied how humorous images could modify the social perception of serious crimes, or enhance critical thinking. Elgaaied-Gambier and Mandler (2021) have analyzed whether memes can help in investigating how citizens perceive the current ecological crisis. Parmentier & Fischer (2014), showed how user-generated content (including

memes) can contribute to the destabilization of a brand's identity, and how they may influence the perception of less deeply engaged audience members.

Despite the growing interest in memes, some research gaps remain. For example, it is unclear to what extent firm-generated memes in Digital Content Marketing would be beneficial for social media engagement. Moving to user-generated memes, we need studies that classify the most common "types of memes", and the impact that they have on brand reputation. Most importantly, we must consider that younger generations are using memes to express themselves. This means that these images are full of information that could reveal the opinions and beliefs of younger consumers. Therefore, we need to study how brands can analyze memes to understand opinions, extract the most common topics, and reveal critiques or compliments about a brand. In other words, could memes be a source to get valuable insights about consumers and organizations? Furthermore, we should also investigate if brands should "interfere" with viral memes (whether they are good or bad publicity). In other words, if viral or non-viral memes are talking about a certain brand, should the firm react, and how? Finally, to perform researches on user-generated memes about brands, we of course need a comprehensive dataset focused on brand memes. However, as of today, there is not such a dataset available online.

Thesis Approach

In the first place, I will identify brands that made use of memes, and I will try to understand how they have contributed in making a certain product viral. My research will focus on social media data. In particular, I will analyze brand-related memes created by users, and I will try to understand how can they reveal brand reputation or opinions. To do so, I intend to create a dataset of user-generated memes (along with metadata) about

certain brands and products, and perform text mining analysis. Moreover, I would like to further investigate to what extent the company should interfere with the most viral memes. In others words, how managers and marketers should respond to memes that mock them?

Contributions

1) The construction of a dataset of user-generated memes about 50 brands.

2) Understanding if memes can reveal the perception of a brand, and if companies should analyze memes to monitor brand reputation and opinions.

3) Understanding if firms should "interfere" with viral memes, hot topics, or memes that are criticizing or praising their brand.

Literature Review

As of June 2021, the pervasiveness of Internet memes in online culture is not as much reflected in consumer and marketing research. Zenette et al. (2018) try to explain this issue asserting that marketing scholars may still struggle to identify how to link Internet memes with consumers and marketing issues. In this section, I will go through some research papers, and I will try to provide a brief summary of the current state-of-art about Internet memes (with a focus on marketing).

The word "meme" has been originally introduced by Dawkins in the book *The Selfish Gene* (1976), and it is defined as "a piece of information or cultural phenomenon that spreads person to person until it becomes part of general consciousness". In other words, Dawkins coined this new term to represent a unit of cultural information spread by

imitation. Murray et al. (2013) provide a general overview of this original concept of "meme" and "memetics", with a focus on the marketing and advertising sector. From this original Dawkins' concept, the idea of "Internet memes" was born. An Internet meme, simply defined, is an idea that is spread via the Internet especially for humorous purposes. Warren et al. (2018) study how humor influences the attaining of various consumption goals, showing that laughter boosts positive emotion, facilitates consumer bonds, and strengthens relationships. Most importantly, the research showed that humor increases consumer willingness to disclose information. For my thesis, in which I will try to extract opinions from user-generated memes, this finding is pretty promising. Klostermann et al. (2018) analyze UGC in order to extract the opinions and preferences of consumers. This last research also deals with memes (but it is not focused on them), and discovers that they are used to express discontent towards the brand. The effect of such discontent is studied by Parmentier & Fisher (2014), in which they analyze how UGC (memes, videos, blogs, etc.) can contribute to the destabilization of a brand. In particular, they find that this "negative content" may influence the perception of less deeply engaged consumers. The research of Elgaaied-Gambier & Mandler (2021) focuses solely on memes to understand how citizens perceive the ecological crisis. This study reveals the ability of memes to depict psychological status, beliefs, and opinions. Given the serious nature of the ecological crisis, it is clear that memes are not used just for humorous purposes; we should therefore ask how memes could be used in other sectors, such as the communication and educational ones. Jimenez et al. (2020), Rasheed et al. (2020), Rastogi & Kashnyap (2019), and McClure (2016) study the potential that memes have as a communication medium, how they influence public opinions, how they are used to communicate political issues, and how they tend to oversimplify complex concepts.

Furthermore, Brown (2020) studies whether memes could be used for educational purposes, showing how students demonstrate critical thinking when asked to create memes related to the class. Zannettou et al. (2018) use a giant dataset of 160M images to study the propagation, evolution, and influence of memes across web communities. In relation to this, Weng et al. (2012) study the role of limited attention in the diffusion process of memes, showing that some memes are extremely successful, while the great majority "die" quickly. What does determine the success and the virality of a meme? To answer this question, Ling et al. (2021) investigate the visual elements that distinguish viral memes from non-viral memes, showing that memes that use a "close up" and that contain characters are more likely to go viral. Returning to the potential of memes in the marketing sector, Sirimarco Bara & Magano (2021) study how brands can use memes to successfully capture the attention of Generation Z customers (born from 1997 onward). The research depicts memes as a very effective and cheap way to bring visibility to the brand.

Below it is provided a Literature Review Table containing the main readings used in the present thesis.

Literature Review Table

Title	Authors	Purpose/Thesis	Method	Major Findings
Analyzing Disruptive Memes in an Age of International Interference	Darren Crovitz, Clarice Moran (2020) *The English Journal*	The article analyzes memes used to convey political positions or opinions (with references to the Russian's "sockpuppet").	A four-step instructional approach was used to analyze this kind of memes. Students were asked to consider their identities and biases, discuss and produce memes.	Campaigns of targeted manipulation and misinformation will likewise grow. We should help persons to build a critical understanding of online texts. Social media can increase engagement, but can also spread misinformation, division and fear.

Title	Authors	Purpose/Thesis	Method	Major Findings
Competition among memes in a world with limited attention	Weng, A. Flammini, A. Vespignani, and F. Menczer (2012) *nature.com - Scientific Reports*	The abundance of information available online is exceeding our capacity to consume it. Ideas must compete for our scarce attention. The researchers proposed a model to study the role of limited attention in the diffusion process of memes.	120 millions of posts were obtained using Twitter's public API. The data was sampled in a subset, and resulted in a network containing 100.000 nodes.	Diversity of meme to which a user can pay attention is bound. Some memes are extremely successful, while the great majority die quickly. A small fraction of memes account for the great majority of posts. Long-lived memes might be sustained by traditional media and real-world events.
Detecting, Preventing, and Mitigating Online Firestorms in Brand Communities	Dennis Herhausen, Stephan Ludwig, Dhruv Grewal, Jochen Wulf, and Marcus Schoegel (2019) *Journal of Marketing*	Any negative electronic word of mouth (eWOM) has the potential to become an online firestorm. Finding a way to detect and respond to negative eWOM constitutes a critical managerial priority.	The authors develop a comprehensive framework that integrates different drivers of negative eWOM and the response approaches that firms use to engage in and disengage from online conversations with complaining customers.	The impact of firestorms can be mitigated by distinct firm responses over time, and the effectiveness of different approaches also varies with their timing. The paper provides guidance on how to detect and reduce the virality of online firestorms.
DetReco: Object-Text Detection and Recognition Based on Deep Neural Network	Zhang, Jiaxing Luan, and Wei Chen (2020) *Hindawi*	In this article, the authors propose a new object-text detection and recognition method to detect objects and texts and recognize the text contents.	The network structure consists of two parts: object-text detection network and the text recognition network.	Researches was able to present a model that detects texts and general objects simultaneously, and also recognizes the text contents inside the detected text bounding boxes. The method combines object detection and text recognition.
Discovering the Discourse of Internet Political Memes	Brian E. McClure (2016) *AERC - University of Georgia*	An increasing number of adults are using the Internet and social media sites. On Facebook, memes can be produced, modified and spread quickly. Some of these memes are about politics, and the problem is that they tend to oversimplify complex concepts.	Hundreds of memes coming from Facebook groups are being considered, analyzed and organized. Metrics such as likes, reactions, shares and comments were also considered to analyze engagement.	As more adults engage in political activities in online environments, it becomes essential to examine and understand this discourse and what the discourse communicates, particularly if people are to make informed choices (such as in the political field).

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Dissecting the Meme Magic: Understanding Indicators of Virality in Image Memes	Chen Ling, Ihab AbuHilal, Jeremy Blackburn, Emiliano De Cristofaro, Savvas Zannettou, and Gianluca Stringhini (2021) *ACM Digital Library*	This paper investigates what visual elements distinguish viral image memes from non-viral ones.	The researches selected a set of viral and non-viral memes from 4chan's /pol/. Then they have identified several features that may enhance virality, and trained a classifier to distinguish between viral and non-viral image memes.	• Composition: memes that use a close up are more likely to go viral. • Subjects: memes that contain characters are more likely to go viral than those that contain objects. Facial expressions enhance virality
Extracting brand information from social networks: Integrating image, text, and social tagging data	Jan Klostermann, Anja Plumeyer, Daniel Böger, Reinhold Decker (2018) *IJRM - International Journal of Research in Marketing*	Through user-generated brand-related images, consumers communicate about brands and share their opinions and experiences. This article aims to analyze UGC by integrating image, text, and social tagging data.	This article presents a two-step approach that involves collecting, labeling, clustering, aggregating, mapping, and analyzing brand-related user-generated content. Data has been collected from Instagram, and labelled using Google Vision API. The analysis yielded to 20 clusters. Among them, the "Cartoon" cluster also contains memes.	Memes provide information about emerging brand-related Internet phenomena. Furthermore, users create memes to express their discontent with the brand. Memes also play a major role in the depiction of the brand on Instagram. Analyzing UGC brand-related images, managers can infer what creates the most attention, how consumers evaluate product and brand experiences, and how these observations change over time.
From words to pixels: text and image mining methods for service research	Francisco Villarroel Ordenes, Shunyuan Zhang (2019) *Journal of Service Management*	The purpose of this paper is to describe the state-of-the-art of text and image mining methods in business research	The authors review business literature in marketing, operations and management concerning the use of text and image mining methods. The authors also identify empirical papers that used text and image mining methods.	The paper identifies seven text mining methods and describes their approaches, processes techniques and algorithms. Due to nonexistent use of image mining service journals, the authors review their application in marketing and management, and suggest ideas for future researches.

Title	Authors	Purpose/Thesis	Method	Major Findings
Humor, Comedy and Consumer Behavior	Caleb Warren, Adam Barsky, A. Peter McGraw (2018) *Journal of Consumer Research*	Humor is useful to attract attention, but may fail to improve brand attitude or increasing sales. The article focuses on how humor helps consumers reach their goals. How and when does experiencing laughter and amusement help consumers reach their goals?	The researchers have developed a framework that explains how different types of humorous content (memes, images, jokes, videos, etc.) can have different effects depending on the type of consumption goal.	Humor boosts positive emotion, helps overcome stress and anxiety, facilitate consumer bonds, and strengthen relationships. This increases consumer willingness to disclose information and augments their tolerance for disagreement.
I-O Can Has Meme? Using Memes to Engage Others With I-O Psychology Content	William P. Jimenez, Lisa M. Kath, Sayeedul Islam, and Gordon B. Schmidt (2020) *Old Dominion University*	This paper discuss the current state of memes in I-O psychology and the potential that memes have as a communication medium	The researchers selected some memes, and analyzed the users' comments related to them.	Memes are useful for sharing information to a wide audience. Anyone can easily create and share them. Memes can also distill concepts into easily accessible formats.
Internet Meme and Political Discourse: a Study on the Impact of Internet Memes as a Tool in Communicating Political Satire	Anushka Amigo Kulkarni (2017) *SSRN*	Memes are mediums that communication information through humor and satire. Today, memes have become part of political campaigns. The research studies how memes have been used to communicate political satire.	Qualitative and Quantitative methodology is used. Structured questionnaire is used for conducting survey in order to understand the impact of political satires and memes on people.	Internet memes increase political attention and helps in learning about political issues. However, even if they are accepted as a medium for communication, memes do not influence the political decision of the majority, and do not have an impact on the change in voting behavior.
Intertextual Virality and Vernacular Repertoires: Internet Memes as Objects Connecting Different Online Worlds	Maria Carolina Zanette, Izidoro Blikstein, Luca M. Visconti (2018) *Journal of Business Management*	This paper describes the trajectory of Internet memes, their main characteristics, and their relationship with the fields of virality literature and cultural production research.	The study connects Internet memes research on virality and on cultural production together. It also posits a novel way to connect the phenomenon of Internet memes with consumer and marketing research.	Memes are created inside an online environment or community. The content that is created will carry some of the linguistic and cultural repertories of the consumers who participate. Internet memes are crucial to also investigate consumer online communities. The study shows that memes are potential carriers of meanings and vernacular repertories.

Title	Authors	Purpose/Thesis	Method	Major Findings
Marketing Trends: Using Memes to Target Generation Z	Rafaela Sirimarco Bara, and José Magano (2021) *Revista Cientifica do ISCET*	Generation Z is changing marketing. Brands need to understand how to appeal to the Generation Z customer, to successfully capture this customer base and interact with them. This implies taking into account memes.	The researchers analyze past researches, the social media context, and the highly-connected Generation Z (born from 1997 onward).	Memes are no longer just a way of entertainment, but a great option to increase marketing reach and create brand awareness. Meme marketing can be a very cheap and effective way to interact and bring visibility to a brand.
Me Trying to Talk About Sustainability: Exploring the Psychological and Social Implications of Environmental Threats Through UGC	Leila Elgaaied-Gambier, Timo Mandler (2021) *Ecological Economics - Journal*	Environmental issues have never been so present in our everyday lives. The research aims to use Internet memes to investigate how citizens perceive the current ecological crisis.	The researchers adopt an exploratory approach. They collected 856 memes from social media, analyzed them using image analytics.	Environmental degradation can be a source of stress, as depicted in many memes expressing a pessimistic view of the future. Internet memes permit to users to combine words and images to express opinions.
Modeling the relationship between firm and user generated content and the stages of the marketing funnel	Anatoli Colicev, Ashish Kumar, Peter O'Connor (2018) *IJRM - International Journal of Research in Marketing*	Firm Generated Content (FGC) is professionally made by the brand's marketing team, while User Generated Content (UGC) reflects the opinion of the crowd. What is the relationships between multiple dimensions of FGC and UGC and the stages of the marketing funnel?	The researchers have collected daily-level FGC and UGC from Facebook, and marketing funnel stages from YouGov. A PVAR model is executed and, finally, a conceptual framework is built to argue how FGC and UGC can affect the stages of the marketing funnel.	Results showed that UGC has a stronger relationship with awareness and satisfaction, while FGC is more effective for consideration and purchase intent. Higher source expertise of FGC determines the higher persuasive effect of FGC on consideration and purchase. FGC has a high influence on customer engagement in terms of building a "fan base"

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On the Origins of Memes by Means of Fringe Web Communities	Savvas Zannettou, Trian Caulfield, Jeremy Blackburn, Emiliano De Cristofaro, Michael Sirivianos, Gianluca Stringhini, and Guillermo Suarez Tangil (2018) *ACM Digital Library*	Internet memes are used to manipulate public opinion; for this reason we need to study their propagation, evolution and influence across the web. The paper aims to detect and measure the propagation of memes on the Web and on its communities.	The researchers use a processing pipeline for detecting and tracking memes across multiple Web communities. The pipeline is based on perceptual hashing and clustering techniques. The dataset is composed of 160M images from 2.6B posts gathered from Twitter, Reddit and 4chan's /pol/.	The meme ecosystem is complex. Some communities post "fun" memes, while others post racist or political ones (4Chan /pol/). Memes are often posted in response to world events. Reddit users are more interested in politics-related memes.
Political Memes and Perceptions: a Study of Memes as a Political communication Tool in the Indian Context	Saumya Rastogi, and Simran Kashyap (2019) *Tiikm Publishing*	Memes can condensate complex political facts into a powerful way to communicate. The paper aims to understand the way memes are used to communicate Indian political issues, and how they can influence the political perception of the audience.	The study uses a qualitative and quantitative approach, with Content Analysis and Surveys. 10 political memes were selected, and the related comments were analyzed.	Memes inform people that previously were unaware of what is going on; however, at the same time, the real picture is not shown conclusively, leading to skewed perceptions. Memes can create awareness on politics and on information, and are a humors way to express opinions. However, they should be supported with facts. It seems that memes reinforce political ideologies rather than shape mindset.
Social Media and Meme Culture: A study on the impact of Internet Memes in reference with "Kudathai Murder Case"	Abdul Rasheed A P K, Carmen Maria, and Anju Michael (2020) *Mukt Shabd Journal*	Memes are now the primary news source for youths. This paper studies how memes act as a mean of communication that frames general public's opinion on criminal acts.	The study adopts a qualitative approach using survey method and questionnaire as a tool. Data was collected from the questionnaires and from meme pages, and then analyzed using percentage method and pie charts.	88% of responders watch meme on a daily bases, and 67% get new information from them. Trolls and memes seem to provide simplified, impartial understanding on things happening around. Memes satire the inefficient politicians, and help to understand in detail about the viral news of the moment. However, memes could oversimplify complex issues, giving biased information to users.

Title	Authors	Purpose/Thesis	Method	Major Findings
The future of digital communication research: Considering dynamics and multimodality	Dhruv Grewal, Dennis Herhausen, Stephan Ludwig, Francisco Villarroel Ordenes (2020) *Journal of Retailing*	Digital communication, the electronic transmission of information, reflects and influences consumers' perceptions, attitudes, behaviors, and shopping journeys. Thus, data stemming from digital communication is an important source of insights for retailers, manufacturers, and service firms alike.	The authors outline four consumer–retailer domains relevant to digital communication, which in turn frame their discussion of the properties of communication dynamics communicators, and their interaction.	The authors delineate six measures of dynamic developments. These properties should be considered as a starting point of researchers looking to investigate the dynamics of digital communication.
Things Fall Apart: The Dynamic of Brand Audience Dissipation	Marie-Agnès Parmentier, Eileen Fischer (2014) *Journal of Consumer Research*	It is clear that fans of a brand can contribute to the value enjoyed by other members of its audience. The article examines how fans can contribute to the destabilization of a brand's identity and fuel the dissipation of audiences.	The paper examines a reality television series, and how its audience has altered over time (from stability to decline). The researchers analyzed TV ratings, and user-generated content (blogs, videos, memes, etc.)	When brands add narratives to create greater cultural resonance, they are more likely to be successful if the new narratives can be construed by audience members. However, user-generated content may introduce dynamics that can impact the brand in ways not welcomed by managers. Furthermore, this content may influence the perceptions of less deeply engaged audience members.
Uniting the Tribes: Using Text for Marketing Insight	Jonah Berger, Ashlee Humphreys, Stephan Ludwig, Wendy W. Moe, Oded Netzer, and David A. Schweidel (2020) *Journal of Marketing*	Words are part of almost every marketplace interaction. Online reviews, blog posts and other interactions create a wealth of textual data. How can marketers best use such data?	The articles provides an overview of automated textual analysis and details how it can be used to generate marketing insights.	Textual data contains useful information. Using automated textual analysis, researchers can convert this raw material into valuable insights. Marketers are well positioned at the interface between consumers, firms, and organizations to leverage and advance tools to extract textual information to address some of the key issues faced by business and society today.

Title	Authors	Purpose/Thesis	Method	Major Findings
We "meme" business: Exploring Malaysian Youths' Interpretation of Internet Memes in Social Media Marketing	Kee-Man Chuah, Yumni Musfirah Kahar, and Looi-Chin Ch'ng (2020) *International Journal of Business and Society*	Many social media marketing strategies use memes. The paper performs a study on iconicity of memes used in marketing, and analyzes their language features. A meme is said to have high iconicity if its message is understood clearly through the graphical representation.	The study uses a qualitative approach. 50 participants and 30 marketing memes were selected. Participants had to rate in a scale of three if they were able to understand the memes. Memes not understood by at least 30 respondents were marked as "low iconicity".	Memes with higher iconicity contains texts. Cultural context may not affect the meaning of certain memes, which are universally understood. Memes with higher iconicity tend to be viral faster, use personal pronouns and avoid the use of cultural slangs. Memes with higher iconicity can reach culturally different targets.
What Do You Meme, Professor? An Experiment Using "Memes" in Pharmacy Education	Joshua D. Brown (2020) *MDPI*	Younger generations use digital and social media to distribute and consumer information. Could memes be used for educational purposes?	The researcher (a professor) asked a group of students to create at least two memes related to the course.	Students appeared enthusiastic. Creating memes was indeed a challenge, and generated discussion amongst group members. Students demonstrated critical thinking and communication thought memes.

Research Question

In the last years we have witnessed a change in the nature of social media platforms. We have passed from text-centric experiences, such as Facebook or Twitter, to visual-oriented ones, such as Instagram or TikTok (Li and Xie 2019). This shift happened because we are overwhelmed by "unlimited" digital content, while our free time is very limited. In other words, this means that users are demanding concise, impactful and easy-to-consume content, rather than long, detailed and difficult content. Under these new circumstances, some new forms of communications have emerged, and memes are one of them.

Memes are mostly used for humorous purposes, but some researches have shown that they are now becoming something more; for example, memes are great to increase marketing reach and create brand awareness (Sirimarco Bara and Magano 2021), and are the primary

news source for youths (Rasheed et al. 2020). This fact is very important, because it means that the new generations are (and will be) using memes as one of the primary means to express their opinions, ideas and beliefs. The fact that these images are very easy to create and share, makes them even more powerful and effective for sharing information and ideas to a wide audience (Jimenez et al. 2020). For this reason, I believe that practitioners should elaborate deep researches on them, trying to understand how memes can reveal the opinions of people about socio-cultural matters, political beliefs or brand reputation. My research will focus just on this last topic.

In particular, considering that younger generations use memes to share their opinions, we should ask whether brands could analyze brand-related memes to assess how they are perceived. My first research question will therefore be "How can brands analyze user-generated memes to assess brand reputation? In particular, how can they identify critiques or compliments about their products or services?". I believe that inside memes we will find a lot of useful information that can help brands to detect the opinion of consumers. However, as I will better explain later, analyzing memes could be very difficult for a computer, mainly because of their ironic language. This problem does not affect the human consumer; in fact, most of the memes are universally understood and not constrained to the cultural context (Chuah et al 2020). Finding a way to effectively and automatically analyze brand-related memes will therefore be a great challenge, but will likely permit marketers and managers to better understand the opinions of their customers. This is the reason why it is important to answer this research question.

Moving forward, once the firm has identified brand-related memes (either showing a "negative" or "positive" opinion), how should it react? What should a firm do if a viral meme is mocking their product? As stated by Parmentier and Fischer (2014), fans who

generate negative images of the brand might hope that managers will take note and remedy. Therefore, my second research question will be: "When user-generated memes and the related consumer opinions have been identified, how should the brand react? Remain silent; take note of the critique and try to remedy; or ironically answer using another meme?". We can assume that the most viral a meme is, the most urgent it is for managers to find an answer to this question.

Method

To perform this study, I need to build a dataset of user-generated memes about brands. The memes will be retrieved from Reddit, a discussion website in which posts are organized in different communities called "subreddits". For the sake of my research, I will focus on subreddits that deal with memes, namely: r/Memes, r/DankMemes, r/MemeEconomy, r/AdviceAnimals, and r/TerribleFacebookMemes. Thanks to these subreddits it will be much easier to find the images we are interested in.

To scrape data from Reddit I will use PushShift, an API that provides enhanced functionalities and search capabilities for searching Reddit submissions and posts. PushShift API can be accessed using Python, by installing the PSAW package.

Reddit Data Collection with PushShift

The data collection process is handled by PushShift's *search_submission()* method. The function requires two parameters: *subreddit*, in which we specify the name of the interested community, and *q*, which is the search term. In my case, the search term will be the name of the brand. Practically speaking, to find brand-related memes I just look for

posts that contain the brand name in the title. This is a quite simple, but effective approach. To implement *search_submission()*, I have developed a function called *collect_reddit_data()* that takes as parameters two lists: one that contains the names of the above-mentioned subreddits, and the other with 50 brand names. The function creates one .csv file for each brand in each subreddit, and each row of the .csv files represents a Reddit post. In the following passage, I use the *concatenate_datasets()* function to join all of them into a single dataset called "memes_dataset_dirty.csv".

This dataset is composed by 114 columns that contain detailed information about the post, the user who has created it, and the subreddit. Data cleaning is performed by *clean_dataset()*, which preserves the columns that contain generic information of the post (i.e. title, author name, image, url, etc.), and keeps only posts that contain an image directly uploaded on Reddit. To verify if the image is still online, I have developed the *remove_deleted_images()* and *is_image_online()* functions. After others cleaning operations, we obtain the final memes dataset, which contains 17,034 rows and 24 columns. In the table below, I describe its most relevant features.

author	The account name of the poster (String)
created_utc	UNIX timestamp that refers to the time of the submission's creation.
id	Post identifier (String)
full_link	Full browser link (url) of the post
num_comments	Number of comments in the post
score	The score of the post. It is the number of upvotes minus the number of downvotes
title	Title of the post
subreddit	Name of the subreddit where the submission is posted
url	Direct URL to the image (meme) uploaded in the post
brandname	The name of the brand(s) in the submission

Downloading the memes

Since my research will focus on the memes themselves, I need to download all the retrieved images. To do this, I have developed the *download_images()* function, which iterates over all the rows of the dataset and takes the "url" feature. The memes are then downloaded with *requests.get()*, and saved in the format "brandname_id" (for example, "microsoft_iddzip.png"). This process took several hours to be completed, and resulted in a 6.67 GB folder containing over 17,000 memes.

Measurement Development

Now that I have collected our data and downloaded the memes from Reddit, I move to my first research question: how can brands analyze user-generated memes to assess brand reputation?

Before proceeding, let me point out a fact: analyzing memes could be very difficult, mainly because of their ironic nature. Furthermore, in order to fully understand the meaning of a meme, we have to correlate the in-image text with the picture underlying it. This process could be extremely challenging for automation systems. Luckily, some "meme templates" are recurrent and, therefore, easier to classify (using clustering or other image-analytics techniques). However, a lot of them are unique and need a different and more elaborated approach.

For the sake of my research, I focus on just the text contained in each image. Using text mining I aim to find out useful insights, such as most recurrent words or topics (topic extraction). These features will likely give us glimpses about what users are complaining or talking about in memes.

Performing Optical Character Recognition (OCR) on memes

Before proceeding with text mining, I have to perform Optical Character Recognition to retrieve the text inside memes. For this purpose I use Tesseract, which is a free OCR engine developed by Google. Both the image preprocessing phase (performed with the *cv2* package) and the OCR (performed with the tesseract's *image_to_string()* method) are executed in the *ocr_meme()* function. This function performs two different types of image preprocessing, executes OCR in the two images, and then selects the output that gives the highest number of real words. This output is then added to the memes dataset. The *execute_ocr_on_dataset()* function executes *ocr_meme()* for every single downloaded image. Below it is shown an example of how the image preprocessing works (basically, preprocessing seeks to automatically emphasize the text inside the picture).

Before preprocessing   After preprocessing

Retrieving comments

The Python script that I have developed also contains the *collect_comments()* function. The function iterates through the memes dataset, takes the *id* of each post, and retrieves its comments using the *search_comments()* method from PushShift. As a result, I have obtained a dataset of 209,386 rows (each row represents a comment). The comment itself is in the "*body*" parameter, and "*submisson_id*" contains the identifier of the related post.

We can assume that memes create a thread in which users discuss the matter displayed in the image. Therefore, it could be useful to perform text mining also on comments. In the present thesis, I will execute sentiment analysis on them.

Modelling with Knime: Topic Extraction on memes

After these passages, the data is finally ready for modeling with Knime, an open-source data analytics platform. The goal is to extract topics that are discussed in memes; in other words, Topic Extraction is needed. As a first step, I have developed the "Text Preprocessing" metanode (which performs operations such as lower-case converter, punctuation erasure, lemmatization, etc.). The preprocessed text is then passed in the "Topic Extractor (Parallel LDA)" node, which executes Topic modeling. To define the optimal number of topics to extract, I use the Elbow Method. The "chunk loop" permits to iterate over all the brand names to execute topic extraction for each brand in the dataset. For the brands having more than 100 images, I execute another topic extraction that takes into consideration only the most common terms (i.e., terms that occur in at least 4 memes). The results of the models (topic_id, terms, and the relative weights) are then saved in .csv files.

Modelling with Knime: Sentiment Analysis on comments

In this research, I will also analyze Reddit comments using text mining techniques. In particular, I will perform sentiment analysis with a dictionary method (a "top-down" approach; Villarroel Ordenes & Zhang, 2019). The NRC Emotion Lexicon will be used, which is a list of English words with associated sentiment and emotions. The comments are preprocessed in a similar way as explained in the previous section; then, the

"Dictionary Tagger" node is used to tag positive and negative words; and a sentiment score is calculated based on the number of occurrences of each sentiment.

Results

Before showing the results of the text mining models, let us perform some data exploration and visualization. The memes dataset is composed of 17,034 downloaded images and as many Reddit posts. The posts have been submitted in the period between May 2020 and April 2021. Of these memes, 75% (12,834) come from the r/memes subreddit, 22% (3,752) from r/dankmemes, and the remaining 3% from r/MemeEconomy, r/AdviceAnimals and r/terriblefacebookmemes. The three most discussed brands are Netflix (2,220 memes, 12.9% of the dataset), Apple (1,850, 10%) and Spotify (1,142, 6.7%). Below is shown the bar chart of the ten most frequently occurring brands.
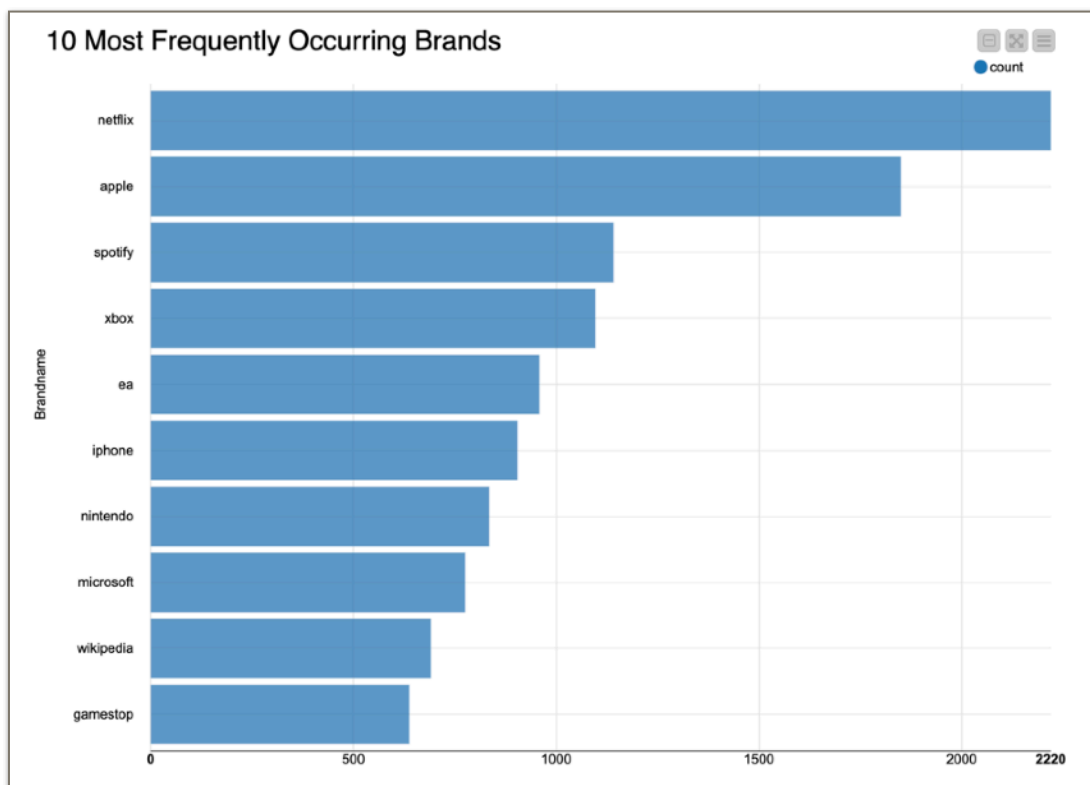
285 memes are labeled with two or more brands (e.g., "xbox,nintendo", "iphone,nokia", etc.). It is interesting to note that these memes are about "brand wars"; that is, users that discuss which brand or product is better among its competitors. Please remember that the images are named according to the brands that appear in the post's title. This could lead to small inaccuracies, like in the "xbox,nintendo" meme shown below, which actually deals with Playstation and Xbox.

iphone,nokia_k1v51q.jpg   samsung,apple_jb68b5.jpg   xbox,nintendo_jmlznc.jpg

We now focus on the topic extraction from memes. Since I have performed a large number of topic extractions (51 in total: one for each brand), in the table below I show only the most interesting results. All the displayed brands (except for Adidas) have been processed considering only the most common terms.

Adidas	gasoline, instead, vodka, woe, via, bit weed, resemble, original
	shoe, enthusiast, lure, rapist, boost, leap, giant, baa, omen
Apple	apple, iphone, charger, phone, people, real, buy, box, video, rating
Burger King	woman, kitchen, belong, twitter, like, retweet
	female, employee, woman, pursue, restaurant, change, culinary, ratio, gender, chef

| EA	game, pay, win, play, micro, transaction, free, video, spend, bad
	star, war, unlock, battlefront, pay, please
GameStop	stock, market, manipulate, billionaire, invest, crash, people, rich
	wall, street, money, people, billionaire, trading, investor
	company, hedge, fund, billion, dollar, lose, bully, silver, people
iPhone	charger, apple, box, google, remove, headphone, power, jack, instead
	smartphone, camera, recognition, youre, world, facial, image, display, wireless
	battery, phone, charge, minute
KFC	people, gaming, console, chicken, colonel, tee, tweet, twitter, release
Microsoft	edge, google, browser, chrome, computer, window, search, web
	update, window, meme, fridge, real, series, xbox
Netflix	cuty, character, trailer, gay, wee, movie, eat, official, child
Nintendo	game, console, video, cardboard, sue, desist, post, use, due
	switch, home, console, online, free, game, people, lite
Nokia	phone, time, fall, drop, iphone, break, dad, user, apple
Samsung	people, phone, use, smart, fridge, play, time, mobile
	apple, galaxy, charger, user, meme, phone, girl, iphone, include
Spotify	day, cake, meme, karma, blue, cheese, post, eat, look
	ad, song, listen, premium, minute, music, playlist, play, free
	music, song, listen, play, gonna, playlist, people, user, friend
Taco Bell	shit, kid, butt, poop, get, people, finally, intestine, toilet, gut
Tesla	musk, tweet, like, car, reply, invent, retweet
	shorts, model, short, musk, history
Walmart	home, mask, wear, mom, tell, family, customer
Wikipedia	josh, encyclopedia, meme, name, president, free, fight, event
	source, donate, teacher, award, birthday, reliable, page, article, people
Xbox	xbox, series, fridge, eat, look, box, playstation
	xbox, mom, kid, live, play, game, tweet, switch, guy, black

As expected, the extracted topics are in large part coherent to the underlying brands, products, or features. For example, Spotify [music, song, listen, play, gonna, playlist, people, user, friend]; iPhone [smartphone, camera, recognition, youre, world, facial, image, display, wireless]; or Microsoft [edge, google, browser, chrome, computer, window, search, web]. Thanks to these topics, we find the main features that are being discussed in memes. If we further investigate the images, we also precisely discover what users are saying about these features. Regarding Apple and Microsoft, for example, users are complaining about the iPhone's camera and are ironizing the Edge web browser.

apple_jbqgbu.jpg

microsoft_ihdpbv.jpg
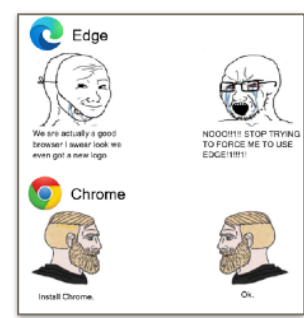
microsoft_i4q8cc.png

Other topics deal with business decisions and strategies. This is the case of Spotify's topic [ad, song, listen, premium, minute, music, playlist, play, free], in which users talk about the limitations of not having Spotify Premium; or iPhone's [charger, apple, box, google, remove, headphone, power, jack, instead], which deals with Apple's decision to remove the power adapter (charger) from the iPhone's box, as well as the headphone jack from the phone itself. Another example is EA's [game, pay, win, play, micro, transaction, free, video, spend, bad], in which users critique EA strategy to use purchasable content and microtransactions to make higher profits from videogames. Other topics are about "incentivize people to take action". For example, Wikipedia's [source, donate, teacher, award, birthday, reliable, page, article, people] reflects the attempt to incentivize users to

donate money to the free encyclopedia; and GameStop's [stock, market, manipulate, billionaire, invest, crash, people, rich] is about the mass-purchase of GameStop stocks that occurred in January 2021 (r/wallstreetbets: "GameStop short squeeze"). Another interesting topic is Walmart's [home, mask, wear, mom, tell, family, customer], which is about wearing masks inside Walmart stores because of the Covid-19 pandemic. There are other topics that gained my attention, and are the ones that seem inconsistent with the brand, or that contain unexpected terms. For example, why do Adidas' topics contain the words "gasoline" and "vodka"? Why do memes about Spotify talk about "cake" and "cheese"? We will investigate these matters later in the thesis.
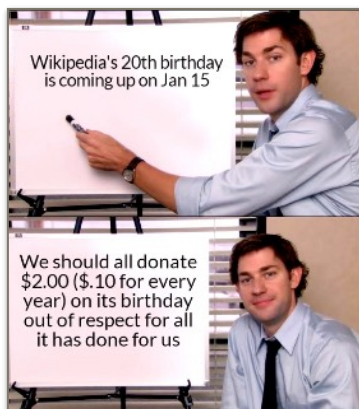

spotify_lszxar.png

ea_k3a6f0.jpg
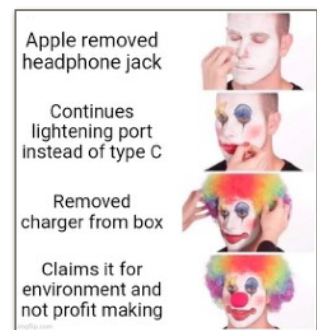
iphone_jawi6t.jpg

wikipedia_k5awjg.jpg

gamestop_lu3yqw.jpg

walmart_hs4l66.png

Overall, I would say that OCR in memes combined with topic extraction has effectively revealed the major matters discussed in the images. Some of the topics seem to give glimpses about consumer opinions, and deserve further studies.

Discussion

Contributions

In the present thesis, I have collected over 17,000 user-generated brand memes from Reddit. This data has been inserted in a comprehensive dataset that includes metadata about each Reddit post, images in .png or .jpg format, and the OCR output for each of these pictures. This data frame aims to solve the current lack of a "brand memes" dataset, and will hopefully be useful for future researches.

With this dataset, my main objective was to determine if memes could reveal consumer opinions and brand reputation. To achieve this goal, I used Tesseract OCR to convert the in-image text of each meme into a string. With these strings, I executed a topic extraction model for each of the 51 brands in the dataset. The topic extraction has been implemented using Knime, and the most interesting topics have been presented in the "Results" section.

In most cases, topic extraction of memes successfully summarized in a few words opinions, critiques, and matters that occurred in hundreds of images. For example, from the 1,850 Apple memes, I discovered that users were complaining about the removal of the power adapter from the iPhone box. Sentiment analysis of the comments under these posts resulted in a perfectly balanced result between positive and negative sentiment. Another example: from the 959 Electronic Arts memes, I found complaints about microtransactions inside EA videogames. In this case, sentiment analysis of comments resulted in a slight advantage of negativity: 53% negative, and 47% positive. Another important finding is Netflix's topic [cuty, character, trailer, gay, wee, movie, eat, official, child]. This topic is related to the two most commented memes in our dataset: they are both about Netflix, and they both deal with "Cuties", a controversial movie intended to

criticize the hyper-sexualization of pre-adolescent girls. Please note that, in the topic, it is written "cuty" instead of "cuties" because of lemmatization in the text preprocessing. This movie received a lot of critics from the audience, and even made viral the #CancelNetflix hashtag. A sentiment analysis and topic extraction of the comments below these two memes showed 56% of positive comments and 44% negative ones.

netflix_idl5c1.png
netflix_id6v46.png

The last three examples that I have just shown demonstrates that, applying topic extraction on memes, permits us to find judgments about products, business strategies, and also controversial or viral content. There is one still question remaining: once opinions have been identified, how should the brand react? I will deal with this matter in the following section.

Managerial implications

Topic extraction successfully showed that brands can potentially analyze memes to understand consumer opinions and perceptions. However, there is a drawback: smaller brands, or brands that target older generations, may struggle in finding memes to analyze. In this case, a topic extraction of memes about bigger competitors' could be done. The

results should show what consumers are criticizing (or praising), and, consequently, also smaller firms could get useful insights for their future operations. In particular, memes could be predictors of possible fashions, trends, and languages that will go viral online (Zanette et al. 2018). However, I have to point out that, of course, memes are not the only digital content that consumers use to share their opinions. In fact, consumers use social media and digital interactions to express themselves and their preferences (Grewal et al. 2020); therefore, marketers have at disposal a large number of resources to discover consumer opinions. For example, companies can use social listening (e.g., online reviews, social media posts, blog posts, etc.) to understand whether consumers like a new product, how they feel about the brand, and what attributes are relevant for decision making (Berger et al. 2020). To obtain such insights, the effectiveness of memes against other "traditional" sources is, at present, unclear. However, memes could be very effective in detecting the virality of negative eWOM in online communities, whose prevention and mitigation constitute a critical managerial priority (Herhausen et al. 2019). For example, an investigation in Burger King's topic [woman, kitchen, belong, twitter, like, retweet] revealed that 31 memes in the dataset opened a debate about a controversial tweet from the fast-food company.

burger king_m0qw4k.jpg
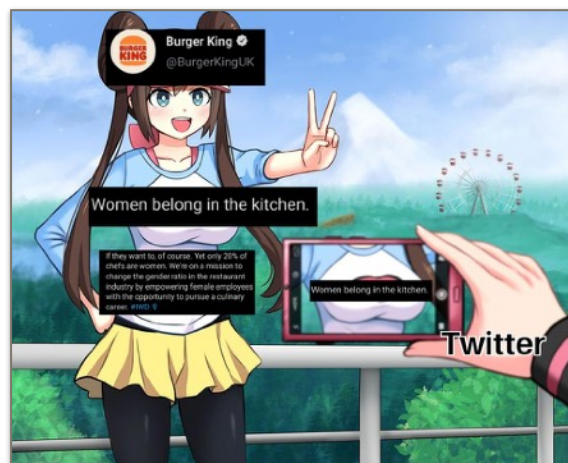
burger king_m0jall.jpg

Furthermore, I assume that insights and opinions that have been identified inside memes can be mainly useful for marketing purposes, and not for enhancing products and customer satisfaction. For example, in the introduction of this thesis I've talked about the "Xbox Series X Fridge" video that Microsoft published in response to memes. In fact, one of the topics that I have extracted from Xbox's memes is [xbox, series, fridge, eat, look, box]. Microsoft, back in 2020, noticed this topic in memes, and decided to ironically answer it using another meme. Looking at YouTube interactions, the results of this operation were great: the meme video counts (as of June 2021) 9 million views, 44,300 comments, and 562,000 likes. The original Xbox Series X Word Premiere trailer, on the other hand, counts 16 million views, but a lower number of comments and likes: respectively, 34,800 and 400,000.


xbox_hhf7ti.jpg

xbox_jm6o4p.jpg

Another example of a similar marketing movement is found in Tesla's extracted topic [shorts, model, short, musk, history]. This topic refers to the "Tesla Short Shorts", a red dress showing the "S3XY" writing on the back that was sold at the ironic price of $69.420 (this price refers to internet memes about a sexual position and cannabis consumption).

This dress was developed only for the purpose of criticizing Tesla short sellers in the stock market, and not in response to any viral meme. However, the dress went sold out in less than five minutes and went viral in memes communities. This showed once again the potential of memes in marketing or, better said, the potential of "speaking the language of memes" in marketing. People familiar with Wendy's or Microsoft's social media strategy can probably understand what I'm talking about. Below are shown some examples of Twitter posts from these two companies.
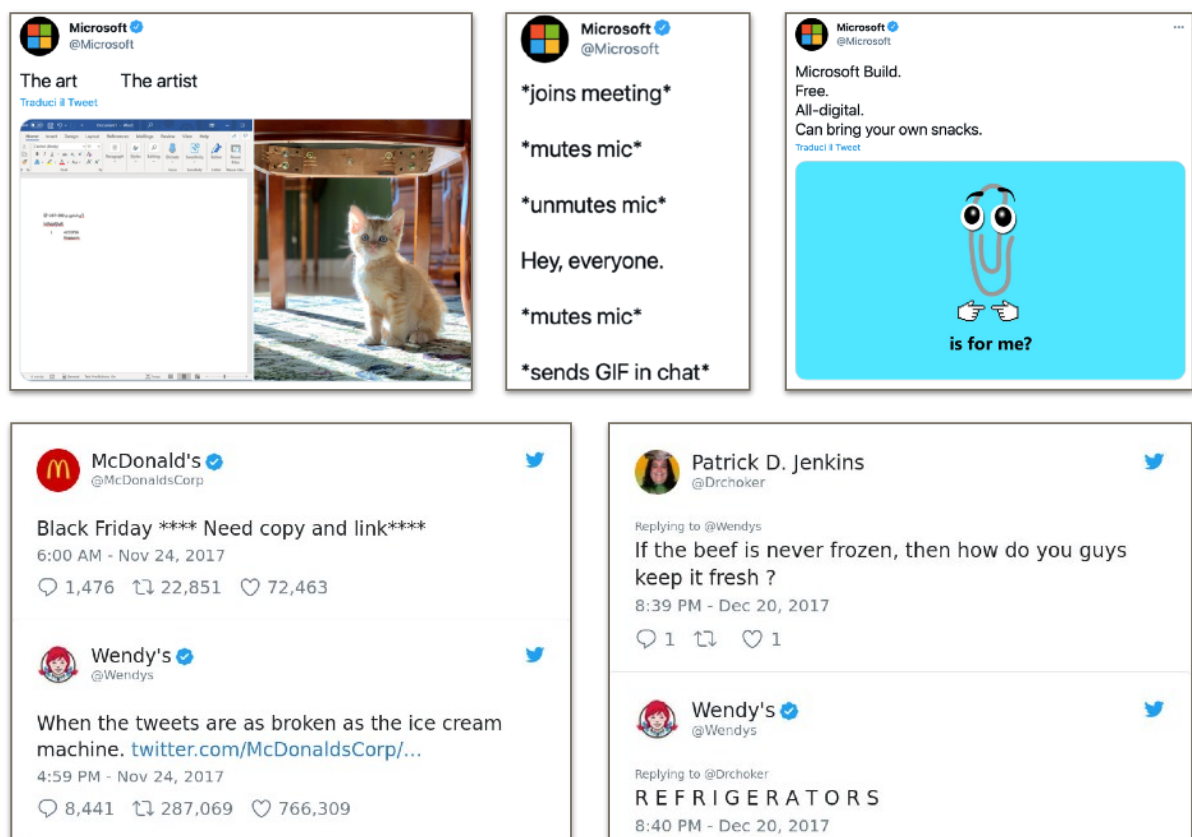
Brands should actively analyze memes, identify the most viral ones and, in case, answer using another meme. Among the topics that I have extracted, two of them are particularly interesting as can potentially be used for such a strategy. For example, the first Adidas topic shown in the table contains the words "gasoline, instead, vodka". These are words pretty unexpected, but reflect an Adidas meme that, for some reason, compares the brand

with Russia. Another example is Spotify's [day, cake, meme, karma, blue, cheese, post, eat, look]. It is unusual to find words such as "cake, blue, cheese" related to Spotify, but once again they reflect a meme that, for some reason, relates a "blue cheese" with Spotify. When thinking about an "answer using memes" strategy, we could first of all identify unexpected topics and terms from user-generated brand-related memes. Here, for "unexpected topics and terms" I mean "topics and terms that are seemingly not related to the underlying brand". Then, once these topics have been identified, brands could take into consideration the possibility to "ride the wave" and produce similar memes.

netflix_idl5c1.png

spotify_h9tjzr.jpg

spotify_i8z9cw.jpg

Further Research Directions

The results of my research seem promising, but can be further improved and optimized. Of course, a larger memes dataset and a more precise OCR will result in even better and detailed results. Therefore, future researches should enlarge the user-generated brand memes dataset, and should optimize the analysis performed in the present thesis. An idea would be to weigh each topic and term according to the number of likes and comments of the post, so that managers can easily identify the most viral memes or most relevant opinions (even if they occur in a small fraction of memes).

One major limitation of my research is that it focuses only on the textual part of memes. Since memes are composed of a picture and a text, future researchers should find a way to integrate both of them in order to completely understand the meaning of a meme. As I have previously pointed out, this task is relatively easy for a human being, but extremely difficult for a computer. The model in the present research just finds the topics inside memes, but ignores "how" users are discussing them. In other words: we know what people are talking about, but we do not know if they are criticizing or praising. In order to solve this, it is critical to fully understand the meaning of the meme. This means, in short words, that we have to join together both the meme's picture and ironic text. In the present thesis, I have tried to understand "how" users are discussing the topics in an empirical way, by looking at the related memes. This may not be the best research approach, therefore an analytical attempt has been done by integrating sentiment analysis of the comments under the memes of interest.

References

• Baumgartner, Jason, Savvas Zannettou, Brian Keegan, Megan Squire, Jeremy Blackburn (2020), "The Pushshift Reddit Dataset", *ICWSM 2020*

• Bereznak, Alyssa (2019), "The Bird Box Effect: How Memes Drive Users to Netflix", *theringer.com*

• Berger, Jonah, Ashlee Humphreys, Stephan Ludwig, Wendy W. Moe, Oded Netzer, and David A. Schweidel (2020), "Uniting the Tribes: Using Text for Marketing Insight", *Journal of Marketing*

• Brown, Joshua D. (2020), "What Do You Meme, Professor? An Experiment Using "Memes" in Pharmacy Education", *MDPI - Pharmacy journal*

• Boyd-Graber, Jordan, Yuening Hu, David Mimno (2020), "Applications of Topic Models", *Foundations and Trends in Information Retrieval*

• Chen, Ihab Abuhilal, Jeremy Blackburn, Emiliano De Cristofaro, Ginaluca Stringhini and Savvas Zannettou (2021), "Dissecting the Meme Magic: Understanding Indicators of Virality in Image Memes"

• Chuah, Kee-man, Yumni Musfirah Kahar, Chng Looichin (2020), "We "meme" business: Exploring Malaysian Youths' Interpretation of Internet Memes in Social Media Marketing", *International Journal of Research in Marketing*

• Colicev, Anatoli, Ashish Kumar, and Peter O'Connor (2018), "Modeling the relationship between firm and user generated content and the stages of the marketing funnel", *International Journal of Business and Society*

• Crovitz, Darren, and Clarice Moran (2020), "Analyzing Disruptive Memes in an Age of International Interference", *The English Journal*

• Dawkins, Richard (1976), "The Selfish Gene", *Oxford University Press*

• Dupuis, Andrew Williams (2019), "The Spread of Disinformation on the Web: An Examination of Memes on Social Networking", *Conference Paper: 2019 IEE SmartWorld*

• Elgaaied-Gambier, Leila, Timo Mandler (2021), "Me Trying to Talk About Sustainability: Exploring the Psychological and Social Implications of Environmental Threats Through UGC", *Ecological Economics Journal*

• Grewal, Dhruv, Dennis Hernhausen, Stephan Ludwig, Francisco Villarroel Ordenes (2020), "The future of digital communication research: Considering dynamics and multimodality", *Journal of Retailing*

•   Grewal, Lauren, Andrew T. Stephen, Nicole Coleman (2019), "When Posting About Products in Social Media Backfires: The Negative Effects of Consumer Identity-Signaling on Product Interest", *Journal of Marketing Research*

•   Herhausen, Dennis, Stephan Ludwig, Dhruv Grewal, Jochen Wulf, and Marcus Schoegel (2019), "Detecting, Preventing, and Mitigating Online Firestorms in Brand Communities", *Journal of Marketing*

•   Hollebeek, Linda D., and Keith Macky (2018), "Digital Content Marketing's Role in Fostering Consumer Engagement, Trust and Value: Framework, Fundamental Propositions and Implications", *Journal of Interactive Marketing*

•   Jimenez, Lisa M. Kath, Sayeedul Islam and Gordon B. Schmidt (2020), "I-O Can Has Meme? Using Memes to Engage Others With I-O Psychology Content", *Old Dominion University*

•   Klostermann, Jan, Anja Plumeyer, Daniel Böger, and Reinhold Decker (2018), Extracting brand information from social networks: Integrating image, text, and social tagging data ", *International Journal of Research in Marketing*

•   Li, Yiyi, Ying Xie (2019), "Is a Picture Worth a Thousand Words? An Empirical Study of Image Content and Social Media Engagement", *Journal of Marketing Research*

•   Ling, Chen, Ihab Abu Hilal, Jeremy Blackburn, Emiliano De Cristofaro, Savvas Zannettou, and Gianluca Stringhini (2021), "Dissecting the Meme Magic: Understanding Indicators of Virality in Image Memes", *ACM Digital Library*

•   McClure, Brian E. (2016), "Discovering the Discourse of Internet Political Memes", *AERC - University of Georgia*

•   Murray, Ajay Manrai, and Lalita Manrai (2013), "Memes, Memetics and Marketing: A State of the Art Review and a Lifecycle Model of Meme Management in Advertising"

•   Parmentier, Marie-Agnès, and Eileen Fischer (2014), "Things Fall Apart: The Dynamic of Brand Audience Dissipation", *Journal of Consumer Research*

•   Rasheed, Adbul, Carmel Maria, and Anju Michael (2020), "Social Media and Meme Culture: A study on the impact of Internet Memes in reference with 'Kudathai Murder Case'", *Mukt Shabd Journal*

•   Rastogi, Saumya, and Simran Kashyap (2019), "Political Memes and Perceptions: a Study of Memes as a Political communication Tool in the Indian Context", *Tiikm Publishing*

•   Sirimarco Bara, Rafaela, José Magano (2021), "Marketing Trends: Using Memes to Target Generation Z", *Revisit Cientifica do ISCET*

•   Villarroel Ordenes, Francisco, and Shunyuan Zhang (2019), "From words to pixels: text and image mining methods for service research", *Journal of Service Management*

•   Villarroel Ordenes, Francisco, Dhruv Grewal, Stephan Ludwig, Ko De Ruyter, Dominik Mahr, Martin Wetzels (2019), "Cutting through Content Clutter: How Speech and Image Acts Drive Consumer Sharing of Social Media Brand Messages", *Journal of Consumer Research*

•   Warren, Caleb, Adam Barsky, and A. Peter McGraw (2018), "Humor, Comedy and Consumer Behavior", *Journal of Consumer Research*

•   Weng, L., A. Flammini, A. Vespignani, and F. Menczer (2012), "Competition among memes in a world with limited attention", *Scientific Reports (nature.com)*

•   Zanette, Maria Carolina, Izidoro Blikstein, Luca M. Visconti (2018), "Intertextual Virality and Vernacular Repertoires: Internet Memes as Objects Connecting Different Online Worlds", *Journal of Business Management*

•   Zannettou, Savvas, Trian Caulfield, Jeremy Blackburn, Emiliano De Cristofaro, Michael Sirivianos, Gianluca Stringhini, and Guillermo Suarez Tangil (2018), "On the Origins of Memes by Means of Fringe Web Communities", *ACM Digital Library*

•   Zhang, Fan, Jiaxing Luan, and Wei Chen (2020), "DetReco: Object-Text Detection and Recognition Based on Deep Neural Network", *Hindawi*