

Social Media Analysis of Textual Patterns in Pizza Industry

Muhammad Umar Nasir
Department of Computer Science
Riphah International University
Lahore, Pakistan
m.nasir@riphah.edu.pk

Urva Rehmat
Department of Computer Science
Riphah International University
Lahore, Pakistan
urvarehmat087@gmail.com

Nasr Umar Khan
School of Computer Science and
Technology
Asia Pacific University
Kuala Lumpur, Malaysia
nasrk77@gmail.com

Muhammad Mohsin Bashir
Department of Computer Science
Riphah International University
Lahore, Pakistan
mohsinbashir455@gmail.com

Abstract—Text mining has become one of the most eminent research filed used in computational techniques and retrieving information from structured and unstructured data. Technique which is used to extract informational patterns and informative knowledge from the textual data is Natural Language Processing. Purpose of text mining is to get useful and trendy patterns from unstructured data in a very shortest period of time. Social media has become buzzword of 21st century. Social media is being used to interact with the customers and source of feedback & customer opinion. This research paper leads to find out trendy patterns of pizza industry from five selected pizza chains in United Kingdom on social media (Facebook): Pizza hut, Dominos, Prezzo, Pizza Express, Papa John. These trendy patterns are very useful for pizza chains in generating competitive marketing strategies to capture more customers towards their pizza chains. Pizza chains can increase their sales depending upon the patterns find out from the research and recommendations to develop competitive marketing strategies.

Keywords— *text mining, social media, facebook, pattern analysis*

I. INTRODUCTION

Now days there are various social media platforms are available, so Twitter, Facebook, YouTube are considered most of the popular social media networks among people [1]. All these social media network sites made an ease to communicate with customers with all family members, friends without any hectic approach and strategies [2]. People are from different fields can connect with each other through sharing their creative ideas, opinions and interesting knowledge on social media network sites [3]. Now days it become very easy to connect with their perspective community by using social media sites [4].

Development of technology has shortened the relations between people real emotions and also technology has contracted the world [5]. Customers can easily share their

views about products or anything by using social media platform. Previous study elaborated that people can learn from social media also from Google Apps and people can share their views and ideas over the social media [6]. Whatever customers likes and dislikes they can share their opinion and feedback on social media.

Zha and Li [7] elaborated in their research, they suggested that companies needs to analyze the textual data on social media to disclose secrete patterns and statistics for their competitive marketing strategies. Analyzing the bunch of data on social media needs a lot of time. So, companies can use automated social media analyzing tools for analyzing the textual content on social media by using different text mining techniques which is very helpful in decision making. Successful business needs to ensure customers satisfaction and analyze their opinions for further marketing strategies. Studies shows that companies who cannot analyze their customer's opinions and their emotions are mostly outperformed in their community and very low in stocks and business growth.

Getting data from social media to analyze it all businesses needs to be able to quickly understand all analysis results and make competitive steps by using analyzed results. By understanding what customers are thought about their company and product, they can easily and quickly make competitive and sensible strategies which can compete their competitors very effectively. In this exploration we will investigate textual information from web-based media of five acclaimed pizza chains from United Kingdom. With the help of textual data results pizza chains can easily understand new emerging trends, their customer's opinions and they can make easily and responsively marketing strategies to compete their competitors and increase in customer's engagement.

II. LITERATURE REVIEW

Literature review describe in detail information about social media, Facebook and briefly text mining tools and techniques.

A. Social media

The online networking give stage to connect among web/web-based life clients who makes content, share content through some cutting-edge client advancements and web advances [8]. Internet-based life has various structures which can be seen by clients like video blogging, miniaturized scale online journals, wikis, video sharing via web-based networking media, webcasts, vlogging and web-based social networking bookmarking [9]. Web based life additionally have many systems administration stages to communicate with clients, for example, Instagram, Twitter, Facebook, Pinterest and numerous other various stages offers distinctive sort of media highlights which are completely referenced above having connection between internet-based life clients and networks [10]. Identified with the out of date media, new century web-based life permits to make online socially dynamic social orders which can communicate with one another with the assistance of two-way transmission instead of the out of date internet-based life single direction transmission style to collaborate with the networks [11]. Consolidated classifications of online networking contain joined plans of internet based life stage resembles video content web based life network, Blogs people group, Microblogs people group, Social communicating network and game universes [12]. Previously mentioned various internet-based life networks/matrices/bunches having socially well-known and far reaching in relationship of its locale traffic have been generally utilized by number of huge firms/ventures to collaborate and comprehend their client/customers and their encompassed network and effect of their item [13] [14]. Web based life is just stage in this century which outfits the development of industry on high height [15]. Radick [16] [17] depicted that web-based life has been included to supporting manufacturing/commercial and furthermore accommodating in fluctuating the client's concentration and gives tremendous amount of information which is extremely useful to impact the clients and apparatus up the corporate.

B. *Development pattern of web based media*

In initial existences clients produced content has gotten dynamic and mainstream on network advancements, numerous client's investment in content creation as opposed to simply utilizing the substance or utilization content [18]. "Today, there are in excess of 180 million Web locales and in excess of 2 billion Internet clients around the globe, the greater part of them are in the 15 years to 34 years age section" [19], which indications that in what way web is celebrated and drifting among these age buyers.

The key qualifications for a new web-based life other than standard telecom can be determined in a variety of ways, for example, the nature of objects, Data duplication, durability, ease of use and accessibility. As in Okonkwo's [19] demonstration, online life is largely based on / dynamic frameworks in which clients are referred to information and purchases rather than the use of obsolete traditional social media where clients are encouraged to pass on.

Over the years, the rapid development of online health has focused on the imagination of pizza sellers. According to ongoing research conducted by L2ThinkTank, the key components that are critical in furthering a business look are based on product satisfaction, product network size, and related and incredible consumer function [20]. Online life and the level of integration of progress as the basis for books, planning and display is a direct mistake by potential customers / clients / buyers that the pizza industry chains depend on their purpose. The main problem with this change is that it is very important to set up a simple sale between the number of places within the particles, more types of pizza without the obvious display of the details made and officially dressed with full interest [19].

C. *Social Media as A Marketing Tool*

Web based life is a prevalent and reasonable displaying instrument that seek after the improvement methods of internet organizing advancing and moreover various other different considerations of electronic life publicizing which influence online life customers autonomously and besides electronic life humankind for the benefit of upgraded public exercises [21]. The enormous issue in this Twenty-First time of electronic publicizing is extensiveness of online casual correspondence. Before the presence of web headways Web 2.0 affiliations/clients had generally couple of decisions to develop relationship with their clients and building their affiliations. As demonstrated by the principles of standard advancing recommend that if your association needs to prepare and collect countless customers from unexpected objections in comparison to you need to stay in a considerable number gathering to achieve a conclusive goal of advantages in arrangement and brand care [22].

In 21st century, new web-based life stage has insignificant every conventional methods of business advertising. Presently days most important methods of business advancements and showcasing, all advertisers concedes to a similar term that expression of-mouse replaces the verbal exchange in internet-based life system to target and approach the greatest business bunches [22].

Ryan [23] portrayed in his circulated book USM (Understanding Social Media), four amazing besides huge commercial directions for expanding internet-based life

throughput which accentuations on the two essences of web-based life inside setting and outside setting. These guidelines are given beneath

- ✓ Understanding client conduct how they utilized their internet-based life and how extraordinary and explicit item and explicit offices could some portion of their discussions in a confident manner.
- ✓ Studying, trying and concluding new important examples which are useful to get clients.
- ✓ Open-handed most extreme opportunity to online life pages.
- ✓ At the end estimating the all accomplishments on the off chance that you accomplish the above guideline in any case rehash above standard [23].

To comprehend the internet-based life promoting this part, depict and outlines the all ideas of 21st century online life and furthermore customary showcasing and their disparities and effect of web-based social networking on association prepping and increment business benefits.

D. Pizza Manufacturing and Community in UK

The insights show the positioning of renowned web-based life stages in the UK United Kingdom as of Nov 2018. Information was gathered based on most extreme online hits via web-based networking media stages and these online hits are very nearly 15 billion. All through ongoing years has held stable and rule the web-based life arrange in United Kingdom. The most elevated network of Facebook in UK is average twenty to thirty years of age with approximately 5.2M female and 5.3M male social media clients [24].

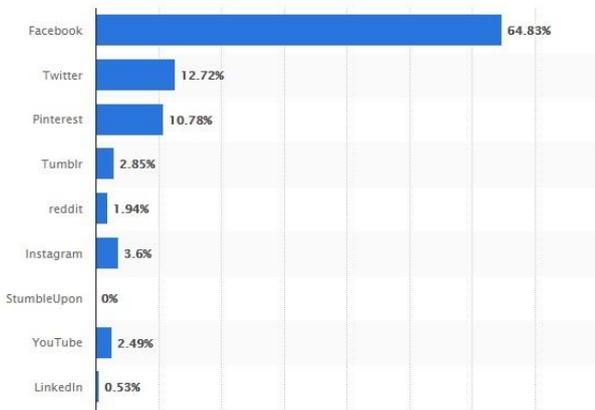


Fig. 1. Social media Platforms Ranking in UK [25]

Utilizing these online networking stages by numerous pizza ventures in United Kingdom to control the pizza business and increment their income utilizing web-based life with in a matter of seconds. A few subtleties of pizza ventures in UK is

assumed underneath and their income expanding techniques in utilizing online networking.

Pizza Hut has worked in the UK since 1973. It's a great United pizza space exchange. Connectivity prioritizes a critical situation and the real customer components in its burger combinations form. Pizza Hut Ltd is a pioneer in what is today considered an unrestricted party, with more than seven branches [26]. Pizza Hut is a high-quality food product approved in the United Kingdom. In a book review, Pizza Hut's Number Four built on the site "Hypocrisy can be taken for granted" simultaneously on a one-time trip to the United Kingdom [27]. Pizza Hut is quickly getting used to the web collection organization obviously. Among the top crowd of the Pizza Chain Site, Pizza Hut found No.1, 526,000, which passed 315,000 [28] of Domino. The result of the Culpability movement. Pizza Hut's redesign of its subsidiaries such as 'Pasta Hut' has led to customer negotiations, despite the fact that it is a job that may not produce much better than the company [27]. Food support. The restaurant network Pizza Hut has established that it will eventually become one of the United Kingdom's leading food machinery to promote nutritious information about its commitment as part of a new virtuoso planned [29]. The brand has a two-sided headline in the sense that it also conducts action classification studies, skipping instant comforts and fully stocked bistros. As for the classic food in the bistros, Pizza Express and Prezzo are the main enemies of Pizza Hut United Kingdom and Domino's Pizza United Kingdom is fighting for the help of aid in the past. Colossal Memo estimates that the focus on food / export and non-food business (excluding bistros) in the United Kingdom will increase from £ 9.75bn in 2008 to £ 10.15bn in 2009, and will cost £ 11.34bn in 2012, given the actual travel concern of 16.3% from 2008 to 2012 [29].

Domino Pizza is considered to be one of the most irreplaceable pizza relationships in the universe. Today in its 25 years of existence, it currently has 628 units in the UK and Ireland. Domino Pizza, the 1st pizza relationship in the United Kingdom, has released this approach that ensures their profits are a major development. Non-stop transaction and search data are not enough to encourage customers to buy convincing stock. Customers are now desperate for control and become the information they need, when they need it and their terms of purchase. Opposing call centers, social work sites and instant chat rooms make sense for an amazing and weighty process of customer communication [30]. It has been said that with the acquisition of 6% of unsustainable clients they may have 26% and 99% of salary (per) per client. Reflecting on these great improvements, the merger is directed forward and keeps clients committed as they love long-term relationships, profitable customers give more and reward their debts on time and customers deserve your thing because they improve it

better than various enemies [31]. To get the decision to appear in the masses of their customers, Domino's Pizza used cutting-edge that empowers their popular position [32]. Advances in television standards in high-profile areas, for example, BGT (British Got Talent), Simpson and the World Cup have helped to make their image clear to consumers.

According to a review of Economics, 84% of customers eat pizza at any one time [32]. As indicated by PMQ's 2018 Business Census, 61.47% of experts passed an increase in sports programs over the past year [32]. All things considered, pizza members are successful, with a 5yr 5% expected development rate [32]. Since then, Domino has passed the random Pizza Hut periodically into the entire game plans [31]. Based on DominosPizza.com, all items considered as bargains accounted for 8.4%, within the same store purchase agreement kept 6.4%, and large deals for the same store were maintained at 3.4% [31]. The product has met the full progress of 233 units net store in the second quarter from 2018, as indicated by the media description of domosos.com [32]. "Disability and satisfaction," the second part of Domino's concept, involves performing a customer-drawn process to request any of their best plans [32]. This is managed to further its new targeting category, Domino's Any Ware, which offers customers planning arrangements for any framework, comparable as home partners, for example, Amazon Echo, smart TVs, smart watches, and electronic health category. Immediately, the weight of the new stage has drawn up in the upper extremities following stock progress [32].

The pizza distribution market looks at 2.1 billion British pounds in the United Kingdom and is the center of the food education industry. The market manager is the United States brand Domino's Pizza, which operates in more than 1000 stores in the United Kingdom. Joined Kingdom is home to the foremost as the legal basis for Domino's Pizza, Domino's Pizza Group (UK), which passed around 1.2 million pounds in the program in Britain in 2017 [33].

UK's Daddy John has revealed their financial results for the year ended December 31, 2017 their favorite position increased by 22.3% by £ 6.3 million from £ 5.1 million last years in 2016 [34]. The movement is driven by a number of stores that are more involved with programs like these. The pizza series almost revealed that they ended the season with 385 stores in the UK, 32 more than 353 in the past. The pizza trend, however, continues unabated for a limited time frame that is set to continue in 2018 as early as the years, "Pope John's said in the report [33] [34].

Wang commented: "Pizza Express has gone according to the terms of the 2017 basic piece, Group earns in full.

III. TEXT MINING

Now days' text mining is an uprising and shining technology which can be used to get meaningful and structured information and patterns from unstructured and unsorted data [36]. Previous studies show that most of big industries use text document to save their data e-g Electronic mail, memos, reports etc. [37]. To get meaningful and trendy patterns from large number of documents use automated text mining tools [38]. Text mining is used to get extract useful information from bunch of data with in no time very quickly [39]. Text mining extract data from all type of files, data types e-g web-based data, online server data bases, pdf files etc. [40]. Automated text mining tools are different from traditional text mining techniques because traditional text mining techniques are manual and time-consuming techniques as compared to new automated text mining tools [41]. Previous studies done by different researchers shows that they use different automated text mining techniques in different business fields to analyze large amount of textual data [42]. Their researches show that automated text mining tools and techniques have high latency rate to detect useful information from large amount of data [43]. Text mining also have many applications like clustering, information retrieval, link analysis etc. [44]. Now days there are different fast and automated text mining analysis tools include: Rapid Miner, Leximancer, QDA Miner, Word Stat, SAS Enterprises. All this text mining tools having very fast and accurate algorithm to find out useful information from large amount of data [42].

IV. IMPORTANCE OF RESEARCH

Eventually times here is tremendous rivalry in pizza industry. Incalculable the pizza things didn't comprehend their clients and what they need from them and they (pizza chains) are in like manner doesn't prepared to convey such substance which their customers adored. We will separate web based life data from Facebook, five of the celebrated to be explicit brands from UK to find famous models in pizza industry. Our examination will assist them with making them great rulings for their client's intrigue and for their business development with the assistance popular examples. Our investigation will assist them with knowing about what their clients like and aversion about them and it is useful in way of their business forceful development and they will rival their rivals in a decent way. We are utilizing one-year information from Jan 2018 to Dec 2018 with the assistance of various content mining mechanized devices like QDA Miner, WordStat and so on.

Words that remain in the word cloud lie between ten to various events. One hundred and sixty-six words are returned to various ceremonies. This shows that pizza clients are displaying their slack piece above all the pizza fastens in question at the moment.

As it can be seen that from the beginning of the pizza reference period to the word cloud that social media used high frequency waves that indicated their location and indicated what they needed from the pizza expression, those words "Kebab", "cheddar", "hot", "banquets", "meat", "cheeseburger pizza, etc. Besides, the most widely used customer with good names, for example, " Yummy / Yum ", " Faltering, etc. this shows a beautiful picture of a pizza featuring an electronic health channel. Customers have used bad words in the same way to break the pizza expression, for example, "unpleasant", "annoyed, etc. They (Pizza Express) need to focus on hiding these bad words for their better future.

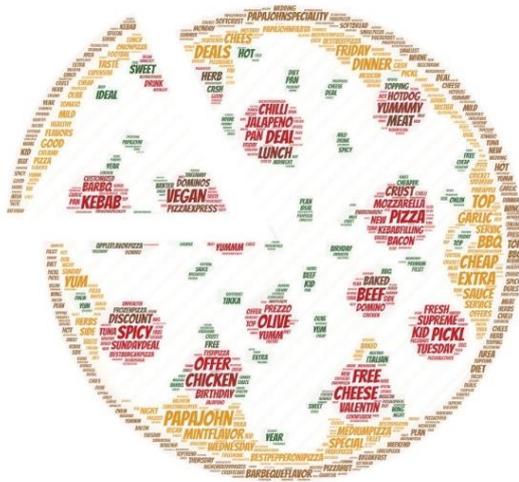


Fig. 7. Papa John Pizza Results

Father john pizza the word cloud shows the full name is one hundred and sixty-two words. With more than thirteen words of refinement that is more than a variety of events and more than a dozen words with more emphasis than various events. The remaining words lie between ten to different events. One hundred and sixty-two words have symbols surrounding various events that are the best of all the first delays aimed at pizza chains.

As can be clearly seen from recent references to Pope john word cloud that the reunion showcases a vast array of their breathing space at Pope John pizza using terms such as "Veggie sweetheart", "Pickle", "Chicken", "Sweet", "legit", "Valentine", "Flavors", "Sauce, etc. Clients have used most of the good words such as " Never Happened ", " Happiness, etc. These are the right words to make Father John a good image through a technology media channel. They need more mental clarity and use repetitive words as their imagination to create a realistic path for their better future.

VII. RECOMMENDATIONS

We have formed substance mining assessment through online structures association media (Facebook) of five picked pizza attempts from United Kingdom to find the fitting reaction of starting late alluded to ask for. The snippets of data concerning the fitting reaction are given under.

A. Trending Pizzas/ Pizza flavors

Pizza flavors are an important industry for pizza. Maintaining customer interest and your commitment to the business with the help of using new, low-pizza seasons and customers on pizza. We look at all the pizza products to find new types of pizza, and we get enough delicious flavors e.g. Mint Pizza, Soya Sauce Pizza, Beef Pizza, Pepperoni Mint Pizza, Sauce Mint, Sauce Fajita, Fajita Pizza, Pizza Meat, Light Bread, Beef Crust, etc. to obtain additional customer responsibility.

B. Trending Pizza deals

For the most part clients looking for just pizza bargains on Facebook. During study we discover the best drifting arrangements in advertise e-g end of the week gives, one on one pizza bargain, Christmas bargains, valentine arrangements and the day after Thanksgiving bargains, these are slanting arrangements which are being looked by clients via web-based networking media (Facebook). On the off chance that pizza ventures center around previously mentioned drifting pizza bargains by utilizing these inclining bargains as their essential weapon in online networking promoting methodologies to redirect clients mind on their internet-based life which are certainly gainful for their business development. At the point when clients see these arrangements on various pizza ventures internet-based life pages than without a doubt client are pulled in towards the substance and alter their perspective.

VIII. CONCLUSION AND FURTHER RESEARCH

Online media is a fundamental mechanism for fruitful organizations. Additionally, at present enormous number of large enterprises center to utilize web-based media in a superior manner to catch their clients. There are additionally couple of studies which expand the utilization of web-based media in an effective and fruitful business. Numerous organizations have their own viewpoint to utilize online media devices. A few organizations utilize web-based media apparatuses productively and some don't. Our examination paper results demonstrate stylish examples of United Kingdom pizza industry which clients' needs and these examples organizations can use in their web-based media showcasing systems to accumulate clients. Results likewise shows that clients are connecting effectively and shows their inclinations. By utilizing these examples organizations market their item as well as, they can assemble their connection with clients. Further research will focus to use many different text mining

tools to find many effective patterns from unstructured data. Also, it will focus on some new Natural Language Processing techniques with the advancement of technology.

REFERENCES

- [1] X. V. M. & M. K. Chen, "Mining social media data for understanding students' learning experiences," *IEEE Transactions on Learning Technologies*, vol. 7(3), pp. 246-259, 2014.
- [2] E. P. S. J. & T. B. Baumer, "America is like Metamucil: fostering critical and creative thinking about metaphor in political blogs," *ACM*, pp. 1437-1446, 2010.
- [3] N. R. & B. P. B. Kasture, "An Approach for Sentiment analysis on social networking sites," *IEEE*, pp. 390-395, 2015.
- [4] M. Naaman, "Social multimedia: highlighting opportunities for search and mining of multimedia data in social media applications," *Multimedia Tools and Applications*, vol. 56(1), pp. 9-34, 2012.
- [5] B. M. K. S. & P. P. Evans, "Do your friends make you smarter?: An analysis of social strategies in online information seeking," *Information Processing & Management*, vol. 46(6), pp. 679-692, 2010.
- [6] M. & M. S. I. Al-Emran, "The Impact of Google Apps at Work: Higher Educational Perspective," *International Journal of Interactive Mobile Technologies (IJIM)*, vol. 10(4), pp. 85-88, 2016.
- [7] S. Z. L. L. Wu Hea, "Social media competitive analysis and text mining: A case study," *International Journal of Information Management* (2013), vol. 33, pp. 464-472, 2013.
- [8] H. JENKINS, *Convergence Culture: Where Old and New Media Collide*, New York: University Press, 2006.
- [9] L. G. S. & L. P. S. H. de Vries, "Popularity of Brand Posts on Brand Fan Pages: An Investigation of the Effects of Social Media Marketing," *Journal of Interactive Marketing*, pp. 26(2), 83-91, 2012.
- [10] E. NB., "Social network sites: definition, history, and scholarship," *J Comput Mediated Commun*, pp. 13, 210-230, 2007.
- [11] Y. RK, *Case study research: design and methods*. Vol. 5, CA: Sage, 2009.
- [12] A. & H. M. Kaplan, "Users of the world, unite! The challenges and opportunities of social media," *Business Horizons*, pp. 53, 59-68, 2010.
- [13] Z. S. L. L. He W, "Social media competitive analysis and text mining: a case study in the pizza industry.," *Int J Inf Manage*, pp. 33, 464-472, 2013.
- [14] L. S. L. J. S. Y. Xu K, "Mining comparative opinions from customer reviews for competitive intelligence," *Decis Support Syst*, pp. 50, 743-754, 2011.
- [15] R. D, "Knowledge, economy, technology and society: the politics of discourse," *Telematics Inf*, pp. 22, 405-422, 2005.
- [16] Z. S. He W, "Insights into the adoption of social media Mashups," *Internet Res*, pp. 24, 160-180, 2014.
- [17] H. M. Kaplan AM, "Consumers, companies, and virtual social worlds: a qualitative analysis of second life," *Adv Consum Res*, pp. 36, 873-874, 2009.
- [18] E. e. a. Agichtein, "Finding High-Quality Content in Social Media," *ACM New York*, pp. 183-194, 2008.
- [19] U. Okonkwo, "Style online, and it's all about me," *International Herald Tribune*, p. 12, 2009.
- [20] S. Galloway, *L2 Digital IQ index : Fashion*, New York: L2 Think Tank, 2012.
- [21] W. Morgan, "Social Marketing Definition," 09 February 2017. [Online]. Available: http://www.isocialmarketing.org/index.php?option=com_content&view=article&id=84:socialmarketingdefinition&catid=28:frontpage&gclid=C P7eggPpgtICFRtGQodnXwLQg#WJxGdTt9601.
- [22] N. G. R. & C. A. Richardson, *A quick start guide to social media marketing: high impact low-cost marketing that works*, Philadelphia: Kogan Page, 2010.
- [23] D. Ryan, "Understanding Social Media," 10 March 2017. [Online]. Available: https://oamk.finna.fi/Record/nelli17_oamk.2670000000607925.
- [24] .. "Market Share held by the leading social networks in the united kingdom UK," 6 May 2019. [Online]. Available: <https://www.statista.com/statistics/280295/market-share-held-by-the-leading-social-networks-in-the-united-kingdom-uk/>.
- [25] Statista, "Market Share held by the leading social networks in the United Kingdom," [Online]. Available: <https://www.statista.com/statistics/280295/market-share-held-by-the-leading-social-networks-in-the-united-kingdom-uk/>. [Accessed 6 May 2019].
- [26] J. Manley, "Resuturants2009," 17 March 2010. [Online]. Available: http://www.keynote.co.uk/marketintelligence/view/product/2293/restaurants?utm_source=kn.reports.browse.
- [27] Marketing., "Domino's breaks menu price vow," 30 November 2009. [Online]. Available: <http://0-search.ebscohost.com.wam.leeds.ac.uk/login.aspx?direct=true&db=buh&AN=32135052&site=bsi-live>.
- [28] G. Luan, "Pizza Hut claims boom in sales over Christmas places it top of online food chain," 2 December 2009. [Online]. Available: <http://0search.ebscohost.com.wam.leeds.ac.uk/login.aspx?direct=true&db=buh&AN=36560617&site=bsi-live>.
- [29] M. Watch, "Pizza Hut: nutrition on the menu Food. Market Watch: Global Round-up," 2 December 2009. [Online]. Available: <http://0search.ebscohost.com.wam.leeds.ac.uk/login.aspx?direct=true&db=buh&AN=36888427&site=bsi-live>.
- [30] A. Bryman, *Social research methods*, Oxford: Oxford University Press, 2012.
- [31] U. Essays, "Customer Retention Policy In Dominos Pizza UK," 6 November 2013. [Online]. Available: <https://www.ukessays.com/essays/marketing/customer-retention-policy-in-dominos-pizza-uk-marketing-essay.php?vref=1>.
- [32] P. P. Magazine, "The 2019 Pizza power report: A state of the industry analysis," December 2018. [Online]. Available: <http://www.pmq.com/December-2018/The-2019-Pizza-Power-Report-A-State-of-the-Industry-Analysis/>.
- [33] Statista., "Pizza and Italian restaurant Market in the United Kingdom- Statistics and facts," November 2017. [Online]. Available: <https://www.statista.com/topics/4848/pizza-and-italian-restaurant-market-in-the-united-kingdom-uk/>.
- [34] Q. Media, "Papa John's reports 22.3% operating profit growth for FY17," October 2018. [Online]. Available: <https://qsrmedia.co.uk/legal/news/papa-johns-reports-223-operating-profit-growth-fy17>.
- [35] T. Caterers, "PizzaExpress returns to growth after two years of falling sales," August 2017. [Online]. Available: <https://www.thecaterer.com/articles/510288/pizzaexpress-returns-to-growth-after-two-years-of-falling-sales>.
- [36] M. S. D. P. J. & B. J. Anderson, "Turning like to buy social media emerges as a commerce channel," 2011. [Online]. Available: www.booz.com/media/uploads/BaC-Turning Like to Buy.pdf. [Accessed 7 June 2012].
- [37] A. Tan, "Text mining: Promises and challenges," in *In Proceedings south east Asia research computer confederation (SEARCC99)* Singapore City, Singapore, 1999.
- [38] B. C. S. G. & H. W. Liu, "Distributed data mining for E-business," *Information Technology and Management*, vol. 12(2), pp. 67-79, 2011.
- [39] S. Ananiadou, "National centre for text mining: Introduction to tools for researchers," 2008. [Online]. Available: <http://www.jisc.ac.uk/publications/publications/bpnationalcentrefortextminingv1.aspx>. [Accessed 8 February 2009].
- [40] F. R. H. L. S. & C. F. T. Lin, "Discovering genres of online discussion threads via text mining," *Computers & Education*, vol. 52(2), p. 481-495, 2009.
- [41] L. & C. J. Tsantis, "Enhancing learning environments through solution-based knowledge discovery tools," *Journal of Special Education Technology*, Vols. 1-35, p. 16(4), 2001.
- [42] M. & H. W. Abdous, "Using text mining to uncover students' technology related problems in live video streaming," *British Journal of Educational Technology*, vol. 40(5), pp. 40-49, 2011.
- [43] J. S. C. & S. G. Tane, "Semantic resource management for the web: An e-learning application," in *In Proceedings of the WWW conference* New York, USA, 2004.

- [44] J. E. & G. J. A. Ingvaldsen, "Industrial application of semantic process mining," *Enterprise Information Systems*, vol. 6(2), pp. 139-163, 2012.
- [45] Statista, "Pizza and italian restaurant market in the united kingdom UK," 5 May 2019. [Online]. Available: <https://www.statista.com/topics/4848/pizza-and-italian-restaurant-market-in-the-united-kingdom-uk/>.
- [46] S. "Global Market value of the pizza industry," 6 May 2019. [Online]. Available: <https://www.statista.com/statistics/499277/global-market-value-of-the-pizza-industry/>.
- [47] C. o. t. profession, "UK Pizza market facts and statistics infographic," 6 May 2019. [Online]. Available: <https://confessionsoftheprofessions.com/uk-pizza-market-facts-and-statistics-infographic/>.