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EMOTION BASED ANALYSIS OF TURKISH CUSTOMER OPINIONS

Firms should manage their customer feedback so they can adapt to rapid changes in the environment. They have to interact with their customers to understand them and to turn their opinions into useful knowledge. Understanding customers' feelings about a product gives firmS competitive advantage through continuous market monitoring. They can thus generate improving strategies about the system to change perceptions that drive the behaviours of the customers. Firms can view their customers' happiness as a key tool for decision-making. This study calculates online product happiness by using the average emotional valence values of customer opinions.

We analyse Turkish opinions about a product over a period of 3 months. We find the averages of the online emotional valence values of the product per month. We also determined the increase in happiness over time. According to the opinion valence values, we found the relations between the documents.

Keywords: opinion mining, emotional analysis, happiness, natural language processing, text mining.

Introduction.

Happiness is one of the most important issues in life. Happy citizens bring a positive force to the economy. It is known that behaving optimistically is good for the economy [14]. Likewise, it is a known fact that a happy workforce gives a company a huge competitive advantage in the modern economy. Happy customers give power to a firm. Therefore, it is really important to manage the happiness issue. For this, we first have to measure happiness. How can we manage happiness if we can't measure it?

It is hard to measure emotional feelings, especially if they are collected from social networks. Firms should understand their customers' emotional feelings, including happiness; if not, they won't be able to manage it in order to change the behaviours that they want to change. In addition, the emotions of online customers have a direct effect on what they will do next. Customer feelings also have an important role in adaptation. Firms need to know the real feelings of customers about their products. It is valuable for a firm to know how happy their customers are with their product for the purpose of customer satisfaction.

Happiness is one of the most difficult interdisciplinary research areas. It has also attracted the attention of the world of marketing and consumption. The underlying principle of so-called "happy consumption" and "happy products" is not just a new form of hedonism but it can bring a tangible quality and innovation to product making by using happiness as a new research approach [4]. The subjects of happiness and well-being have been studied for a long time in psychology [19, 27, 28, 29], in behavioural economics [12], and in economics [9]. Frey and Stutzer [9] examined the literature on happiness and subjective well-being in economics. In addition, they initiated the economic analysis of happiness. Jalloh et al. [11] reviewed the literature on happiness relating to the common constructs used to define and explain the concept of happiness, including the most common scales and instruments utilised to measure this concept. They also aimed to explain the definition and measurement of happiness.

Most researchers have measured happiness by means of questioning. Some of the scales used to measure happiness can be given as follows: the Single-Item Measurement of Happiness [1]; the Subjective Happiness Scale [15]; the Satisfaction with Life Scale (SWLS) [5]; the Oxford Happiness Questionnaire [10]; and Bhutan's Gross National Happiness Index [26]. They are usually based on a *limited number* of participants. Complementing these techniques, *participation in the crowd brings together the wisdom of the crowd* [24]. In recent years, large-scale texts have been used in the subject of happiness to overcome the limited small sample size problem due to costs.

The subject of social media has long been studied [20, 22, 23]. Mostafa [18] mined customer emotional data on social media. He used a random sample of 3516 tweets to evaluate consumers' sentiment towards well-known brands such as Nokia, T-Mobile, IBM, KLM and DHL. He used an expert-predefined lexicon including around 6800 seed adjectives with known orientation to conduct the analysis. Yassine and Hajj [30] aimed to extract the emotional content of texts in online social networks. They focused a whether the text is an expression of the writer's emotions or not. They presented a new perspective for studying friendship relations and emotions' expression in online social networks which deals with the nature of these sites and the nature of the language used. Brew et al. [3] described a companion system which is based on Twitter that maintains a happiness index for nine US cities to identify the underlying causes behind shifts in sentiment. They showed that sentiment scoring methods are susceptible to unexpected shifts due to noise and trending memes. You, DesArmo and Joo [31] described a methodology to numerically represent the happiness of a city by mining user generated terms in Flickr.com. They collected 15,000 text records consisting of titles, tags, descriptions, and comments for the thirty most populous cities in the United States. They calculated happiness scores (H-Score) by matching text extracted from Flickr.com with a happiness index dictionary. Kamvar and Harris [13] presented the "We Feel Fine" project that collected the world's emotions to help people better understand themselves and others. Since August 2005, "We Feel Fine" has been harvesting data on human feelings from a large number of weblogs. Every few minutes, the system searches the world's newly posted blog entries for occurrences of the phrases "I feel" and "I am feeling". They use both a qualitative and statistical exploration of other people's emotions.

Mogilner et al. [17] also examined 12 million personal blogs containing the phrase "I feel" They aimed to capture the meaning of happiness by examining emotions that co-occurred with feeling "happy". They determined the ages of 4,462,053 of the authors through their public profiles. Of those, 3,049,866 expressed identifiable emotions (sentences of the form "I feel like going to the store" were excluded), 70,153 of which were "happy." A total of 6,302 of these sentences expressed feeling happy as well as other emotions. They use Affective Norms for English Words (ANEW), which was developed to provide a set of normative emotional ratings for a large number of words in the English language, in order to provide standardised materials that are available to researchers in the study of emotion and attention [2]. Dodds and Danforth [6] are the directors of the Computational Story Lab group of applied mathematicians working on large-scale, system-level problems in many fields including sociology, nonlinear dynamics, networks, ecology, and physics at the University of Vermont with the Vermont Complex Systems Centre and Vermont Advanced Computing Core. The Computational Story Lab has built a hedonometer which is an instrument to "remotely-sense" emotional states and levels, in real time. Dodds and Danforth [6] quantified happiness levels on a continuous scale for a diverse set of large-scale texts: song titles and lyrics, weblogs, and State of Union addresses. Their method, which can be seen as a form of sociotechnical data mining, was based on large-scale texts to use human evaluations of the emotional content of individual words within a given text to generate an overall score for that text. They use the ANEW dictionary. They also used the labMT 1.0 dictionary, which was developed by using the crowdsourcing power of Amazon's Mechanical Turk. Dodds et al. [7] present evidence of a deep imprint of human sociality in language, observing that (i) the words of natural human language possess a universal positivity bias, (ii) the estimated emotional content of words is consistent between languages under translation, and (iii) this positivity bias is strongly independent of frequency of word use, using human evaluation of 100,000 words spread across 24 corpora in 10 languages which are diverse in origin and culture.

From the perspective of felt human experiences rather than at neurological or descriptive levels, it seems that there are two fundamental dimensions rather than a range of differing kinds of emotions [8, p.120]. First, the valence of an experienced emotion is the degree to which it is strongly positive or negative. Second, the level of arousal felt is the amount of energy perceived (e.g., from lethargic to hyperactive). This assertion apparently contradicts the neurological evidence mentioned earlier of at least five emotions and the linguistic evidence in the form of the existence of a wide range of nonsynonymous terms for emotions. Nevertheless, research has shown that people describing the same traumatic event may use a wide range of different emotional terms (e.g., sad, angry, upset) almost indiscriminately and that the two dimensions of valence and arousal seem to be the key underlying factors. A consequence of this is that identifying valence and arousal is likely to be far easier and more reliable than identifying other types of emotion detection [25]. In this research, we use words' emotional valences to calculate the online product happiness. The aim of the study is to understand customer feelings by calculating an average happiness score about a product. We translated ANEW [2] into Turkish to use the average emotional valences which are in the ANEW dictionary. We calculate the average happiness scores for documents.

We have organised the paper as follows. We present the methodology of the research and the research results in the next section. We draw the conclusions and give our plans for further research in last section.

Methodology

Each of the customer opinions, which are large, noisy, and dynamic, is formed of web pages. Customers' online opinions are collected automatically from the web URLs with web TM techniques. We collected 380 Turkish free-text formed feedback about an international electronic trade mark's product over a period of three months from 01.12.2015 to 01.03.2016. The online opinions are converted to documents, which then become ready for clustering by applying natural processing techniques (NLPs). The word vector, which is a numeric matrix [21], is extracted after applying NLP techniques.

Term frequency and occurrences are used in processing the documents. To each term in a document we assign a *weight* for that term that depends on the number of occurrences of the term in the document. For example, we would like to compute a score between a query term $\underline{t}$ and a document d, based on the weight of $\underline{t}$ in d. The simplest approach is to assign the weight so that it is equal to the number of occurrences of term $\underline{t}$ in document d. This weighting scheme is referred to as *term frequency* and is denoted by $tf_{t,d}$, with the subscripts denoting the term and the document in order. For a document d, the set of weights determined by the *tf* weights above (or indeed any weighting function that maps the number of occurrences of $\underline{t}$ in d to a positive real value) may be viewed as a quantitative digest of that document. In this view of a document, known in the literature as the *bag of words model*, the exact ordering of the terms in a document is ignored but the number of occurrences of each term is material (in contrast to Boolean retrieval). We only retain information on the number of occurrences of each term. Thus, the document "Mary is quicker than John" is, in this view, identical to the document "John is quicker than Mary". Nevertheless, it seems intuitive that two documents with a similar bag of words representations are similar in content [16].

Tokenisation is applied to break up the streams of customer opinions' documents into tokens, which are meaningful elements. We applied non-letters tokenisation. Then we used the Turkish Snowball stemming algorithm, which finds the stems of the words. All tokens are transformed into lower cases. We also filter tokens by length, removing all the words composed of less than 2 characters and more than 20 characters from the documents. The unnecessary words and the html codes are deleted. A vector space model was used to represent each web page. The word matrices of the customer opinions are extracted.

To estimate the overall valence score for a text, which we denote by ν_{text}, we determine the frequency f_i that the ith word from the ANEW study word list has in the text; we then compute a weighted average of the valence of the ANEW study words as in Equation (1). The ν_i is the ANEW study's recorded average valence for word *i* [6]. The distribution of psychological valence will show us the customer's happy words. The average valence of a text is given in Equation (1) [2].

$$\gamma_{text} = \frac{\sum k\gamma k - fk}{\sum kfk} \qquad (1).$$

To measure the average emotional valences of the documents, a Turkish dictionary which has emotional valence values is necessary. We used the ANEW dictionary and we translated the words into Turkish. We added some Turkish synonyms words into the dictionary (ie. "life" has two meanings "yaşam" and "hayat" in Turkish). In addition some Turkish words can have more than one meaning in English (i.e. "ev" means "house" or "home").

Table 1 presents some words, which are both in the dictionary and the word vector. If a word which is in the word vector is in the ANEW translation dictionary then we use that word and its frequency in the document/documents to calculate the average valence values. Some of the words in the dictionary and their average valence values are shown in Table 2.

Table 1. **The word list for opinions**

Turkish words	Translation	Frequency
Bilgi	Knowledge	299
Kabul	Acceptance	296
Saygı	Respect	245
Para	Money	34
Arkadaş	Friend	26
Hata	Fault	71
Dünya	World	19
Renk	Colour	18

Table 2. **Some average valence values of the words**

Turkish words	English translation	Average valence
Kabul	Acceptance	7.98
Güzel	Beautiful	7.60
Bomba	Bomb	2.1
Taciz	Abuse	1.70
Altın	Gold	7.54

Table 3 presents the average emotional valences. We can easily see that there is only a small increase in the average values. Fig. 1 presents the network graph of all the opinions according to their average emotional valence values. The relations of the documents according to the average emotional valences can be seen in figure.

Table 3. **The average emotional valence values of the product**

Month	Average valence
December	6.227819872
January	6.228682161
February	6.23086011
3 months period	6.229120473
Average of 3 months	6.22912071

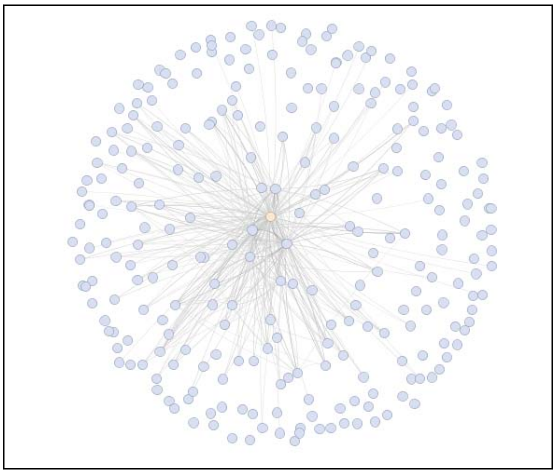

Fig. 1. kk-layout network graph

If we compare the happiness scores of customers' emotional change with other studies [6], our results are acceptable. According to the customer opinions, level of happiness with the product is over the average happiness. We thus achieve the valence measures between all the documents. For example, customer feedback with customer opinion ids, 2 and 21 are near to each other. The distance between these documents' valence values is 5.398. Their emotional valence values are very similar. When we read these customer feedbacks, we see that they are writing nearly the same things.

Conclusions, discussion and further research

Happiness is the gap between the perceptions of the firm and those of the customer as to how the firm should actually be. If the decision makers understand the emotional feelings of the customers, then they can understand how to move them in order to change the behaviours that they want to change. The customer opinions are analysed dynamically based on TM and social networks.

Although there are studies about measuring happiness in different fields, there is no study which measures happiness from online Turkish opinions by using emotional valences. We calculate the average valences of the documents. We measure the product's and the opinions' emotional valences. We then compare the happiness scores of customers' emotional change about the product. Consequently, the firm can easily generate improvement strategies about the feedback system by comparing the happiness scores to change perceptions that drive the behaviors of the customers. Decision makers can also use the results to make decisions.

According to the results, we have numeric values to order the happiness of the customer opinions. If we check the content of the customer opinion documents, the opinions which have close emotional values are very similar to each other. In addition, the customer opinions with higher average valence scores are written more politely than the rest. In conclusion, although we used the translation of the ANEW dictionary, we find valid results.

The limitation of the research is that it uses a translated dictionary which is not designed for Turkish. Because of the differences in the meaning of happiness due to cultural variations, the translated dictionary's valence values are not adequate to measure Turkish happiness correctly. In future work, we aim to gain a better understanding of the relationships that exist in online customer opinions. For this, we plan to develop a set of normative emotional ratings for the Turkish language in order to standardise materials for researchers in the field of emotion. In addition, we plan to design a Turkish happiness dictionary for online research. We will present the distributions of psychological valences, which will show us the customer's happy words.

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АНАЛІЗ ДУМОК ТУРЕЦЬКИХ СПОЖИВАЧІВ НА БАЗІ АНАЛІЗУ ЕМОЦІЙ

Фірми повинні управляти зворотным зв'язком з їх клієнтами, щоб вони могли адаптуватися до швидких змін у навколишньому середовищі. Вони повинні взаємодіяти зі своїми клієнтами, щоб зрозуміти їх і перетворити свою думку в корисні знання. Розуміння почуттів клієнтів про продукт дає конкурентну перевагу фірмам за рахунок безперервного моніторингу ринку. Таким чином, вони можуть генерувати вдосконалення стратегій про систему, щоб змінити сприйняття, які керують поведінкою клієнтів. Фірми можуть проглядати задоволенність своїх клієнтів в якості ключового інструменту для прийняття рішень. Це дослідження обчислює онлайн задоволення від продукту, використовуючи середні емоційні цінності валентних думок клієнтів.

Ми аналізуємо думки турецьких споживачів про продукт протягом періоду 3-х місяців. Ми знаходимо середні онлайн валентні емоційні значення про продукту. Ми також визначили збільшення задоволеності протягом довгого часу. Згідно валентних значень думок, ми знайшли відносини між документами.

Ключові слова: пошук думок, емоційний аналіз, задоволеність, обробка природної мови, аналіз тексту.

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АНАЛИЗ МНЕНИЙ ТУРЕЦКИХ ПОТРЕБИТЕЛЕЙ НА ОСНОВЕ АНАЛИЗА ЭМОЦИЙ

Фирмы должны управлять обратными связями с их клиентами, чтобы они могли адаптироваться к быстрым изменениям в окружающей среде. Они должны взаимодействовать со своими клиентами, чтобы понять их и превратить свои знание в полезные. Понимание чувств клиентов о продукте дает конкурентное преимущество фирмам за счет непрерывного мониторинга рынка. Таким образом, они могут генерировать совершенствования стратегий о системе, чтобы изменить восприятие, управлятьповедением клиентов. Фирмы могут просматривать удовлетворенность своих клиентов в качестве ключевого инструмента для принятия решений. Это исследование вычисляет онлайн удовольствие от продукта, используя средние эмоциональные ценности валентных мнений клиентов.

Мы анализируем мнения турецких потребителей о продукте в течение периода 3-х месяцев. Мы находим средние онлайн валентные эмоциональные значения о продукте. Мы также определили увеличение удовлетворенности в течение долгого времени. Согласно валентных значений мыслей, мы нашли отношения между документами.

Ключевые слова: поиск мыслей, эмоциональный анализ, удовлетворенность, обработка естественного языка, анализ текста.

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FINANCIAL GLOBALIZATION – GLOBAL IMBALANCES – GLOBAL FINANCIAL CRISIS

In the context of globalization, global financial crisis reflected the evolution of the relation global finance – global economy. The paper focuses on two issues. First, we review a part of the literature regarding the costs and benefits of financial globalization and the links between financial globalization, global imbalances and crises. Second, we discuss whether the financial globalization associated with global imbalances contributed to the 2008 global financial crisis. We conclude that global imbalances (GDP, current account, capital flows and international reserves) played a key role in determining the incidence and propagation of the global financial crisis both in advanced and developing economies. But they are still not resolved and so the risk to power a new global crisis remains high. Therefore economic and financial globalization has to redefine the links between international finance and global economy nowadays.

Key words: financial globalization, global imbalances, global financial crisis.

Introduction. In the context of globalization, global financial crisis reflected the evolution of the relation global finance – global economy. The question is whether the financial globalization associated with global imbalances contributed to the global financial crisis.

Methodology. *In the beginning we* ***review a part of the literature*** regarding the costs and benefits of financial globalization and the links between financial globalization, global imbalances and crises.

In their paper, Kose et al. [1] give a conceptual framework for structuring the literature regarding the *costs and benefits of financial globalization.*

The main risks of financial globalization highlighted by Schmukler and Zoido-Lobatón [2] are: financial crises when financial liberalization is not well managed; domestic financial system deterioration if the financial infrastructure does not meet the integration requirements.

In addition, Schmukler [3] shows the benefits – especially the development of the financial system – and risks of financial globalization for developing countries.

Kenen [4, p. 182] warns of the risk that "resides in the way that the United States has exploited financial globalization to finance its current account deficit and, indirectly, its budget deficit. […] The global financial system is a source of strength but likewise a source of risk, and thus calls for close cooperation among the world's major countries."

Faia and Iliopulos [5, p. 1] compare alternative monetary policy regimes for alternative degrees of financial globalization. They find that "the impossible trinity is reversed: higher financial integration increases the persistence and volatility of the current account and calls for exchange rate stabilization".

Not least, the Institute of International Finance [6] points that capital account integration, risk sharing and financial market development are the main benefits of financial globalization.

Various studies analyses the *links between financial globalization, global imbalances and crises.*

Arestis and Singh [7] explore theoretical framework of financial globalization and its contribution to the 2008 financial turmoil.

The econometric analysis of Milesi-Ferretti and Tille [8] demonstrates that the decrease of capital flows during the 2008 global crisis is correlated with the degree of international financial integration, the domestic macroeconomic conditions and their connection to world trade flows.

Lane and Milesi-Ferretti [9] analyse the global imbalances (capital flows and current account balances) before, during and after the global financial crisis.

On the one side are the authors who believe that globalization can be a cause of a crisis.

Schmukler [10] thinks that globalization can lead to crises due to imperfections in international financial markets and importance of external factors and also through contagion effect.

Eichengreen [11] explores the links between capital flows and crises, on the one hand, and between capital flows and growth, on the other hand, finding a close correlation between capital mobility and crises.

Eichengreen et al. [12] find that financial openness has positive effects on the growth of financially-dependent industries, but they consider that during the financial crises these effects disappear.

Chowdhury and Islam [13] state that the banking and financial sector of the countries that had prudential regulation and control of short-term capital flows remained unaffected by the turmoil in the global financial markets (e.g. India, China and Chile).