

Generating Cultural Personas From Social Data

A Perspective of Middle Eastern Users

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Abstract— We conduct a mixed-method study to better understand the content consumption patterns of Middle Eastern social media users and to explore new ways to present online data by using automatic persona generation. First, we analyze millions of content interactions on YouTube to dynamically generate personas describing behavioral patterns of different demographic groups. Second, we analyze interview data on social media users in the Middle Eastern region to generate additional insights into the dynamically generated personas. Our findings provide insights into social media users in the Middle East, as well as present a novel methodology of using computational analysis and qualitative data enrichment to generate descriptive and culturally receptive personas from social media audiences.

Keywords— *social media analytics; personas; Middle East; mixed method research*

I. INTRODUCTION

Social media provides an interesting lens into different sociological and behavioral patterns. However, turning the big data into easily understandable insights remains a persistent issue. In addition, while many studies tend to focus on North-American or European social media users, there is a need for studying other cultural contexts prevailing on social media. Like many types of social behaviors, the use of social media is culturally embedded, and there may not be a “one size fits all” description of its usage in different cultures. Motivated by these issues, namely the complexity of data abundance and the impact of cultural diversity on social media behavior, we propose the process of automatic persona generation (APG) [1] coupled with qualitative data analysis for additional enhancement. The aim of our approach is to compress social media data into simpler representations, namely personas, and then enrich them with insights gained from qualitative interviews. The end results are representations that can be intuitively understood by end-users of analytics systems without numerical sophistication. We demonstrate the approach by analyzing millions of content interactions from the YouTube channel of AJ+ Arabic, a major Middle Eastern news and media outlet. In the next section, we briefly review the related literature. After that, we present the methodology, followed by the key findings. Finally, we discuss the results and future research avenues.

II. RELATED LITERATURE

A. Social Media Use in the Middle East

We searched the literature with relevant key phrases (e.g., “middle east + social media,” “culture + “social media”) to find prior work on culture’s impact on social media behavior, particularly in the Middle Eastern context. This audience is chosen primarily for two reasons: 1) opportunity to access large volumes of data from a major Middle Eastern media organization, and 2) scarcity of extant research on social media behavior of Middle Eastern users. It is commonly known that the culture and societal conditions in the Middle East are distinctively different from those in the West and elsewhere in the world [2, 3, 4], and these overarching conditions are likely to reflect in all strata of the social behavior, including social media usage. Consequently, the impact of these conditions to the local social media usage gives a solid motivation for our research.

New opportunities for social networking, information sharing, and personal experience have been created by the emerging mobile and Web technologies in the Middle East, where such activities have been limited by the cultural, religious, and traditional norms. Several studies have been conducted by different scholars on the use of social media in the Middle East and its influence on social and cultural change. A study examining the readers’ comments on websites of popular television networks in the Middle East by Al-Saggaf [5] explored the potential influence of online technologies in fostering the civic engagement in the Middle East. After studying the use of the Internet in Palestine, Aouragh [6] proposed that the social and political agency and activists’ tactics among the Palestinian citizens have been strengthened by the emerging Internet technologies, especially social media.

Some scholars have focused on how Arab women, especially in the Middle East, use emails and blogs in challenging the predominant social and cultural norms in the region [6]. However, many of the prior studies emphasize the use of social media for political and social engagement. These studies conclude that the sustainment and launch of the Cultural Revolution in the Arab world have been catalyzed by the adoption of Internet technologies and social media [7]. A study of the social media trends in over 20 Arab countries, including

some of the Middle Eastern countries, by Mourtada and Salem [8] highlighted that social media have played a critical role in shaping opinions, mobilization, and empowerment of the Arabic people.

Prior studies have also examined the cultural influences that arise from the use of social media, particularly social platforms such as Facebook and Twitter, in many different societies across the world. A study by Barry and Bouvier [9] on cross-cultural communication between the United Arab Emirates (UAE) and Welsh students of Facebook established key cultural differences in the social media usage. The UAE students showed a preference for using Facebook as a channel of conveying collective communication, such as posting a message on the Facebook platform rather than sending it privately to individual recipients, whereas students from Wales intend to use Facebook as part of their offline social life and more significantly in maintaining their private relations [9]. Similar results were observed in other studies where different cultural and religious norms governed the appropriate ways to share content in digital platforms [10, 11].

Several researchers have proposed that social media can result in social and cultural change in the Arab world. For instance, Wasserman [12] hypothesized about the potentiality presented by the social media and the increasingly emerging Internet and mobile technologies in promoting the involvement of democratic debates among the youths in Africa [12]. Another study by Lin and Tong [13] examining communication via text messaging, especially through platforms such as WhatsApp among the young people in Saudi Arabia, pointed out that social media contributes to a gradual change in the traditional patterns of gender communication. The study concluded that young Saudi Arabian people are more open in expressing their inner thoughts and emotions through social media and, in particular, young women have become more expressive and active, especially in the social activities related to men.

Another area that has been examined by scholars is media localization of culture and society. Hjarvard [14] defined the concept of media localization as a process of modern societies across the globe in which the mainstream media can no longer be perceived as separated from social and cultural institutions. He further pointed out that media have become a more integrated institution especially into the operations of social institutions and platforms [14]. A study conducted by Chen [15] examining the global and rapid spread of social media argued that the rate that social media usage has led to the incapability of traditional conventions to keep up with new cultural values arising from the use of social media. Singh [16] argued that cultural identities are being replaced with new cultural values created by the use of social media, and further highlighted that through social media, aspects of Western cultures are rapidly spreading into the non-Western cultures, especially among the younger generations. The use of social media has increased the spreading of the Western culture into the Arab world [7]. An example is the use of English in social media platforms such as Facebook, Twitter, and even WhatsApp among the youths in the Arab world, despite the introduction of Arabic keyboards [7]. In her study report on social media in the Arab world, Wiest [7] found that the most preferred language by Facebook users in some parts of the Middle East is Arabic; however, about 45 percent of the

social media users in those countries prefer to use English [7]. Another study conducted by Haggan [17] on social media text messaging in Kuwait pointed out that most of the text messages sent in Kuwait are typed either in English only or English combined with Arabic, but a sizable percentage of the Kuwaiti people prefer to use English only, while a small percentage prefer using Arabic language in text messaging.

In conclusion, the use of social media has resulted in the transition and emergence of numerous cultural values from traditional to modern, especially in the Middle East and other Arab nations. Because of social media, Arabic women in most of the Gulf-nations are gaining the freedom to become knowledgeable and publicly express their opinions on cultural and religious laws that limit them to carry out certain activities that also affects them directly or indirectly. Social media have also given these women a freedom to interact with the opposite sex publicly on the social platforms [7]. This way, Arab women are gradually becoming more independent from the cultural norms. Through social media, family roles among the Arab families are also changing gradually since fathers who are the families' heads are no longer the only decision makers in the family [18]. Through social media, the youths in the Middle Eastern countries have become more open minded and gained self-confidence by participating in political movements, such as the Arab Spring. In conclusion, steps to study the local social media users provide vital background information for understanding the social and political developments taking place in these societies. One alternative to study the users is by creating personas from analytics data.

B. User Personas

A 'persona' is an artificial representation of a larger underlying user group. Introduced to software development by Cooper in 1998 [19], personas are used as a design tool answering, 'Who are we developing to?'. Personas can 1) challenge existing preconceptions about the users, 2) provide decision making support in product development and marketing, 3) segment and prioritize user needs, and 4) summarize complex information into an easier format [20, 21, 22]. In addition to software development, buyer personas are applied in the field of marketing to better understand the drivers of consumer behavior [23]. Compared to data analytics by numbers, personas render the data to appear more 'human,' which is presumed to enhance immersion of software developers into users' life situations and contexts, while enhancing the developers' ability of creating solutions that are useful in real circumstances [19, 24]. Traditionally, personas are created via market research methods, such as ethnography and/or interviews. Because these manually performed efforts are time-consuming, the persona generation process in the industry can take several months and cost tens of thousands of dollars. Considering this reality, persona-generation via computational methods seems feasible. The following section explains the APG approach.

III. METHODOLOGY

A. Automatic Persona Generation

1) Case Company and Data Collection

AJ+ is an online news and media channel owned by Al Jazeera Media Network. It delivers content via YouTube,

Facebook, Instagram, and other social media platforms. AJ+ Arabic (AJ+ عربي) is the Arabic-language version of the service, that aims at presenting contemporary events and topics from an Arabic perspective. Its goal is to stimulate dialogue and constructive interaction in the society [25]. The generated personas are based on a dataset containing more than 12M views on 2,443 videos published between November 26, 2015 and April 20, 2017. The data is pulled from the YouTube API, and stored into a local database for processing. The durations of the videos range from 15 seconds to 10 minutes. The topics include news content, culture, technology, and lifestyle.

2) Generating the personas

To generate personas from the AJ+ Arabic users on YouTube, we conduct the following steps: 1) data collection via the YouTube API, 2) detection of distinct behavioral patterns, 3) detection of dominant demographic groups matching the distinct behavioral patterns, 4) creation of persona bases, and 5) enrichment of the persona bases with additional information (photo, name, etc.). An example of the resulting personas can be seen in the Fig. 1.

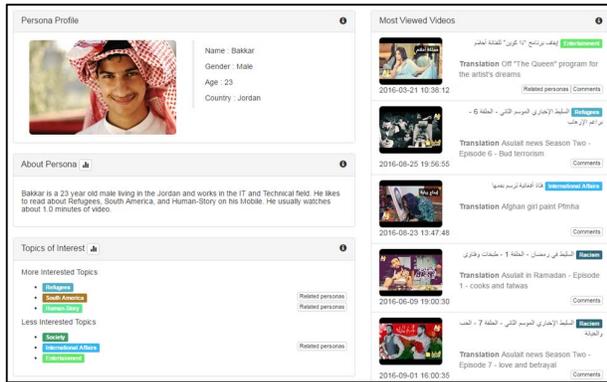


Fig. 1. An example of resulting persona from the APG system. The website is rendered by using Flask, a Python web framework. Demo of the system can be viewed at <https://persona.qcri.org/>.

The *Persona Profile* section includes a descriptive name, gender, age, and country of residence. The name and picture are retrieved from a database mapping names and pictures to different combinations of age/gender/location. The *About Persona* section contains a summary describing the persona in plain words. The *Topics of Interest* section shows the topics the persona has shown the most and least interest in. The *Most Viewed Videos* section list the videos that are most descriptive to this persona, sorted by their overall views. Users’ video viewing behavior is the key to generating the personas, as the final personas are a combination of distinct viewing patterns and enrichment information. The applied computations are briefly described in the following section.

3) Matrix calculations for APG

As mentioned previously, we obtain information on user groups and their viewing behavior from the YouTube channel. By using this data, we first construct a large matrix, and then decompose it in order to detect latent behavioral patterns. This process is depicted in Fig. 2.

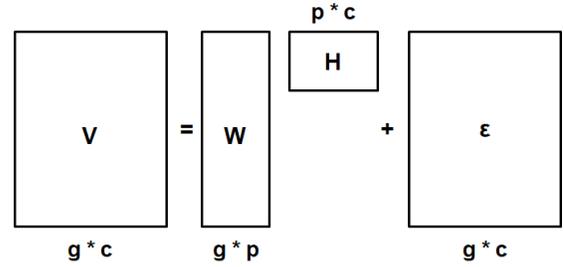


Fig. 2. Matrix decomposition for APG. We use non-negative matrix factorization to extract distinct video consumption patterns.

V is a $g \times c$ matrix, where g represents the user groups and c the individual videos. The elements of this matrix are the number of views (“ViewCount” in the YouTube API) of each video by each user group. The user groups are defined by age, gender, and location, so that the maximum number of user groups can be calculated by multiplication (age \times gender \times location). For example, 24-35 Female, Qatar. As stated, videos are the individual videos, for example “Attacks against refugees in Germany.” The matrix V is decomposed into two matrices, H and W , separating the user groups and the videos. Both include the parameter p , which is the chosen number of video viewing patterns (i.e., personas) we want to infer. This step applies the non-negative matrix factorization (NMF) whereby a linear combination of W as the basis and H as the encoding is calculated [26]. Finally, ϵ is the error term. After calculating the persona prototypes, they are enriched with additional information, including the name and photo, and then shown to end users as website profiles. Compared to clustering, NMF can produce multiple behavioral patterns from a single user group. This is appropriate because different social media behaviors can exist within the same demographic group [27]. Compared to other matrix decomposition methods, such as principal component analysis and vector quantization, NMF has distinct advantages that make it more appropriate for our use; see [26]. Moreover, because we are using aggregated data, so that view counts are obtained per user group (e.g., Females 25-24 years old), we can maintain the privacy of individual users. For a more detailed explanation of the computational techniques applied in APG, refer to [28], [29], and [30].

B. Interviews

To further understand and explain the behaviors of the generated personas, we analyzed five qualitative interviews with social media users from the Middle East. The interviews were conducted with Middle Eastern individuals (5 Qataris), dominantly over teleconferencing software. The interviews lasted between 45 to 90 minutes. Three interviewees were male and two were female, with ages ranging between 20 and 30. The interviews were all conducted in English, a language the participants and the interviewer were comfortable with. We recoded all the previous interview data [27] from the perspectives of the personas and social media usage patterns, constructing a theme map more relevant to our purposes. In this light, our qualitative analysis builds upon previous results [27] and expand them into the realm of persona generation from Middle Eastern social media users. To analyze the qualitative data, we used the Action-Implicative Discourse Analysis [31]

for coding the interviews along with the techniques of grounded theory [32]. The latter included identifying common themes from the interviews, known as categories. Then, categories were given types based on interview transcripts. For example, we identified that formality of social media usage was a theme, and that it has the types “formal” and “informal” usage.

IV. FINDINGS

A. Descriptive personas

We first present the descriptive personas for AJ+ Arabic, which are shown in Table 1. Then, they are merged with the qualitative data analysis, as described in the sub-section B. These personas are automatically generated by using the previously described methodology. From an ethical standpoint, we note that our approach preserves the privacy of individual users, even though it results in personas that have individualized attributes.

TABLE I. OUTPUT FROM THE APG SYSTEM. THE END-USER CAN CHOOSE BETWEEN 5 AND 15 PERSONAS; HERE, THE FIVE MOST IMPACTFUL PERSONAS (I.E., DISTINCT BEHAVIORAL PATTERNS COMBINED WITH DEMOGRAPHIC AND OTHER ATTRIBUTES) ARE SHOWN.

Persona 1: Omar	
	Name: Omar Gender: Male Age: 29 Country: Saudi Arabia
About Omar: Omar is a 29 year old male living in the Saudi Arabia and works in the Management field. He likes to read about US-affairs, and Human-Story on his Mobile. He usually watches about 1.9 minutes of video.	People like Omar: 450,020 Gender (Male), age (25~34), country (Saudi Arabia), interests (Society, South America, Human Interest Story), and language (Arabic) based potential reach.
Persona 2: Youssef	
	Name: Youssef Gender: Male Age: 26 Country: Morocco
About Youssef: Youssef is a 26 year old male living in the Morocco and works in the Food Preparation and Services field. He likes to read about Israel-Palestine, South America, and Human-Story on his Mobile. He usually watches about 1.3 minutes of video.	People like Youssef: 144,620 Gender (Male), age (25~34), country (Morocco), interests (Israeli-Palestinian Peace Process, South America, Human Interest Story), and language (Arabic) based potential reach.

Persona 3: Bakkar	
	Name: Bakkar Gender: Male Age: 23 Country: Jordan
About Bakkar: Bakkar is a 23 year old male living in the Jordan and works in the IT and Technical field. He likes to read about Refugees, South America, and Human-Story on his Mobile. He usually watches about 1.0 minutes of video.	People like Bakkar: 16,040 Gender (Male), age (18~24), country (Jordan), interests (Refugees International, South America, Human Interest Story), and language (Arabic) based potential reach.
Persona 4: Nalkah	
	Name: Nalkah Gender: Female Age: 31 Country: Saudi Arabia
About Nalkah: Nalkah is a 31 year old female living in the Saudi Arabia and works in the Food Preparation and Services field. She likes to read about Technology & Science, South America, and Human-Story on her Mobile. She usually watches about 1.1 minutes of video.	People like Nalkah: 3,250 Gender (Female), age (25~34), country (Saudi Arabia), interests (Science Technology, South America, Human Interest Story), and language (Arabic) based potential reach.
Persona 5: Jahmir	
	Name: Jahmir Gender: Male Age: 28 Country: Iraq
About Jahmir: Jahmir is a 28 year old male living in the Iraq and works in the IT and Technical field. He likes to read about Religion, South America, and Human-Story on his Mobile. He usually watches about 1.2 minutes of video.	People like Jahmir: 1,247,020 Gender (Male), age (25~34), country (Iraq), interests (Religion, South America, Human Interest Story), and language (Arabic) based potential reach.

As can be seen, the audience is predominantly young males, from the age group of 25–34. The potential reach expresses the size of each respective persona group on Facebook, as retrieved from Facebook Marketing API by using the visible targeting criteria.

B. Insights from Qualitative Data Analysis

We matched the interview findings with the automatically generated personas by considering the demographic traits of the personas as well as the interviewed individuals. The results can be seen in Table 2.

TABLE II. COMBINING QUALITATIVE ANALYSIS RESULTS WITH AGPS (MATCHING DEMOGRAPHICS LIKE GENDER, AGE, GEOGRAPHY, AND EXTRAPOLATING OTHER ASSOCIATIONS) ENABLES US TO CONSTRUCT LIKELY BEHAVIORAL PATTERN NARRATIVES FOR OUR PERSONAS.

 <p>Omar</p>	<p>Omar's social media usage is of the formal type. Due to his job he has many colleagues and professional connections in his social media accounts. As a result his representation, posts, and vocalized opinions would be more in line with social and cultural norms and expectations. He might employ additional anonymized accounts where he connects informally with close friends or strangers. Being a GCC citizen he is affected by modesty requirements and his physical and online self is more or less permeated into each other.</p>
 <p>Youssef</p>	<p>Youssef's social media usage focuses on a combination of family and informal categories as a possible young father. He is interested in social issues and local happenings, and is also vocal about them. He is less affected by the themes of monitoring and modesty. Although he might employ additional anonymized accounts, he is more likely to be a member of closed communication groups, where politics and social issues precede family and daily matters.</p>
 <p>Bakkar</p>	<p>Bakkar's social media usage focuses on the informal category. As a young user, although he has some formal connections, many of his other connections are informal such as close friends and even strangers. He is less affected by modesty and monitoring, as a result he is more vocal, his visual representation is more candid and "Westernized". Being savvy in using IT he is expected to have an intensive social media presence distributed across many platforms. Some of his accounts may be more anonymized and more disassociated from his physical identity.</p>
 <p>Nalkah</p>	<p>Nalkah's social media usage focuses on the thematic representation category. Although she shows her face in social media, the majority of her posts stay as thematic photos with no face and are considered modest. She utilizes privacy settings of social media systems to her advantage. Although she is a frequent social media user, she does not vocalize her thoughts so often as in comments and remains an observer. She has a few number of public posts if ever. Instead of utilizing multiple identities she prefers closed communication systems (e.g. WhatsApp, Snapchat, etc.) to stay in touch with her friends and family.</p>
 <p>Jahmir</p>	<p>Jahmir's social media usage focuses on a combination of family and formal categories. He claims not to be affected by concerns of modesty and privacy, however he still maintains a self-imposed modest and private social media presence. His posts often employ religious and motivational quotes. Although he is interested in global issues, his posts mainly consists of family photos and business related content. He is vocal since he is not subject to much monitoring. His physical and online identity are overlapping. He does not maintain multiple accounts, however he is a member of many closed friend groups in platforms like Facebook and WhatsApp.</p>

V. CONCLUSION AND FURTHER RESEARCH

Our contribution is twofold: first, we add to knowledge about Middle Eastern social media users, a segment not well-researched in studies from outside of the region. In particular, we observe that the large dataset of views reveals young males as predominant users of social media content in the region. This finding should be explored further in sequential studies. Second, we connect qualitative interviews with the quantitative creation of personas, which has not been done in earlier works on

automatic persona generation [28, 29, 30]. We reiterate that the APG approach has several advantages, such as generalizability across industries and social media platforms, preservation of privacy of individual users, and compatibility with both small and big data, thereby also supporting small to medium-sized organizations. The automatic persona generation is also many times faster than manual persona generation, such as ethnography and interviews. However, its limitation is in depth: While APG is good at describing what the audience segments are like, it cannot currently answer why they behave the way they do. In this study, we have explored ways to bridge this gap by combining qualitative data with the automatically generated personas. The mixed method approach shows promise, as it has the potential to combine advantages from automation (speed, accuracy) and human analysis (in-depth insights).

Regarding further research, automatic persona generation opens avenues for comparisons across and within cultures. For example, how do social media personas compare in diverse global settings, including considering the subcultures within specific societies? What are the differences and similarities between male and female personas? There are many other questions to pursue along these lines. More research is also needed to validate the usefulness of the automatic personas in real decision-making situations. For now, many analysis steps can be automated, but the optimal combination of automatic and manual methods raises several open questions. Particularly, how much value does the qualitative enrichment add? Is it possible to infer the same information by automatic means? Qualitative insights and interviews could provide clues on what information to include in the persona profiles, after which we can aim to automatically capture this information from social media data. At the same time, we must acknowledge that automatic techniques are not currently able to capture nuanced cultural meanings as well as a trained researcher, or even a layman, can. Toward that end, we encourage multi-disciplinary, mixed-method studies in the field of social media analytics, especially when generating rich data representations, such as user personas.

REFERENCES

- [1] Jung, S., An, J., Kwak, H. Ahmad, M., Nielsen, L., and Jansen, B. J. (2017). Persona Generation from Aggregated Social Media Data. *ACM Conference on Human Factors in Computing Systems 2017 (CHI2017)*, 6-11 May.
- [2] Bakhtari, H. (1995). Cultural Effects on Management Style. *International Studies of Management & Organization*, 25(3), 97-118.
- [3] Karabenick, S. A., & Moosa, S. (2005). Culture and Personal Epistemology: U.S. and Middle Eastern Students' beliefs about Scientific Knowledge and Knowing. *Social Psychology of Education*, 8(4), 375-393.
- [4] Zualkernan, I. A., Allert, J., & Qadah, G. Z. (2006). Learning Styles of Computer Programming Students: A Middle Eastern and American Comparison. *IEEE Transactions on Education*, 49(4), 443-450.
- [5] Al-Saggaf, Y. (2006). The online public sphere in the Arab world: The war in Iraq on the Al Arabiya website. *Journal of Computer-Mediated Communication*, 12(1), 311-334.
- [6] Aouragh, M. (2008). Everyday resistance on the Internet: The Palestinian context. *Journal of Arab & Muslim Media Research*, 1(12), 109-130.
- [7] Wiest, J. (2015). Mediatization in the Arab World: A Cross-Cultural Comparison of New Media Use. *Social Media Report*, 5(2).
- [8] Mourtada, R., & Salem, F. (2011). Civil Movements: The Impact of Facebook and Twitter. *Arab Social Media Report*, 1(12), 1-30.

- [9] Barry, W., & Bouvier, G. (2011). Cross-cultural communication: Arab and Welsh Students' use of Facebook. *Journal of Arab & Muslim Media Research*, 4(2-3), 165-184.
- [10] Abokhodair, N., & Vieweg, S. (2016). Privacy & social media in the context of the Arab Gulf. In: *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*, p. 672–683. ACM.
- [11] Abokhodair, N., Hodges, A., & Vieweg, S. (2017). Photo sharing in the Arab Gulf: Expressing the collective and autonomous selves. In: *Proceedings of CSCW 2017*. p. 696–711. ACM
- [12] Wasserman, H. (2011). Mobile Phones, Popular media, and everyday African democracy: Transmissions and transgressions. *Popular Communication*, 9(1), 146-158.
- [13] Lin, A., & Tong, A. (2007). Text-messaging cultures of college students in the Middle East. *Journal of Media & Cultural Studies*, 21(2), 303-315.
- [14] Hjarvard, S. (2008). The mediatization of society: A theory of the media as agents of social and cultural change. *Nordicom Review*, 29(2), 105-134.
- [15] Chen, G. (2012). The Impact of new media on the intercultural communication in global context. *China Media Research*, 8(2), 1-10.
- [16] Singh, G. (2010). New Media and Cultural Identity. *China Media Research*, 6(1), 86-90.
- [17] Haggan, M. (2007). Text messaging in Kuwait: Is the medium the message? *Multilingua*, 26, 427-449.
- [18] Alsharkh, Y. (2012). The Social Media Effects on the Families of the Saudi Society from the Perspective of the Youth. *Master Thesis*, 1-55.
- [19] Cooper, A. (1998). *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity* (1st edition). Indianapolis, IN: Sams - Pearson Education.
- [20] Nielsen, L. (2004). *Engaging Personas and Narrative Scenarios*. Vol. 17, PhD Series. Samfundslitteratur.
- [21] Pruitt, J., & Adlin, T. (2006). *The Persona Lifecycle: Keeping People in Mind Throughout Product Design* (1st edition). Amsterdam ; Boston: Morgan Kaufmann.
- [22] Miaskiewiczza, T., & Kozarb, K. A. (2011). Personas and User-centered Design: How Can Personas Benefit Product Design Processes? In: *Design Studies* 32(5), pp. 417–430.
- [23] Scott, D. M. (2007). *The New Rules of Marketing*. Hoboken, New Jersey: John Wiley and Sons.
- [24] Pruitt, J., & Grudin, J. (2003). Personas: practice and theory. In: *DUX 2003 - Designing for User Experiences*, p. 1–15. ACM.
- [25] YouTube page of AJ+ Arabic (2017). <<https://www.youtube.com/channel/UC-4KnPMmZzwAzW7SbVATUZQ>>, 20th April, 2017.
- [26] Lee, D. D., & Seung, H. S. (1999). Learning the parts of objects by non-negative matrix factorization. *Nature*, 401(6755), 788–791.
- [27] Harrell, D.F., Vieweg, S., Kwak, H., Lim, C., Şengün, S., Jahanian, A., & Ortiz, P. (2017). Culturally-Grounded Analysis of Everyday Creativity in Social Media: A Case Study in Qatari Context. *Proceedings of the ACM Conference of Creativity and Cognition*. Singapore. June 27-30. 13 p. accepted.
- [28] An, J., Kwak, H., & Jansen, B. J. (2017) Automatic Generation of Personas Using YouTube Social Media Data. *Proceedings of the 50th International Conference on System Sciences (HICSS-50)*. Waikoloa, Hawaii. p. 833-842. 4-7 January.
- [29] An, J., Kwak, H., & Jansen, B. J. (2017) Personas for Content Creators via Decomposed Aggregate Audience Statistics. *Proceedings of the 2017 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), Short paper*, Sydney, Australia, 31 July - 03 August, 2017.
- [30] An, J., Kwak, H., & Jansen, B. J. (2016b). Validating Social Media Data for Automatic Persona Generation. In *The Second International Workshop on Online Social Networks Technologies (OSNT-2016)*. 29 November - 2 December.
- [31] Karen, T. (1995). Action-implicative Discourse Analysis. *Journal of Language and Social Psychology*, 14(1-2), 195–215.
- [32] Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine Publishing.