2020 The 3rd World Symposium on Communication Engineering

Taxonomy about the Stages of Performing Automated Decision-Making Processing under GDPR in the Light of 6G Networks

Stavroula Rizou
Dept. of Applied Informatics
University of Macedonia
Thessaloniki, Greece
e-mail: rizstavroula@uom.edu.gr

Eugenia Alexandropoulou-Egyptiadou
Dept. of Applied Informatics
University of Macedonia
Thessaloniki, Greece
e-mail: ealex@uom.edu.gr

Kostas E. Psannis
Dept. of Applied Informatics
University of Macedonia
Thessaloniki, Greece
e-mail: kpsannis@uom.gr

***Abstract*—Automated decision-making and profiling are spreading rapidly through all the sectors of modern life, such as e-commerce, financial sector, marketing and transportation industry. The ever-increasing potentials of automated decision-making processing, provided by new technologies (such as the upcoming 6G mobile networks), demand specialized data protection. The scope of this paper is the presentation of a taxonomy and commensurate regulatory proposals, which aim at pointing the effects of the data subject's right of Article 22 GDPR, especially with the advent of 6G networks in combination with AI.**

Keywords-automated decision-making; profiling; GDPR; AI; data protection; 6G

I. INTRODUCTION

Automated decision-making is achieved through algorithms or AI systems [1]. Artificial intelligence (AI) is the intelligence developed by humans and achieved as an artifact [2]. More specifically, the machines act like "intelligent agents", which take actions according to algorithms and their environment with the support of software [3] [4]. The algorithm includes the procedures of calculation, data processing, evaluation and automated reasoning and decision-making. As a result, AI which includes machine learning, demands the production, collection and processing (e.g. profiling[1]) of large amounts of data (big data) [5]. The way an algorithm acts varies from fully automated to partly automated decisions [6]. GDPR do not permit the decisions based "solely on automated processing" [7].

The continuously advent of AI will be supported by various new technologies such as the upcoming 6G (Sixth generation of wireless cellular systems), in which it will be a key requirement to support AI applications from the core to the end devices [8]. This paper presents a taxonomy, which can be used to conduct an automated decision-making processing, preserving the data protection of data subjects located in EU and data subjects located outside EU as well, when the processing refers to the operations of a controller or a processor inside EU [7].

[1] 'profiling' means any form of automated processing of personal data consisting of the use of personal data to evaluate certain personal aspects relating to a natural person, in particular to analyse or predict aspects concerning that natural person's performance at work, economic situation, health, personal preferences, interests, reliability, behaviour, location or movements [Refer GDPR Article 4 (4)].

II. TAXONOMY OF AUTOMATED DECISION-MAKING PROCESSING

A. First Stage-Anonymization

Security measure of anonymization [2] could make it possible to avoid all the next stages under some circumstances, as it is presented in Figure 1. More specifically, the principles of GDPR do not apply to anonymous data, which are not related to an identified or identifiable natural person (Recital 26). It should be mentioned though, that anonymization is a continuous procedure, which follows the technology development, and must be reviewed and even revised regularly by data controllers, in order to avoid the identification of a natural person [9]. Moreover, in relation to datasets, which consist of linked personal and non-personal data, GDPR is applicable to all the data of these mixed datasets. Mixed datasets are definitely the most common condition, especially regarding Internet of Things and AI environments [10].

B. Second Stage-Data Subject's Rights

As in every data processing, the data subjects' rights are the following [7]:

1) *Right to be informed (Article 13,14)*
2) *Right of access (Article 15)*
3) *Right to rectification (Article 16)*
4) *Right to be forgotten (Article 17)*

[2] 'anonymization' is a technique applied, according to the state of the art, to personal data, in order to convert them into non-personal data [11].

978-1-7281-8564-4/20/$31.00 ©2020 IEEE

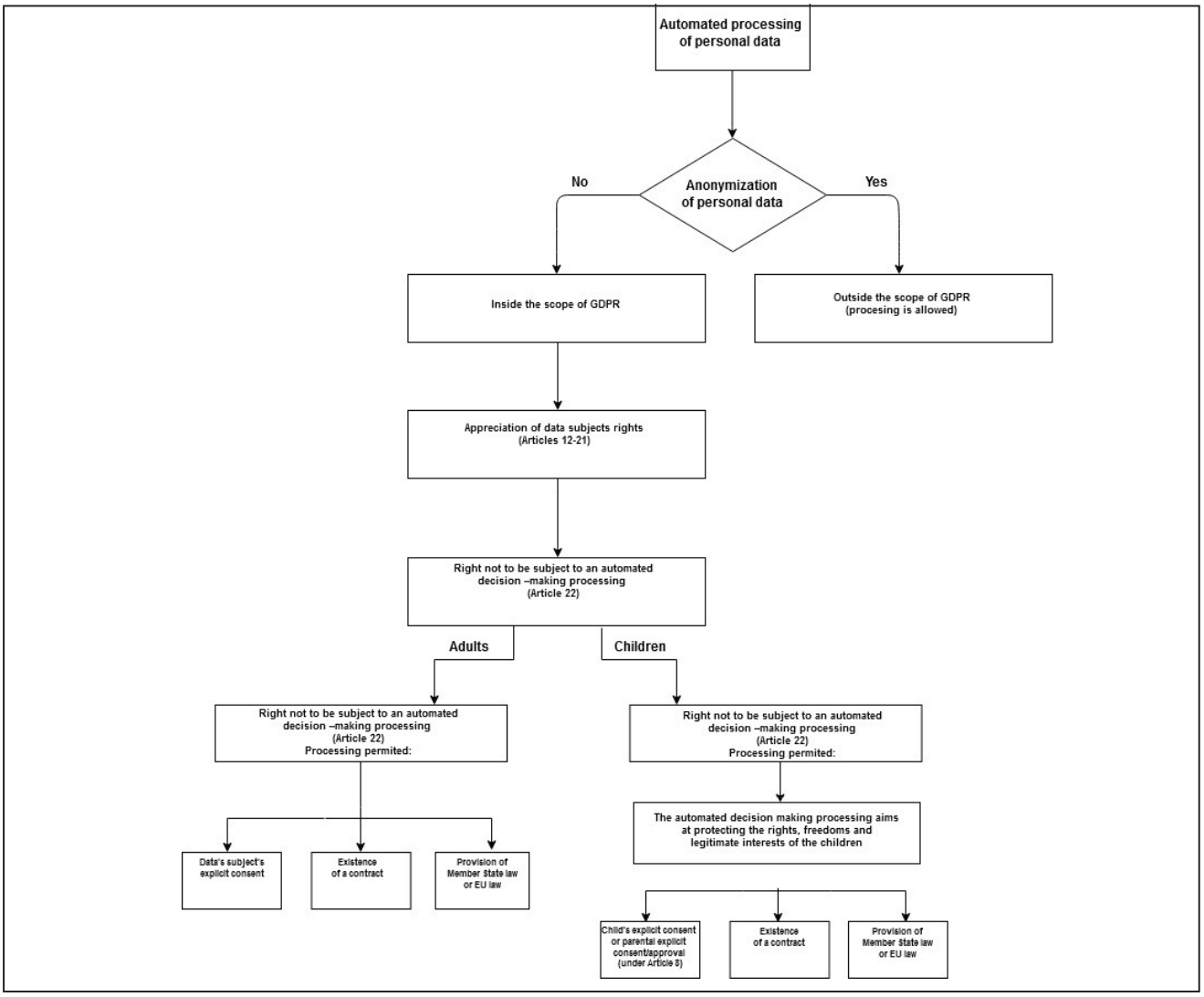

Figure 1. Stages of conducting automated decision-making processing according to Article 22

5) Right to restriction of processing (Article 18)

6) Right to be notified regarding the rectification or erasure of personal data or processing restriction (Article 19)

7) Right to data portability (Article 20)

8) Right to object (Article 21)

9) Right not to be subject to an automated decision–making processing (Article 22), as presented seperately in more detail in bellow third stage.

C. Third Stage- Right not to be Subject to an Automated Decision–Making Processing (Article 22)

1) Adults

In general, processing that includes automated decision-making and has a legal or similarly significant effect, including profiling, is prohibited by GDPR, [12] and is allowed only in case of:

a) data's subject's explicit consent,

b) existence of a contract between the data subject and a data controller and

c) support from Member State law or EU law [13].

Consent, regarding Article 22, should be explicit, informed (given information about the use of the data for automated decision-making), free, specific and unambiguous [14]. As for the condition of the existence of a contract, the automated decision-making should be also required during the pre-contractual procedures [12].The (c) condition, refers to the existence of a relevant national or EU law, which permits the automated decision-making processing (i.e. fraud and tax-evasion monitoring according to Recital 71).

2) Children

The above (a), (b), (c) exceptions that allow automated decision-making, vary greatly when it comes to children, underlying Recital 71[3] of GDPR, shifting the attention to their special protection.

According to WP29[4], in order to process children's' personal data through automated decision-making the above (a),(b),(c) requirements should at the same time aiming at protecting the rights, freedoms and legitimate interests of the children [12]. It should be mentioned that regarding child's consent, under the circumstances[5] of Article 8 (1), there are two situations based on their age:

a) 16 years and over and

b) under 16 years of age.

In the first condition, the consent of a minor 16 and over is sufficient, while in the second case parental consent or parental approval of minors consent is essential [15]. More specifically, national jurisdictions are allowed to set, as in the case of a Directive, the right age limit for mandatory parental consent or approval, with a general threshold the age of 13 [16].

3) Automated decision-making regarding sensitive personal data

In case of automated decision-making processing of sensitive personal data[6], it can be conducted under Article's 22 safeguards, those mentioned in Chapter II Section C in addition to one of the following situations:

a) explicit consent of the data subject [Article 9 (2) (a)] or,

b) necessary processing for reasons of substantial public interest, on the basis of Union or Member State law, which shall be proportionate to the aim pursued, respect the essence of the right to data protection and provide for suitable and specific measures to safeguard the fundamental rights and interests of the data subject [Article 9 (2) (g)].

At the same time, suitable measures must be enforced by controllers of the processing of personal data, in order to safeguard the data subject's rights, freedoms and legitimate interests [12].

III. Recommendations for 6G Standards and Security Measures

This Chapter summarizes the standardization and regulation proposals for 6G networks, including the taxonomy presented in Figure 1, in order to draw attention to the crucial data protection factors.

[3] '*…Such measure should not concern a child'* [Refer GDPR Recital 71].

[4] Article 29 Working Party was an independent European advisory body on data protection and privacy, which was set up under of Directive 95/46/EC [12].

[5] '*…in relation to the offer of information society services directly to a child'* [Refer GDPR Article 8].

[6] "sensitive data" are the data reveal racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, genetic data and biometric data processed for the purpose of identifying a person and data concerning health, a person's sex life or sexual orientation [Refer GDPR Article 9].

A. Anonymization of Personal Data

It is of great importance to maintain the anonymity of data, as a security measure inside 6G environment, as it is mentioned in Chapter II Section A. Anonymization could in general allow every data processing, including automated-decision making.

B. AI (Automated Decision-Making)

The upcoming development and implementation of 6G networks, interacts mutually with AI. More specifically, 6G standardization, architecture and characteristics will be influenced by AI developments [8]. As a result, standardization and regulation of 6G privacy and security measures should contain concerns regarding lawful automated decision-making processing of data, as presented in Chapter II Section C. Accordingly, childrens' data protection is highly important regarding AI inside 6G environment. Generally, children should be excluded from profiling as they are vulnerable [17] [12], and as a result more exposed to marketing methods.

C. "Storage Limitation", "Purpose Limitation" and "Data Minimization" Processing Principles

According to [18], 6G networks will focus on greater involvement with network than 5G. As a result, taking also into account AI development, the factors that can affect data protection and should be considered for 6G standardization are: time, space, use-case and the context of every personal data processing [18].

More specifically, regarding time the key challenge is the compliance with the processing principle, which demands limited duration of the conservation of personal data regarding a specific processing (storage limitation). In relation to use-case and context, the attention should be shifted in *purpose limitation* and *data minimization* processing principles. In particular, the use-case of personal data should be specific, according to purpose limitation principle, demanding restriction on further data processing incompatible with the primary collection purpose [13]. In addition, data minimization principle should be implemented as well, by examining the context and the use-case of every processing inside 6G networks, in order to process only the necessary personal data.

D. Location Privacy

6G networks, apart from enabling many new applications, will bring highly precise positioning capability [19], achieving centimeter-level precision of location data [20]. As a result, real-time and accurate location data demand specialized data protection and security. Additionally, apart from the collection of location data by e.g. an app, efforts should be made in standardization level and by entities in order to prevent sharing location data with third parties (i.e. advertisers, other applications) [21].

IV. Conclusion

This paper intends to provoke and point out a taxonomy

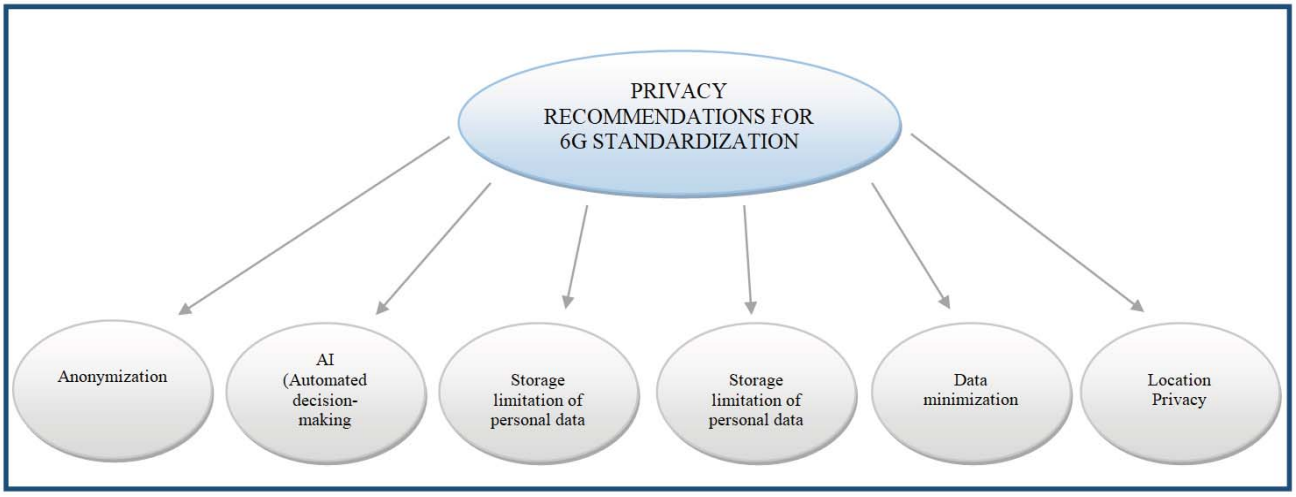

Figure 2. Privacy recommendations in the light of 6G networks

about the main essential stages for a proper management of automated decision-making processing, according to the data subject's right of Article 22 GDPR. In addition, taking into account the upcoming context of 6G networks and their interaction with AI, privacy proposals for 6G standardization are being pointed out.

In particular, it is of great importance to mention the significance of the combination of the legal safeguards in the context of Article 22 and the distinction between children and adults upon the right not to be subject to automated processing.

This paper illustrates the EU data protection pattern for the right, concerning automated decision–making processing, and shifts the attention to crucial privacy issues of 6G networks considering AI, aiming at supporting stakeholders, who operate or design automated processing of personal data.

ACKNOWLEDGMENT

The research work was supported by the Hellenic Foundation for Research and Innovation (HFRI) under the HFRI PhD Fellowship grant (Fellowship Number: 290). All websites were accessed on 26 July 2020.

REFERENCES

[1] T. Araujo, N. Helberger, S. Kruikemeier, & C. H. De Vreese, "In AI we trust? Perceptions about automated decision-making by artificial intelligence," AI & SOCIETY, 2020, pp. 1-13.

[2] K. B. Korb & A. E. Nicholson, Bayesian artificial intelligence. CRC press, 2010.

[3] S. Russel & P. Norvig, Artificial Intelligence: A Modern Approach (2nd ed.). Upper Saddle River, New Jersey: Prentice Hall, 2003, pp. 27, 32–58, 968–972.

[4] S. Russel & P. Norvig, Artificial Intelligence: A Modern Approach (3rd ed.). Upper Saddle River, New Jersey: Prentice Hall, 2009, p. 2.

[5] Handbook on European data protection law, 2018 edition, Publications Office of the European Union, Luxembourg, 2018.

[6] F. J. Zuiderveen Borgesius ,"Strengthening legal protection against discrimination by algorithms and artificial intelligence", The International Journal of Human Rights, 2020, pp. 1-22.

[7] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance), April 2016, [Online]. Available:https://eur-lex.europa.eu/eli/reg/2016/679/oj

[8] K. B. Letaief, W. Chen,Y. Shi, J. Zhang, & Y. J. A.Zhang, "The roadmap to 6G: AI empowered wireless networks," IEEE Communications Magazine, vol. 57, no. 8, August 2019, pp. 84-90.

[9] Council of Europe, Consultative Committee of Convention 108, Guidelines on the protection of individuals with regard to the processing of personal data in a world of Big Data, T-PD(2017)01, Strasbourg, 23 Jan 2017. [Online]. Available: https://rm.coe.int/16806ebe7a

[10] European Commission. "Guidance on the Regulation on a framework for the free flow of non-personal data in the European Union, Brussels," 29 May 2019. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:250:FIN

[11] Article 29 Data Protection Working Party. "Opinion 05/2014 on Anonymisation Techniques." WP216, 10 Apr 2014. [Online]. Available:https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2014/wp216_en.pdf

[12] Article 29 Working Party. "Guidelines on Automated Individual Decision-Making and profiling for the purposes of Regulation 2016/679." WP 251, 6 Feb. 2018. [Online]. Available: https://ec.europa.eu/newsroom/article29/item-detail.cfm?item_id=612053

[13] C. Burton, L. De Boel, C. Kuner, A. Pateraki, S. Cadiot, & S. G. Hoffman, "The final european union general data protection regulation", BNA Privacy & Security Law Report 15: 153, 2016.

[14] EDPB (European Data Protection Board). "Guidelines 05/2020 on Consent under Regulation 2016/679." Version 1.0. 4 May 2020. [Online]. Available:https://edpb.europa.eu/sites/edpb/files/files/file1/edpb_guidelines_202005_consent_en.pdf

[15] E. Alexandropoulou-Egyptiadou, "Minor's data protection according to GDPR," DiMEE, vol. 1, 2018, pp. 5-19.

[16] S. Rizou, E. Alexandropoulou-Egyptiadou & K.E. Psannis, "GDPR interference with next generation 5G and IoT networks," IEEE Access, vol. 8, 2020, pp. 108052-108061.

[17] Article 29 Working Party. "Opinion 02/2013 on apps on smart devices." WP202, 27 February 2013. [Online]. Available: https://ec.europa.eu/newsroom/article29/news-overview.cfm

[18] M. Ylianttila,R. Kantola, A. Gurtov, L. Mucchi, I. Oppermann, Z. Yan & A. Ijaz 6G, “White paper: Research challenges for Trust, Security and Privacy,” 2020, arXiv preprint arXiv:2004.11665.

[19] M. Latva-Aho and K. Leppänen, "Key drivers and research challenges for 6G ubiquitous wireless intelligence", Sep. 2019, pp. 36.

[20] Z. Xiao & Y. Zeng,“An Overview on Integrated Localization and Communication Towards 6G,” 2020. arXiv preprint arXiv:2006.01535.

[21] C. Tikkinen-Piri, A. Rohunen & J Markkula, “EU General Data Protection Regulation: Changes and implications for personal data collecting companies,” Computer Law & Security Review, vol. 34 no. 1, 2018, pp. 134-153.