

Automating Public Administration in the Digital Age

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Abstract— Automated administration, as a part of e-administration, is showing different characteristics from conventional automated administration in the digital age. This paper presents the development stages of automated administration, the concept and characteristics of automated administration in the digital age, and the legal challenges for its use. For the first time in academia, we defined automated administration as “machines performing all or part of administration without human intervention” and structured its development in 5 stages. Accordingly, machines will perform administrative acts from the current stage of automated administration after the third stage. Therefore, we need to resolve issues related to the scope and procedures of administrative tasks that will be performed by machines before introducing automated administration to specific administrative acts.

Keywords— automated, autonomous, administration, digital, data analytics, artificial intelligence, e-government

Introduction

E-government refers to a government that uses information technology to electronically perform the work of administrative and public agencies to improve efficiency. [1] To date, e-governments have digitalized the tools used by people to perform their jobs. However, the development of digital technologies goes beyond just digitizing tools and now enables machines to autonomously perform tasks.

Digital technologies such as big data analytics technologies and artificial intelligence are already being used in government administration systems. Moreover, according to the public informatization plan announced by the government, more advanced digital technologies are scheduled to be used. [2]

Before officially introducing automated administration in the digital age, it is necessary to examine relevant issues to prepare for the activation or adverse effects of automated

administration. Therefore, this article presents the concept of automation administration and identifies its characteristics in the digital age by dividing the development stages of automated administration. Based on these characteristics, this study presents matters that need to be legally addressed by priority.

I. CONCEPT OF AUTOMATING ADMINISTRATION

Terms such as ‘automatic administrative decisions’ [3] or ‘computer administrative act’ [4] are used for the use of machines for administrative acts. The expression “Automated Assistance in Administrative Decision-Making” is also used in Australia. [5] These concepts presuppose computer programming based on the algorithms designed by humans. Therefore, it seems inappropriate to apply these concepts when machines use data analytics and deep learning to independently understand the rules of work and develop algorithms to perform work or assist the tasks performed by humans.

In accordance with this problem, the definition and term ‘automatic administrative decisions’ is also being used, which refers to “the autonomous issuance of administrative acts (dispositions) by automatic devices (computer) and completely excluding human processing from the decision process.” [6] It would be difficult to include assisting administrative tasks, however, with machines such as computers that independently understand the rules and analyze data to fulfill this definition.

Therefore, this article collectively refers to ‘automated administration’ as performing tasks using machines in the field of administration and defines the concept as “machines performing all or part of administration without human intervention.” [7] The phrase ‘all or part of the administration’ is intended to include cases in which machines support or assist people in performing their tasks through data analysis in the interpretation of automated administration. In addition, “perform without human intervention” is used to refer to cases where automated administration is handled at the machine level,

regardless of whether the algorithm is designed by a machine or human.

II. DEVELOPMENT OF AUTOMATING ADMINISTRATION

A. The development of automated administration

Based on the concept of automated administration above, the results of dividing the development stages of automated administration are shown in Table 1 below.

Technically, automated administration started from the time of performing work with computer programming. However, the office automation period, which can be regarded as the beginning of e-government, was set as the first stage of automated administration, because automated administration corresponds to a form of work in e-government.

The second stage is the period when the work was automatically processed by machines according to predetermined rules and results. The third stage is when machines begin to autonomously understand the rules, in which there are still mixed cases where machines assist people or autonomously make decisions. The fourth and fifth stages are distinguished from other stages in that machines will have the abilities that are the same as or superior to those of humans due to advances in AI technologies. The scope of work for machines will thereby expand to almost (all) types of work.

TABLE 1. DEVELOPMENT STAGES OF AUTOMATED ADMINISTRATION [8]

Stage Contents	1 Office Automation	2 Automated	3 Semi- autonomous	4 Autonomous	5 Super intelligence
Main techno- logies	Excel, Word programs, etc.	Computer programming , etc.	Deep- learning, Big Data Analytics (Weak AI)	Strong (General) AI	Super AI
Charact- eristics	· Tools used by people to perform their jobs (substitutes for paper and pen)	· Human- designed algorithms	· Machine- designed algorithms - Machine learning, especially deep learning	· Able to compete with humans in many ways Has emotion, conscience, self- conscio- usness	· Surpassing human intelligence (exceeding 1,000x)
Decision /Judgm- ent	· Human	· Judged by the results entered by humans even though the machine	· Machines only support the decision/ judgment (reasoning, prediction, etc.)	· Machines can make the decision or judgment for almost all cases	· Machines make the decision or judgment for all cases

		performs the entire task	accordin- g to the rules entered by humans, and humans make the final decision/ judgment		
			· Machines will only make the decision or judgment for specific tasks that require reasona- ble judgment		
Tasks that can be perfor- med by machines	· Most tasks	· Tasks with clear performa- nce rules (binding acts)	· Binding acts & some discretio- nary acts · Technic- ally, - when there is no explicit knowledge - when it is Difficult For humans to program a solution for the problem	· Binding And discretion- ary acts	· Binding And discretion- ary acts
Scope of work	· Some tasks and stages of work	· Every aspect of work · Some tasks and stages	· Every aspect of work · Some tasks and stages	· Every aspect of work	· Every aspect of work
Exam- ples	· e-documents, automatic computation	· Scoring multiple- choice tests & calculating scores · Traffic lights · Automatic	· Interview evaluation · Translat- ion · Spam filter · Watson Health · Traffic	· Watson (most similar to super intelligence at this stage since it can be applied to	-

		street lights with sensors · Immigration	forecast · Image recognition (large-scale · waste recognition · flame detection, etc.) · Smart traffic lights	any system (similar to general intelligence, no self-consciousness)	
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B. Characteristics of automated administration in the digital age

In terms of automated administration in the digital age, the first and second stages coexist and the third stage is expected to be introduced and spread. In the third stage, machines will be recognized as the main agents of administrative acts by autonomously designing algorithms to make decisions and judgments with the development of AI and data analytics technologies. Although conventional automated administration only covered binding acts, some discretionary acts will be performed by automated administration from the third stage.

In the fourth stage, the capabilities of humans and machines will become equal, and machines will start to surpass humans in the fifth stage. In terms of the fourth and fifth stages of automated administration, matters need to be discussed such as re-establishing the relationship between humans and machines as well as changes in the legal system.

This paper focuses on addressing legal issues and countermeasures in the third stage, which corresponds to the present and near future.

Considering the characteristics of the third stage of automated administration, it is necessary to examine and review the main issues related to introducing automated administration from the influence on law principles to the adverse effects after introduction [9].

However, in many cases, the government or public agencies are already planning to introduce the third stage of automated administration. In response, the question of “Despite the characteristics of automated administration in the third stage, what requirements should be met before we introduce automated administration?” may be asked. Therefore, this paper will cover three aspects.

III. LEGAL CHALLENGE FOLLOWING SUCH A DEVELOPMENT

A. The scope of administrative work for machines

Considering the characteristics of administration as a function of public power for the people, the scope of administrative work that can be performed by machines needs to be determined.

Cases related to machines making decisions and judgments in the third stage of automated administration include smart (or AI) traffic lights and the request of the Estonian Ministry of Justice to design a “robot judge” that could adjudicate small claims disputes where the claim amount is less than €7,000 (about \$8,000). [10] These examples are characterized by the

simple and clear rules of work in the third stage of automated administration.

Even in the case where machines autonomously understand the rules and analyze data to produce results, the scope of work for machines can be flexible if such work is to support or assist civil officials in performing their jobs.

However, in the case where machines autonomously make decisions and judgments for all or part of the work, it would be advisable to limit the scope of work to tasks that can be handled by mechanical judgment according to specific requirements. That is, machines should not handle tasks that require humans (public officials) to make judgments in consideration of public interest, the balance of interests, or tasks that require the discretionary act of public officials. However, if an administrative act can be divided into discretionary acts and binding acts, or in the case of administrative acts with clear judgment criteria for discretionary acts, machines may perform such tasks.

B. Legal grounds for machines to perform administrative work

It is necessary to establish laws that allow machines to be the main agent of administrative work thereby enabling them to make decisions and judgments when performing administrative work. Defining the main agent of the task has importation implications concerning the subject of administrative action and its responsibilities.

Most legislations define or interpret administrative agencies or public officials as the main agent of work.

Therefore, in order to enable machines to complete administrative work, machines should be allowed to perform administrative work and measures such as including provisions that regard the work performed by machines to be equivalent to the work performed by the head of relevant agencies or public officials in the laws related to the corresponding administrative work should be considered.

C. Explaining the decisions made by machines

When performing administrative work, the government should be able to clarify the relevant legal grounds and explain why they came to such conclusions. For example, when dealing with civil complaints related to permits, the government must explain the reasons for approval or disapproval in addition to the relevant legal provisions. These characteristics of administration should also be followed in the case of automating administrative work because administration is a function of public power and can affect the rights and obligations of the people.

However, when applying deep learning technologies that involve learning through numerous layers, it would be difficult to understand the logic or reasons that led the machine to make such conclusions. This is because of the difficulties in identifying the correlations between the layers. The same problems will also occur in the third stage of automated administration using deep learning technologies. [10]

Therefore, a system for explaining the decisions or judgments made by the machines should be prepared to ensure the transparency and fairness of administration even in the case

in which automated administration is implemented. In this case, it would be advisable to determine the implementation level of explanation by reflecting the characteristics of each administrative task. [11]

IV. CONCLUSIONS

Among the development stages of automated administration, automated administration in the digital age is expected to show the characteristics of the third stage.

As discussed, we must first consider issues related to setting the scope of work to be performed by machines, allowing them to be the main agents of work. At the same, it will be necessary to clarify the responsibilities and secure the capability to explain the logic (or reason) that led the machines to make the decisions or conclusions to introduce the third stage of automated administration.

There is also a wide variety of related issues. These issues include those related to establishing a foundation for effective automated administration such as data collection and use, personalized administrative services, issues related to the positive effects of automated administration regarding positive administration, personal data protection and privacy issues, data bias related to the decisions and judgments made by machines, liability and compensation for damage caused by the work of machines, and issues concerning adverse effects such as matters related to international relations.

The process of having concerns and discussions on these issues is essential for stable use despite the changes brought by the use of technologies.

We hope that this article will lead to active discussions on the various issues related to automated administration.

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