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POTERE ALGORITMICO E DISUGUAGLIANZA SOCIALE NELLA SOCIETÀ DIGITALE

ALGORITHMIC POWER AND SOCIAL INEQUALITY IN THE DIGITAL SOCIETY

SUPERVISOR:
PROF. MARCO ARLOTTI

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INTRODUCTION

RESEARCH CONTEXT AND RELEVANCE

The past twenty years have witnessed a significant structural shift in European society, with digital technologies playing a crucial role in this transformation. The mode of economic production, communication systems, and governance structures are increasingly embedded with digital technologies. Digital platforms are further facilitating this change. In The platform society, J. VAN DIJCK and her colleagues (2018) describe how online platforms have become essential infrastructures that bring interactions between citizens, markets, and public institutions. This shift means that data has become a central economic resource, and the systems that process data increasingly influence everyday life.

At the same time the rising importance of data has also significantly impacted the dynamics of power. In The Age of Surveillance Capitalism S. ZUBOFF (2019) explains how large technology companies collect and analyze personal data in order to predict and shape human behavior. Her argument suggests that algorithmic systems are not neutral tools but rather they are part of economic models that depend on extracting and monetizing personal data. Similarly, C. O'NEIL (2016), in Weapons of Math Destruction, shows how algorithmic decision-making systems can reinforce inequality when they are not transparent and accountable. These systems may look like they are objective and neutral, but they often have existing social disadvantages.

For these reasons, studying algorithmic governance is important. As algorithmic systems highly influence access to jobs, welfare, credit, and information, they also affect the distribution of life chances. Therefore understanding the role of algorithm in social inequality is essential for evaluating the impact of digital transformation on European society.

OBJECTIVES

There are four main objectives of this thesis. The first one is to theoretically conceptualize algorithmic power from a sociological and economic perspective by understanding algorithmic systems as a means of coordination and control over resources, information, and opportunities in the digital economy. The second main objective is to analyze the interaction between algorithmic governance and social inequalities, including classifications, predictions, and assessments through algorithmic systems that could contribute to redefinition of social hierarchies. The third objective is to analyze the European Union's regulatory framework as a response to algorithmic change which includes the risks and opportunities for competitiveness and development. The fourth main objective is considering the Italian case as a means of contextualizing the interaction between the diverse European Union framework and the socio-economic structure.

RESEARCH QUESTIONS

"What is the role of algorithmic power in the reproduction and transformation of social inequalities in European digital society, with particular reference to Italy?" This is the central question guiding this thesis. The sub questions that guide this thesis are presented below:

1) In which socio-economic spheres does algorithmic power influence social division?
2) How do current economic systems meet with algorithmic systems of governance?
3) What regulatory and institutional frameworks have been developed in European countries in response to the socio-economic effects of algorithmic decision-making?
4) How does the Italian case study reflect, intersect with and challenge European dynamics?

Through these range of questions and objectives, this thesis tries to link changes in the European digital economy.

SCOPE AND LIMITATIONS (EUROPE AND ITALY)

This thesis aims to focus in the geographical and institutional scope of the EU. This features a high level of digital integration, regulatory coordination, and market unity. In addition to the EU, this thesis specifically focuses on Italy as a case for analysis in order to better observe the effects of algorithmic systems. The Italian context is a suitable framework of analysis because of its dualisms in the structure of the economy, including differences in the digital infrastructure of the regions, and the process of modernization of the public administration and the labor market. This thesis is based on a critical review and synthesis of existing literature, policy, and theoretical contributions, rather than upon the collection of primary empirical data. Its aim is interpretative and analytical, conceptualizing patterns and mechanisms, rather than providing new quantitative measures.

STRUCTURE OF THE THESIS

Chapter I introduces Theoretical Foundations of Algorithmic Power and Social Inequality. This chapter evaluates the association between algorithms and power from a sociological perspective, with particular importance on the role of technology as a tool of classification, control, and coordination. Then chapter II discusses Algorithmic Systems and the Production of Social Inequalities in Europe. It focuses on the framework of the European Union. In the next chapter, the process of the digital transformation in the Italian context will be studied, especially in relation between the use of technology and the specific characteristics of the institutional framework in the country. The last chapter discusses the topic of Critical Perspectives and Future Challenges. This chapter extends the analysis to include the ethical and social debates surrounding algorithmic power, including debates on fairness, accountability, and dem-

ocratic oversight. The final part which is the Conclusion tries to integrate the main findings of the thesis, bringing together the insights from the theoretical discourse and the contextual analysis. Through the sociological analysis of algorithmic power in the European digital economy, this thesis aims to contribute to a more refined understanding of the relationship between technological systems and the existing structures of social inequality.

CHAPTER I: THEORETICAL FOUNDATIONS OF ALGORITHMIC POWER AND SOCIAL INEQUALITY

1.1 ALGORITHMS AND POWER IN SOCIOLOGICAL THEORY

Power has been defined in many ways across different theoretical traditions. The sociological definition of power according to Max Weber is the ability to exercise one's will over others (WEBER, 1922). In other words, it is the capacity to dominate or influence the life and actions of others. In digital environments, algorithmic systems contribute to this capacity by organizing and processing large volumes of data that guide decision-making processes in both public and private institutions. From this perspective, algorithmic systems can be seen as mechanisms through which WEBERIAN forms of power are exercised within digital infrastructures. From a classical sociological perspective, power has long been linked to control over resources and information. BURRELL and FOURCADE explain that algorithmic infrastructures are reshaping social hierarchies and this shift is not only technical but also social. These algorithmic infrastructures reshape social hierarchies by concentrating power in the hands of a "coding elite" the engineers, designers, and organizations that build and control these systems. At the same time, these systems depend on the labor and data of a larger group that the authors refer to as the "cybertariat." This group includes everyday users, gig workers, and people whose online activities generate the data that algorithm rely on (BURRELL & FOURCADE, 2021). As a result, the integration of algorithmic technologies into institutional decision-making raises important questions about how digital infrastructures redistribute power and reshape traditional sociological understandings of authority, control, and inequality. To better understand how this form of power operates in digital environments, it is necessary to assess how algorithmic systems are used in decision-making processes.

Algorithmic systems are being used across a wide range of domains to assist decision making. Decision making algorithms are designed to process large datasets, estimate probabilities, and select actions that optimize specific outcomes under uncertain conditions (KOCHENDERFER, WHEELER, & WRAY, 2022). These models allow institutions to evaluate complex information and produce decisions at a scale and speed that would be difficult for human decision-makers alone. When such systems are integrated into institutions for hiring, credit evaluation, or risk assessment they effectively shape the criteria through which individuals are evaluated and opportunities are distributed. For this reason algorithmic decision systems can be understood as mechanisms through which power operates in digital environments, as the design and implementation of these models influence how choices are structured and whose interests are prioritized.

The exercise of power through algorithms is often indirect, operating not through explicit commands but through the structuring of digital environments in which decisions are made. Algorithmic systems on digital platforms play a central role in organizing visibility and guiding user attention. In this sense, algorithms shape the conditions under which information is encountered and evaluated (GILLESPIE, 2014). Experts have described this broader transformation as a shift toward algorithmic governance, where computational systems increasingly participate in the regulation of social and institutional processes. At the same time, concerns have been raised about the opacity of these systems. Frank Pasquale, in The Black Box Society, argues that many algorithmic systems function as "black boxes," meaning that their internal logic remains difficult to interpret. This lack of transparency can reinforce asymmetries of power between technology developers, corporations, and users (PASQUALE, 2015). Additionally, as highlighted by NICK SRNICEK in Platform Capitalism, the development and control of algorithmic infrastructures are increasingly concentrated within a small number of large technology firms, giving these organizations significant economic and political

influence (SRNICEK, 2017). Taken together, these discussions indicate that algorithms function not only as technical tools but also as sociotechnical systems that influence how opportunities, visibility, and resources are distributed in digital societies.

1.2 SOCIAL INEQUALITY IN THE DIGITAL SOCIETY

Social inequality refers to the unequal distribution of resources, opportunities, and power (WEBER, 1978). In digital environments, these inequalities are shaped not only by traditional factors such as class, education, and economic resources but also by access to digital technologies, data, and algorithmic platforms. As digital infrastructures are increasingly used in areas such as employment, finance, education, and communication, they influence how opportunities are allocated and how individuals are evaluated. The growing integration of algorithmic systems into social and institutional processes has important implications for patterns of social inequality in digital societies (NOBLE, 2018; ZUBOFF, 2019). Algorithmic systems interact with existing social structures, sometimes reinforcing historical patterns of disadvantage. Because algorithms rely on large datasets that reflect past social conditions, they may reproduce biases present in those data. As a result, algorithmic decision-making can affect who gains visibility, access to resources, or economic opportunities in the digital economy.

By analyzing large datasets, algorithms classify individuals into categories or scores, and these classifications influence who receives certain opportunities and who does not. For example, as argued by NOBLE in Algorithms of Oppression, digital technologies develops the concept of algorithmic bias arguing that digital technologies, especially search engines do not operate as neutral tools that simply organize information. Instead, they reflect and reproduce the social values, inequalities and power structures that exist in society. Noble shows that search algorithms are designed to rank and organize information based on complex criteria

such as popularity, engagement, advertising interests, and patterns in existing data. Because these systems rely on data generated within unequal social contexts, they may reproduce the same racial and gender stereotypes already present in society. As a result, algorithmic systems can unintentionally amplify discriminatory representations or prioritize content that reflects biased social patterns (NOBLE, 2018).

Researchers have also studied how algorithms can create inequality when they are used to make decisions in public institutions. For example, V. EUBANKS demonstrates that data systems used in areas like welfare, housing support, and child protection often focus more on poorer and disadvantaged groups. These technologies are often described as objective and efficient ways to manage public services. However Eubanks suggests that they can actually increase existing forms of social control over marginalized communities. Because these systems rely on historical administrative data, they may repeat patterns of inequality that already existed in earlier institutional practices (EUBANKS, 2018). Similarly, the work of R. BENJAMIN shows that algorithmic technologies can increase racial and social hierarchies even when they seem to be neutral or technologically advanced solutions for everyday problems. In Race after technology, she introduced the concept of the "New Jim Code" to describe how technological systems can produce forms of racial discrimination. This concept highlights that algorithmic technologies do not operate outside of social contexts. They are shaped by the data they depend on, the assumptions used in their design, and the institutions in which they are implemented. Because of this, systems that are presented as efficient and data-driven may produce patterns of racial discrimination if they are built on data that reflect historical inequalities. Therefore, according to Benjamin technological innovation can unintentionally support existing racial hierarchies without people noticing because they seem objective and neutral (BENJAMIN, 2019).

Digital platforms represent another key aspect of digital inequality within economic structures. ZUBOFF claims that major technology companies have developed business models based on the systematic extraction and analysis of users' behavioral data. She explains digital platforms continuously gather information generated through everyday online activities such as browsing, searching, communicating, and interacting on social media. These data are then processed through algorithmic systems that aim to predict and influence user behavior. These insights are converted into economic value, primarily through targeted advertising and predictive analytics that anticipate and shape consumer decisions and actions. This model of data extraction has significant implications for the distribution of power in digital societies. By controlling the infrastructures through which data are collected and analyzed, a small number of technology corporations accumulate significant informational and economic insights. They can influence digital markets, shape the flow of information, and guide user behavior through algorithmic mechanisms. At the same time, individual users often have limited knowledge of how their personal data are gathered, stored, and monetized, frequently providing information passively as they participate in online environments. Due to this, companies have more power than individuals when it comes to digital data this is because of companies ability to collect huge amounts of data and use digital tools to analyze it. While many users have limited awareness of how their data are collected, they also have limited ability to control how this data is processed. This dynamic contributes to broader patterns of digital inequality, as the concentration of data and technological infrastructures in the hands of a few firms shape access to information, economic opportunities, and online visibility (ZUBOFF, 2019).

These perspectives collectively highlight that algorithmic systems operate within broader social, economic, and institutional frameworks. Algorithms play a key role in structuring how individuals are evaluated, ranked, and made visible within digital systems, influencing the distribution of opportunities and resources. By structuring processes of classification, evalua-

tion, and visibility, these systems can reinforce existing patterns of inequality. To address these issues, it is necessary to give attention to the governance mechanisms and economic models that shape the operation of digital platforms.

1.3 ALGORITHMIC GOVERNANCE AND ECONOMIC STRUCTURES

The increasing use of algorithmic systems into economic and institutional processes has attracted a lot of scholarly attention. Researchers have begun to study how algorithmic technologies influence forms of governance in digital societies. KATZENBACH & ULBRICHT, for example, describe algorithmic governance as a form of social coordination in which algorithms play a central role in structuring interactions between different actors. In their explanation, governance does not necessarily depend on direct control by a single authority. Instead, it can emerge through multiple mechanisms that shape behavior and interactions, including institutional arrangements, technological infrastructures, and shared social norms. These mechanisms create relatively stable patterns that allow actors to anticipate and respond to one another within complex systems (KATZENBACH & ULBRICHT, 2019). Algorithmic governance therefore goes beyond traditional state regulation and can operate in various contexts such as digital platforms, labor markets, financial systems, and public administration. In a similar way, YEUNG describes algorithmic regulation as the use of automated decision systems to guide or influence social behavior (YEUNG, 2018). According to this perspective, algorithmic systems analyze large datasets to identify patterns and transform them into operational rules or recommendations that support institutional decision-making.

The increasing use of automated decision systems within public institutions and administrative processes is one of the main areas where algorithmic governance becomes visible. According to YEUNG, public institutions increasingly rely on algorithmic systems in areas such as policing, welfare administration, migration control, and taxation. Governments and public

agencies are increasingly adopting algorithmic tools to analyze large datasets and support decision making processes. She notes that governments adopt these systems partly because of pressures to reduce costs and increase administrative efficiency, which has encouraged the automation of bureaucratic tasks and decision procedures. She explains that algorithmic governance plays a major role in addressing governance and administrative challenges by using data-driven automated systems to guide or implement regulatory decisions. She also points out that even though governments increasingly use algorithmic systems to manage complex social problems more efficiently than traditional bureaucratic methods. These systems raise important concerns regarding transparency, accountability, and potential bias in automated decision making. One reason for this is that, by processing large amounts of data quickly, algorithmic models allow institutions to evaluate complex social information and identify patterns that may not be immediately visible to human decision makers. For this reason, scholars have raised concerns that these technologies may reproduce existing institutional biases or reduce transparency and accountability, particularly when their internal logic is difficult to interpret, audit, or challenge.

Since both public institutions and private platforms are using algorithmic governance within their systems, scholars like FRANK PASQUALE have studied how these systems reshape forms of power within digital societies. Rather than functioning as neutral technical tools, algorithms increasingly participate in processes of classification, ranking, and prediction that influence how individuals are evaluated within institutional systems. PASQUALE describes many algorithmic systems as “black boxes.” meaning that the processes through which algorithms generate decisions are not transparent to external observers. As a result, individuals affected by automated decisions often cannot understand how these outcomes were produced or challenge them effectively. In the context of algorithmic governance, this lack of transparen-

cy raises important concerns regarding accountability, fairness, and democratic oversight (PASQUALE, 2015).

Furthermore, ZUBOFF argues that companies and institutions increasingly rely on the collection and analysis of large volumes of behavioral data. These systems classify individuals into categories, scores, or ranking, and those classifications can affect access to employment opportunities, financial services, public resources, and online visibility (ZUBOFF, 2019). While Pasquale highlights the lack of transparency in algorithmic decision making, ZUBOFF explains how data extraction and predictive analytics give technology companies power to monitor and influence behavior. These perspectives highlight that algorithms function as mechanisms of power because they structure how individuals are assessed and treated within institutional environments. As algorithmic governance becomes increasingly embedded in economic and administrative systems, these technologies contribute to shaping the distribution of opportunities and resources across digital societies.

Algorithmic decision making systems heavily depend on large datasets and statistical models that classify individuals based on patterns found in historical data. Because these datasets often reflect existing social conditions, scholars have raised concerns that algorithmic systems may reproduce or reinforce existing forms of inequality when they are used in institutional decision making. For example, CATHY O'NEIL argues that some algorithmic models used in areas such as hiring, credit scoring, and policing can produce unfair outcomes when they rely on biased or incomplete data (O'NEIL, 2016). In addition, Frank Pasquale highlights that the lack of transparency in many algorithmic systems makes it difficult for individuals and regulators to understand or challenge automated decisions (PASQUALE, 2015). These concerns raise important questions about accountability, fairness, and oversight in algorithmic governance. Overall, these debates suggest that while algorithmic systems may improve efficiency

in decision making, they also create inequalities and power imbalances within digital societies.

This theoretical understanding of power provides the basis for analyzing how inequalities are produced through algorithmic systems.

CHAPTER II: ALGORITHMIC SYSTEMS AND THE PRODUCTION OF SOCIAL INEQUALITIES IN EUROPE

After building on the theoretical foundations presented in chapter one, this chapter examines how algorithmic systems operate within the European context and how they contribute to the production and transformation of social inequalities. While Chapter I focused on the conceptual understanding of algorithmic power and its relationship with social structures, this chapter shifts attention to how these processes take place within real socio-economic and institutional settings. In particular, it analyzes how algorithmic decision-making is used across different sectors, how issues of bias and transparency emerge, and how European institutions have responded through regulatory frameworks.

In this context, algorithmic systems can be understood as part of broader processes of digital transformation in Europe, where technological developments increasingly interact with existing social and institutional structures (EUROPEAN COMMISSION, 2020). These transformations are not neutral, as they influence how opportunities, resources, and forms of participation are distributed across society.

2.1 ALGORITHMIC DECISION-MAKING IN EUROPEAN SOCIETY

Algorithmic decision-making has become increasingly combined into a wide range of socio-economic fields across Europe, including labor markets, financial systems, public administration, and digital platforms. These systems process large amounts of data, identify patterns, and support or automate decision-making processes that were traditionally carried out by human actors (KITCHIN, 2017). As a result, algorithmic systems now play an important role in structuring access to opportunities, resources, and services.

In the labor market, algorithmic tools are widely used in recruitment processes and workforce management. Employers rely on automated systems to screen job applications, rank candidates, and evaluate employee performance. These systems are often introduced to improve efficiency and reduce costs. However, they also shape the criteria through which individuals are assessed. When these systems are trained on historical data, they may reflect existing patterns of inequality related to gender, education, or socio-economic background (BOGEN & RIEKE, 2018). As a result, algorithmic decision-making can influence career opportunities and contribute to the reproduction of labor market inequalities.

In the financial sector, algorithmic models are used to evaluate creditworthiness, detect fraud, and manage financial risk. Credit scoring systems rely on large datasets to estimate the likelihood that an individual will repay a loan. While these systems may increase efficiency and expand access to financial services, they may also reproduce existing socio-economic disparities. This is because they often rely on data related to income, employment stability, or geographic location, which are themselves unequally distributed across society (FUSTER ET AL., 2020). In this sense, algorithmic systems may contribute to forms of financial exclusion for already disadvantaged groups.

Algorithmic systems are increasingly used within public administration in European countries, where governments rely on automated tools in areas such as welfare allocation, taxation, and migration management (PEETERS & WIDLAK, 2023; ALLHUTTER et al., 2022). These systems are often presented as efficient solutions for managing complex administrative processes. However as mentioned in chapter one, their use raises important concerns regarding fairness, accountability, and transparency, particularly when decisions directly affect individuals' access to public services (EUBANKS, 2018). This reflects a broader transfor-

mation in governance, where digital technologies play a more central role in decision-making processes.

Digital platforms represent another important domain in which algorithmic decision-making shapes everyday life. Platforms use algorithms to organize content, recommend information, and target advertisements. These processes influence what users see, how they interact with digital environments, and which information becomes more visible. As a result, algorithmic systems play a key role in shaping access to information and visibility in digital spaces (PARISER, 2011; GILLESPIE, 2018).

Overall, these developments show that algorithmic decision-making is deeply embedded in European socio-economic structures. While these systems offer efficiency and innovation, they also influence how opportunities are distributed, contributing to the reproduction and transformation of social inequalities.

2.2 BIAS, DISCRIMINATION, TRANSPARENCY IN ALGORITHMIC SYSTEMS

Although algorithmic systems are often presented as objective and neutral, a growing body of research shows that they can reproduce and even amplify existing social biases, leading to discriminatory outcomes (STINSON, 2022; ZHANG et al., 2024; KELLY-LYTH, 2023). These issues are related both to the data used to train algorithms and to the design choices embedded in these systems (BAROCAS & SELBST, 2016).

One of the main sources of algorithmic bias is the use of historical data. These datasets reflect past social and institutional practices and may include patterns of inequality related to class, gender, ethnicity, or geographic location. When such data are used in algorithmic models, these patterns may be reproduced or even amplified (O'NEIL, 2016). Due to this, individuals who already experience disadvantage may face additional barriers in accessing opportunities.

Discrimination can also result from the ways in which algorithms classify and evaluate individuals. By assigning scores, rankings, or categories, these systems simplify complex social realities into measurable indicators. However, these classifications may not fully reflect individual circumstances and can lead to unfair outcomes. In some cases, variables such as postal codes or online behavior can act as indirect indicators of sensitive characteristics producing discriminatory effects even when explicit information is not used (CITRON & PASQUALE, 2014).

Another important issue is the lack of transparency in many algorithmic systems. In many cases, the internal logic of these systems is difficult to understand, particularly when they rely on complex machine learning models. Within the European Union, where principles such as transparency, accountability, and the protection of fundamental rights are central, this issue becomes a central focus of regulatory frameworks and policy debates. Institutions may rely on algorithmic systems whose decision-making processes are not fully visible or explainable, raising important concerns about accountability and oversight (BURRELL, 2016).

In the European context, these challenges are particularly relevant due to the widespread use of algorithmic systems across both public and private sectors. The combination of bias, opacity, and large-scale implementation raises important questions about fairness, trust, and legitimacy. Addressing these issues requires both technical solutions and institutional responses.

2.3 THE EUROPEAN REGULATORY FRAMEWORK AND INSTITUTIONAL RESPONSES

In response to the increasing role of algorithmic systems, the European Union has developed a regulatory framework aimed at addressing potential risks while supporting technological

innovation. This approach reflects an attempt to balance economic development with the protection of fundamental rights.

One of the main elements of this framework is the General Data Protection Regulation (GDPR), which establishes key principles for the processing of personal data, including fairness, transparency, and accountability (EUROPEAN UNION, 2016). The GDPR also includes provisions related to automated decision-making, giving individuals certain rights when decisions are based solely on algorithmic processes. These include the right to obtain information about how decisions are made and, in some cases, the possibility to contest them.

More recently, the European Union has introduced the Artificial Intelligence Act, which adopts a risk-based approach to regulating algorithmic systems (EUROPEAN COMMISSION, 2021). Under this framework, AI systems are classified according to their level of risk, with stricter requirements applied to systems considered high-risk. These include systems used in areas such as employment, education, and public services. The regulation emphasizes transparency, human oversight, and accountability.

In addition to legal regulation, European institutions have also developed ethical guidelines for the use of artificial intelligence. These guidelines highlight principles such as fairness, non-discrimination, transparency, and accountability, and aim to promote responsible technological development (HIGH-LEVEL EXPERT GROUP ON AI, 2019).

Despite these efforts, several challenges remain. The rapid development of technology makes it difficult for regulatory frameworks to keep pace. At the same time, the complexity of algorithmic systems can limit effective oversight and enforcement. Differences between European countries in terms of institutional capacity and digital development may also affect how these regulations are implemented (VEALE & BORGESIUS, 2021).

Overall, the European regulatory framework represents an important step in addressing the social and economic implications of algorithmic systems. However, its effectiveness depends on continuous adaptation and the ability of institutions to respond to evolving technological and social conditions.

While the European framework provides a general approach to regulating algorithmic systems, its practical impact becomes more visible at the national level. Member states play a key role in implementing these regulations and shaping how algorithmic systems are used in specific contexts.

Italy represents a particularly relevant case for this analysis. Its socio-economic structure—characterized by regional disparities, institutional complexity, and ongoing processes of digital transformation provides a valuable context for examining how algorithmic systems interact with existing inequalities. Analyzing the Italian case enables a deeper understanding of how algorithmic decision-making operates in practice, how regulatory frameworks are implemented, and how social inequalities may be both reinforced and challenged within specific institutional settings. The following chapter therefore focuses on the Italian context, examining the role of algorithmic systems across key sectors and their implications for the production and transformation of social inequality.

CHAPTER III: THE ITALIAN CONTEXT: ALGORITHMIC POWER AND SOCIAL INEQUALITY

3.1 DIGITAL TRANSFORMATION IN ITALY

Building on the European framework discussed in Chapter II, this section focuses on the process of digital transformation in Italy and its impact on socio-economic and institutional structures. While Italy is part of the broader European digital framework, its path of digital development shows specific characteristics, especially in relation to regional differences, institutional organization, and levels of technological adoption (OECD, 2020; EUROPEAN COMMISSION, 2020).

In recent years, Italy has introduced several strategies to support digital transformation. One of the main initiatives is the *Piano Nazionale di Ripresa e Resilienza (PNRR)*, which includes investments in digital infrastructure, innovation, and the modernization of public administration (Italian Government, 2021). These efforts are connected to broader European strategies that aim to strengthen digital development and economic competitiveness (EUROPEAN COMMISSION, 2020).

Despite these advancements, Italy continues to face structural challenges in achieving uniform digital development. One of the most significant issues is the persistence of a digital divide**.** Studies show that northern regions exhibit higher levels of broadband access, digital infrastructure, and technological innovation, while southern regions lag behind in connectivity and digital service adoption (AGCOM, 2022). This divide reflects broader socio-economic inequalities and affects individuals' access to digital opportunities.

Another important factor is the level of digital skills. Data from Eurostat show that a significant part of the Italian population lacks basic or advanced digital competencies (EURO-

STAT, 2021). This gap is particularly pronounced among older individuals and those with lower levels of education. As a result, digital transformation may not be equally accessible to all social groups, reinforcing existing inequalities rather than reducing them.

Furthermore, the Italian economy is characterized by a high proportion of small and medium-sized enterprises (SMEs), many of which face difficulties in adopting advanced digital technologies. This limits the diffusion of innovation and affects the overall competitiveness of the economy (OECD, 2020). Consequently, the integration of algorithmic systems into economic processes is uneven and often concentrated in more developed sectors and regions.

Within this context, algorithmic systems are increasingly used in both public and private sectors. These systems support decision-making processes, organize data, and improve efficiency. However, their impact is shaped by existing social and institutional conditions. For this reason, algorithmic systems do not operate in a neutral environment, but rather interact with existing inequalities and may contribute to reinforcing them (VAN DIJCK ET AL., 2018; ZUBOFF, 2019).

3.2 ALGORITHMS IN ITALIAN LABOR AND WELFARE SYSTEMS

Algorithmic systems are increasingly used in the Italian labor market and welfare system. Their use reflects broader trends in Europe but also highlights specific characteristics of the Italian socio-economic structure, particularly in relation to labor market divisions and social protection (BOERI ET AL., 2020; OECD, 2020).

In the labor market, algorithmic tools are increasingly used in recruitment, performance evaluation, and workforce management. Digital platforms such as food delivery and ride-hailing services rely heavily on algorithmic management systems that assign tasks, monitor worker performance, and determine compensation. These systems function as mechanisms of control

and coordination, structuring the relationship between workers and employers (SRNICK, 2017).

While platform work offers flexibility, it is often associated with precarious conditions, including income instability and limited access to social protections. In Italy, where labor market dualism is already significant, the expansion of platform-based work may intensify divisions between secure and insecure forms of employment (BOERI ET AL., 2020). Workers classified as independent contractors typically lack access to benefits such as unemployment insurance, paid leave, and pension contributions.

Algorithmic decision-making is also present in traditional employment contexts. Companies increasingly rely on automated systems to screen applications and evaluate candidates. As discussed in Chapter II, these systems may reproduce existing biases when trained on historical data reflecting unequal labor market outcomes (BOGEN AND RIEKE, 2018). In the Italian context, this raises concerns about inequalities linked to education, geographic origin, and socio-economic status.

In the welfare sector, Italian public administration has adopted digital platforms to manage social benefits and administrative processes (OECD, 2020; EUROPEAN COMMISSION, 2021) Systems are used to assess eligibility, detect fraud, and allocate resources. These technologies aim to improve efficiency and reduce administrative costs. However, they also introduce new forms of governance based on data-driven classification.

Research by EUBANKS (2018) suggests that automated welfare systems may disproportionately affect disadvantaged populations. In Italy, similar concerns arise when algorithmic systems rely on administrative data that reflect existing inequalities. Individuals with irregular

employment histories or limited documentation may be more likely to be excluded from welfare benefits.

Moreover, the increasing digitization of public services may create barriers for individuals with limited digital literacy. Access to welfare services increasingly requires the use of online platforms, which may disadvantage older individuals or those without adequate technological skills. This contributes to a form of digital exclusion**,** reinforcing existing social inequalities (OECD, 2020).

The integration of algorithmic systems into labor and welfare institutions therefore reflects a broader transformation in the organization of work and social protection. While these systems may enhance efficiency, they also reshape the criteria through which individuals are evaluated and resources are distributed.

3.3 SOCIOLOGICAL IMPLICATIONS FOR ITALIAN SOCIETY

The expansion of algorithmic systems in Italy has significant sociological implications, particularly in relation to inequality, power, and governance. These implications can be understood by analyzing how algorithmic technologies interact with existing social structures.

One of the most important effects is the reinforcement of regional inequalities**.** Since algorithmic systems depend on data availability and digital infrastructure, regions with more advanced technological development are better positioned to benefit from these systems. This creates a cumulative dynamic in which already advantaged regions continue to attract resources and opportunities (VAN DIJCK ET AL., 2018).

Another key issue is the reproduction of socio-economic inequality through data-driven classification. Algorithmic systems evaluate individuals based on indicators such as income, em-

ployment history, and behavioral patterns. These indicators often reflect existing social conditions, meaning that disadvantaged groups may systematically receive fewer opportunities. This aligns with the concept of algorithmic bias discussed by O'NEIL (2016) and Noble (2018).

At the same time, algorithmic systems contribute to changes in power relations. As discussed in Chapter I, control over data and digital infrastructures represents an important source of power. In Italy, this control is often concentrated in large companies and institutional actors that manage these systems (ZUBOFF, 2019; SRNICEK, 2017).

Transparency and accountability remain central concerns. Many algorithmic systems operate as "black boxes," making it difficult for individuals to understand or challenge decisions (PASQUALE, 2015). In the Italian context, this raises questions about trust in institutions and the perceived legitimacy of automated decision-making processes.

Finally, the rise of algorithmic governance requires new forms of institutional regulation. While European frameworks such as the GDPR and the Artificial Intelligence Act provide important guidelines, their implementation at the national level presents challenges. Differences in administrative capacity and technological development may affect how effectively these regulations are applied (VEALE and BORGESIUS, 2021).

Overall, the Italian case shows how algorithmic systems interact with specific social and institutional conditions. These systems can both reinforce and transform patterns of inequality. Understanding these dynamics is important for analyzing the broader impact of digital transformation on society.

CHAPTER IV: CRITICAL PERSPECTIVES AND FUTURE CHALLENGES

4.1 ETHICAL AND SOCIAL IMPLICATIONS OF ALGORITHMIC POWER

Building on the previous chapters, this section analyzes the ethical and social implications of algorithmic power in digital societies. As discussed earlier, algorithmic systems are increasingly used in decision-making processes across different sectors, including labor markets, welfare systems, and digital platforms. While these systems offer efficiency and innovation, they also raise several concerns related to fairness, accountability, and inequality. This is particularly relevant in the Italian context discussed in Chapter III.

One of the main issues is algorithmic bias. Algorithmic systems rely on large datasets, which often reflect existing social and institutional inequalities. As a result, these systems may reproduce or even reinforce patterns of discrimination (O'NEIL, 2016; NOBLE, 2018). For example, when algorithms are used in hiring or credit scoring, individuals from disadvantaged backgrounds may face additional barriers due to biased data or design choices. This challenges the assumption that algorithmic decision-making is objective and neutral.

Another important issue is the lack of transparency. Many algorithmic systems operate in ways that are not fully visible or understandable to users. As highlighted by PASQUALE (2015), these systems can function as "black boxes," which makes it difficult to understand how decisions are made. This lack of transparency raises concerns about fairness, particularly when individuals are affected by decisions they cannot explain or challenge. In contexts such as welfare allocation or employment, this can have significant consequences for access to resources and opportunities.

The issue of accountability is closely related to transparency. When decisions are made through automated systems, it becomes difficult to identify who is responsible for the out-

comes. Responsibility may be distributed across developers, institutions, and organizations, creating challenges for regulation and oversight (YEUNG, 2018). This raises important questions about how to ensure that algorithmic systems operate in a responsible and ethical manner.

The increasing use of algorithmic systems also has important social implications. One of these is the potential for social sorting, where individuals are classified and treated differently based on algorithmic evaluations. These classifications can influence access to employment, credit, and public services, reinforcing existing inequalities (FOURCADE AND HEALY, 2017). As discussed in previous chapters, algorithmic systems play a role in structuring visibility, opportunities, and access to resources.

Another key issue is the concentration of power. As highlighted by ZUBOFF (2019), organizations that control data and algorithmic infrastructures gain significant influence over social and economic processes. This creates asymmetries between individuals and large technology companies, as well as between citizens and institutions. In this context, algorithmic power becomes a central element in shaping social relations and governance structures.

Furthermore, the increasing use of algorithmic systems may affect democratic processes (PASQUALE, 2015; YEUNG, 2018). When decision-making is delegated to automated systems, there is a risk that human judgment and public deliberation are reduced. This raises concerns about democratic accountability and the role of citizens in shaping decisions that affect their lives.

Overall, the ethical and social implications of algorithmic power highlight the need for a critical approach to digital technologies. Rather than viewing these systems as neutral tools, it is

necessary to consider how they interact with existing social structures and contribute to the production of inequality.

4.2 FUTURE DIRECTIONS FOR EUROPEAN DIGITAL SOCIETY

The challenges associated with algorithmic power also highlight the need for future strategies that promote fairness, accountability, and inclusion in digital societies. In the European context, this involves both regulatory developments and broader institutional and social changes.

One of the main areas of development is the improvement of regulatory frameworks. The European Union has already taken important steps through policies such as the General Data Protection Regulation (GDPR) and the Artificial Intelligence Act. These frameworks aim to ensure transparency, protect fundamental rights, and regulate the use of algorithmic systems (EUROPEAN COMMISSION, 2021). However, their effectiveness depends on how they are implemented across different member states.

Another important direction is to improve transparency in algorithmic systems. This includes both technical solutions and regulatory requirements that make it possible to understand how decisions are made. Increasing transparency can help build trust and allow individuals to challenge decisions that affect them (PASQUALE, 2015).

In addition, there is a need to address issues of algorithmic bias through better data practices. This involves improving the quality and diversity of datasets, as well as developing methods to identify and reduce bias in algorithmic systems (BAROCAS AND SELBST, 2016). Ensuring that these systems are designed in a fair and inclusive way is essential for reducing inequality.

Another key aspect is the role of public institution (YEUNG, 2018; EUROPEAN COMMISSION, 2021).Governments need to develop the capacity to regulate and monitor algorithmic systems effectively. This includes investing in digital skills, institutional expertise, and interdisciplinary collaboration. Without this capacity, it may be difficult to ensure that regulations are properly enforced.

At the same time, public awareness and education are also important (EUROPEAN COMMISSION, 2020; OECD, 2020). As algorithmic systems become more integrated into everyday life, individuals need to understand how these technologies work and how they affect their opportunities. Promoting digital literacy can empower individuals to engage more critically with digital systems.

Finally, future developments should consider the importance of balancing innovation and social protection (EUROPEAN COMMISSION, 2020; OECD, 2020). While algorithmic systems can support economic growth and technological development, it is important to ensure that these benefits are distributed fairly. This requires policies that address inequality and protect vulnerable groups.

In conclusion, the future of European digital society depends on the ability to manage the opportunities and risks associated with algorithmic systems. By developing effective regulatory frameworks, improving transparency, and promoting social inclusion, it is possible to create a digital environment that supports both innovation and equality.

CONCLUSION

SUMMARY OF FINDINGS

This thesis set out to examine the role of algorithmic power in the reproduction and transformation of social inequalities in European digital society, with particular reference to Italy. Through a theoretical, analytical, and contextual approach, the study demonstrates that algorithmic systems are not neutral technological tools but constitute embedded structures of power that shape the distribution of opportunities, resources, and social outcomes.

From a theoretical perspective, the analysis in Chapter I established that algorithmic systems can be understood as an extension of classical sociological concepts of power. Building on Weberian theory, algorithmic power operates not through direct coercion but through the structuring of decision-making environments. Algorithms classify, rank, and evaluate individuals based on data, thereby shaping access to employment, credit, welfare, and information. In this sense, power is increasingly exercised through digital infrastructures that organize social interactions and institutional processes. The chapter also highlighted how this form of power is linked to new social divisions, such as the distinction between those who design and control algorithmic systems and those whose data and labor sustain them.

Chapter II extended this analysis to the European context, showing how algorithmic decision-making is embedded across key socio-economic sectors, including labor markets, financial systems, public administration, and digital platforms. The findings demonstrate that algorithmic systems systematically structure access to opportunities by introducing standardized forms of evaluation and classification. While these systems offer efficiency and scalability, they also contribute to the reproduction and amplification of social inequalities. In particular, the use of historical data and proxy variables can embed bias within automated decision-

making processes, leading to discriminatory outcomes. Furthermore, the opacity of many algorithmic systems limits transparency and accountability, making it difficult for individuals to understand or challenge decisions that affect them.

The analysis of the European regulatory framework revealed that the European Union has taken significant steps to address these challenges through policies such as the General Data Protection Regulation and the Artificial Intelligence Act. These frameworks aim to balance technological innovation with the protection of fundamental rights by promoting transparency, accountability, and human oversight. However, the study also shows that the effectiveness of these measures is constrained by the complexity of algorithmic systems, the rapid pace of technological development, and differences in implementation across member states.

Chapter III provided a contextual analysis of Italy, illustrating how algorithmic systems interact with specific socio-economic and institutional conditions. The findings indicate that digital transformation in Italy is uneven, characterized by regional disparities, gaps in digital skills, and structural features of the economy such as the prevalence of small and medium-sized enterprises. Within this context, algorithmic systems do not operate in a neutral environment but are shaped by existing inequalities. In the labor market, algorithmic management contributes to the expansion of precarious forms of employment, particularly in platform-based work, reinforcing existing labor market dualism. In the welfare sector, data-driven systems may create barriers for disadvantaged groups, especially when access to services depends on digital literacy and administrative data that reflect unequal social conditions. These dynamics demonstrate that algorithmic systems can both reinforce and transform patterns of inequality, depending on the institutional and social context in which they are implemented.

Finally, Chapter IV examined the ethical and social implications of algorithmic power, highlighting key issues related to bias, transparency, accountability, and the concentration of

power. The findings show that algorithmic systems enable the large-scale standardization of decision-making processes, embedding inequalities within institutional practices while reducing visibility and democratic oversight. The concentration of data and technological infrastructures in the hands of a limited number of actors further intensifies asymmetries of power. At the same time, the increasing reliance on automated systems raises concerns about the role of human judgment and public deliberation in decision-making processes. These challenges underscore the need for a critical approach to digital technologies that goes beyond technical efficiency and considers their broader social impact.

Taken together, the findings of this thesis demonstrate that algorithmic power plays a central role in shaping contemporary forms of social inequality in European digital society. Rather than simply reflecting existing structures, algorithmic systems actively participate in their reproduction and transformation, redefining how individuals are evaluated and how opportunities are distributed.

THEORETICAL AND PRACTICAL IMPLICATIONS

The findings of this thesis contribute to both theoretical and practical debates on digital transformation and social inequality.

From a theoretical perspective, the study advances the sociological understanding of power by conceptualizing algorithmic systems as key mechanisms through which power is exercised in digital societies. It shows that algorithmic power operates through processes of classification, prediction, and evaluation, extending traditional forms of authority into data-driven environments. This perspective highlights the importance of considering technology not as an external factor but as an integral part of social structures. By linking algorithmic governance

to classical and contemporary sociological theories, the thesis contributes to a more nuanced understanding of how inequality is produced and maintained in the digital age.

Furthermore, the analysis emphasizes that inequality in digital societies is not only a matter of access to resources but also of visibility, categorization, and data representation. Algorithmic systems shape how individuals are perceived and evaluated, influencing their life chances in ways that are often indirect and difficult to observe. This expands traditional approaches to social inequality by incorporating the role of digital infrastructures and computational systems.

From a practical perspective, the findings have important implications for policymakers, institutions, and society more broadly. The European regulatory framework represents a significant effort to address the challenges posed by algorithmic systems. However, the study shows that regulation alone is not sufficient. Effective governance requires a combination of legal frameworks, institutional capacity, and technical expertise. Public institutions need to develop the ability to monitor and evaluate algorithmic systems, ensuring that they operate in a transparent and accountable manner.

In addition, addressing algorithmic bias requires improvements in data practices and system design. This includes ensuring the quality and diversity of datasets, as well as developing methods to identify and mitigate discriminatory outcomes. Transparency is also essential for building trust and enabling individuals to challenge decisions that affect them. Without meaningful transparency, the principles of fairness and accountability cannot be effectively implemented.

The Italian case further highlights the importance of considering national contexts in the governance of algorithmic systems. Differences in digital infrastructure, institutional capacity,

and socio-economic conditions can significantly influence how these technologies impact inequality. As a result, policies must be adapted to local conditions rather than applied uniformly across different contexts.

Finally, the findings underline the importance of education and public awareness. As algorithmic systems become more integrated into everyday life, individuals need to develop the skills and knowledge required to understand and critically engage with these technologies. Promoting digital literacy is therefore a key component of reducing inequality in digital societies.

LIMITS OF THE STUDY AND FUTURE RESEARCH

Despite its contributions, this thesis has several limitations that should be acknowledged.

First, the study is based on a qualitative and interpretative analysis of existing literature, policy documents, and theoretical frameworks. While this approach allows for a comprehensive understanding of the mechanisms through which algorithmic systems influence social inequality, it does not provide new empirical data. Future research could complement this analysis with empirical studies, such as quantitative analyses or case studies, to examine how algorithmic systems operate in specific contexts and to measure their impact on different social groups.

Second, the scope of the thesis is limited to the European Union, with a particular focus on Italy. While this provides valuable insights into the interaction between supranational regulation and national contexts, the findings may not be directly applicable to other regions with different institutional and socio-economic structures. Comparative studies involving other countries or regions could provide a broader perspective on the global dynamics of algorithmic power and inequality.

Third, the rapid pace of technological development represents a challenge for research in this field. Algorithmic systems are continuously evolving, and new applications emerge across different sectors. As a result, regulatory frameworks and theoretical approaches may quickly become outdated. Future research should therefore adopt a dynamic perspective, taking into account the evolving nature of digital technologies and their social implications.

In addition, further research is needed to explore the role of specific algorithmic systems in greater detail, particularly in areas such as artificial intelligence, platform economies, and public administration. This includes examining how different types of algorithms produce different forms of inequality and how these effects vary across contexts.

Finally, future studies could investigate the role of interdisciplinary approaches in addressing the challenges associated with algorithmic power. Combining insights from sociology, economics, law, and computer science may provide a more comprehensive understanding of how to design and regulate algorithmic systems in ways that promote fairness, accountability, and social inclusion.

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