

The Impact of Racism on the Access to Technology in the U.S

Chengyu Luo *

Beijing Bayi School International Department, Beijing, China

* Corresponding Author Email: chengyu.luo@bayims.cn

Abstract. On the background of information age, racism shows a different influence on our society by the power of internet and digital technology. Therefore, the digital divide occurs, and it has significant effect of separation and create social inequality. Recent research on racism or digital divide giving little analyze on their relationships and further influence. Based on previous of digital divide and structure racism, this study uses data analysis to explore the structure racism and digital divide in United State. From the perspective of access, the impact of racism to digital divide presented and provides prediction of the crisis of digital divide. In the U.S., the technology provides a way of digital divide as extending of structure racism and accelerating social inequality. In addition, possible suggestions to addressing digital divide proposed in this study. With the rapid development of technology, structural racism and the digital divide need more attention, or it may lead to the deepening of racism and other social inequality problems, such as wealth gap, education inequality and algorithm bias.

Keywords: Digital divide, structure racism, inequality, algorithm bias.

1. Introduction

Stepping into the information age, developing technology provides convenient access to information in daily lives. From computer to mobile phone, internet, new media, and artificial intelligent bring us tons of information. To a certain extent, the barriers to people's social interaction and access to information are eliminated. However, at the same time, these information technologies further aggravate existing contradictions and inequalities, and amplify social problems, such as race discrimination, economic inequality, gender inequality, etc. Prejudice is amplified by the flood of information on the Internet, and these old social problems are further developed in the context of the new era.

In this contest, digital divide emerged. Digital divide refers to the gap between people who have adequate access to information communication technology (ICT) and people who have to “zero” or no access to ICT [1]. With different major changes taking place, digital divide is always being discuss extensively. The second digital divide, the skill of information acquisition, is widely researched in the background of Covid-19. In fact, in recent years, very few research studies have focused on the first-level divide [2]. In van Dijk's theory, there are four main phase of access ability of ICT, motivation access, physical access, skill access and usage access.

This paper focuses on the creation and impact of racism in American society on the digital divide between races and possible solutions through the analysis of physical, skill, and usage aspects. With the development of science and technology, people are more willing to contact the Internet and other media, and the digital divide formed in motivation is gradually decreasing. Most motivation access problem occurs in the psychological and spiritual level of individuals, which has little relationship with racism inequality. Therefore, this paper primarily examines these three types of access to exploring the digital divide of race in American society.

Through data analysis, literature analysis, and other research methods, this paper analyzes how racism causes ICT inequality among ethnic groups through the differentiation of social relations, wealth gaps, educational resources, and other social resources. The paper explores how the digital divide, both at its first and second levels, deepen racial problems and triggered potential social inequalities. The analysis of structural racism in the digital divide in the United States provides a new perspective on the development of technology and its further impact on social issues, such as racial inequality. This study highlights the current state and direction of the digital divide in developed

countries and suggests new perspectives and methods for addressing racial inequality in society in the future.

2. Digital Divide Created by Racism

The structural racism that exists in American society has resulted in inequality of social resources between races. As the external expression of the social impact caused by racism, economic inequality, education inequality, and healthcare inequality interact each other and further deepening racism. The inaccessibility of educational resources for minority represents the poor family financial situation, and this then leads to a further gap in jobs and wages for the next generation, which means the deepen of economic inequality. Interacting of these factors deteriorates racial discrimination. In addition, such racial problems are structural.

Structural racism is a system that existed in society and made of the interconnection of different institutions that follow racialized rules of White supremacy. Prejudice and potential discrimination lurk in every corner of the social system, they further led to racial inequality in power and health, or other issues like computer algorithm. The external problems of social inequality caused by racism and the internal complex structural racism raising racial digital divide in Information Age. The following section will analyze how structure racism and the social inequality problems caused by racism created the racial digital divide by explore three main phases of digital divide.

2.1. Physical Access

By analyzing racial and ethnic economic inequality in the United States from 1967 to 2020, it reveals that racial disparities of median household income persistent to exist from 1967-2020 (Figure 1). Asian and White families have higher median household than Hispanic and Black families. Different racial and ethnic background bring the vast wealth gap between races and this income inequality still growing in United States. Worse still, in 2020 (Figure 2), 29.7% Black and 20.4% Hispanic households had annual income under \$25,000, but for Asian and White household, this ratio only count for 13.7% and 15.6% [3]. This certainly defined the economic inequality that caused by racism. In Information age, the wealth gap transforms into the digital devices gap between races because the access of digital divide depends on household income.

In United States, as shown in Figure 3, for adults from household incomes below \$30,000 a year, 24% of them do not have smartphone, 43% of them do not have home broad service, and 41% of them do not have a desktop or laptop [4]. However, in comparison, for adults from household incomes larger than \$100,000 a year all the technologies mentioned above. Moreover, for 60% higher-income families have multiple devices, but for lower-income familiar only 23% of them reported that the have multiple devices. These data determining obvious devices gap extend by the income inequality, which shows the digital divide that higher-income households have high physical access than low-income households. Therefore, these results of racial economic inequality and digital divide caused by wealth gap suggests structure racism created a digital divide in aspect of physical access.

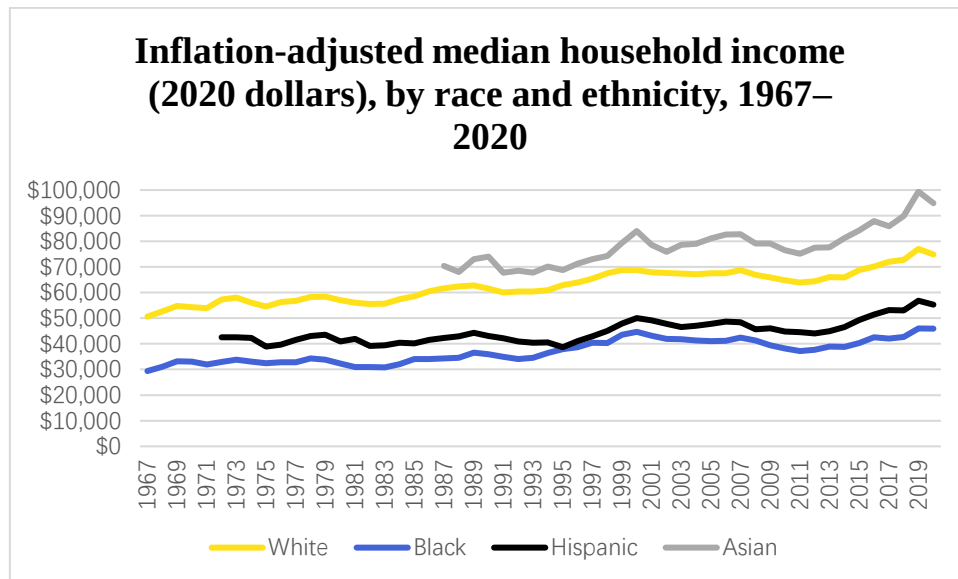


Figure 1. Inflation-adjusted median household income (2020 dollars), by race and ethnicity, 1967–2020

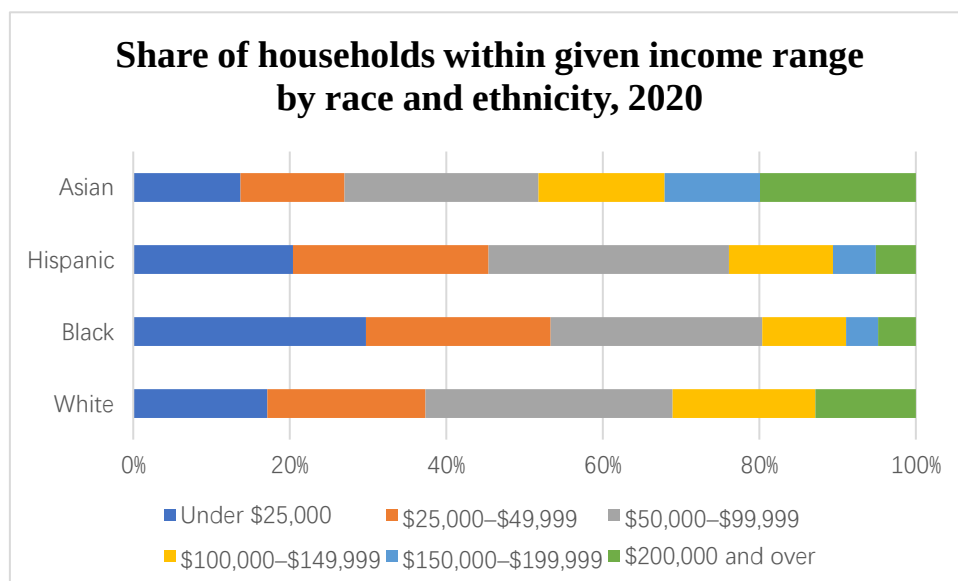


Figure 2. Share of households within given income range by race and ethnicity, 2020

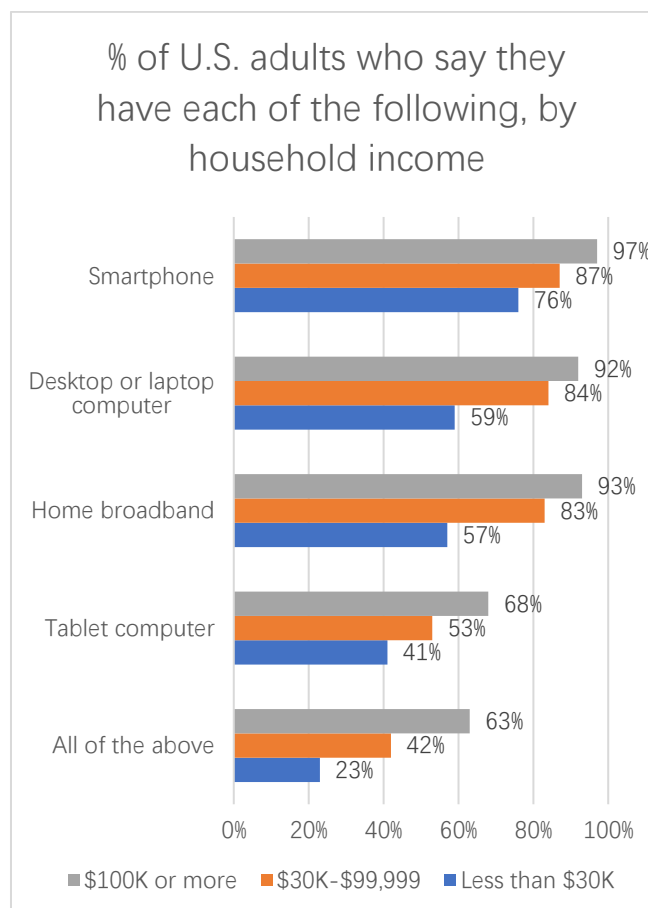


Figure 3. Percent of U.S. adults by household income

2.2. Skill Access

Skill access represent the ability that people needed to use common digital media. It can be divided in two distinct kinds of skill, operational skill, and substantial skill. Operational skill means the basic ability of use digital devices and browse internet, for example, using mobile phones and computers to watch videos and send messages. However, substantial skill is more complex. It represents the ability of information retrieval and digital tool application, for example, using a variety of tools to write documents, make PPT, videos, write code, make 3D models, etc. Indeed, having the basic operational skill does mean having access to the Internet and having the requisite skill access, and as the technology developed, minimum threshold to satisfy the request of operational skill sharply decrease, that everyone can easily have the fundamental access to devices. At this point, the digital divide created by the phase of skill access seems to have been eliminated.

However, substantial skill entails a greater ability to use ICT and means being able to extract more useful information from the digital world. Therefore, Substantial skill is more important than operational skill in the measurement of skill access. The level of substantial skill is dependent on multiple factors, such as school resources, family income, social environment, and the most important factor can be represented as the level of education, which is closely related to school, family and society situation and can reflect all those factors. By the influence of structure racism in the United States, the gap in educational resources for students of different ethnic groups has created an inequality between their level of education. According to White-Black and White-Hispanic achievement gap in National Assessment of Educational Progress (NAEP), that test with reading and math skills of American students from different grades, the results show over the past 40 years the gap between White Hispanic and gap between White Black have been declining. However, these educational gaps are still large and represents the level of education disparities in background of racism. Thus, digital gap draw from skill access inequality in minority exist in American. This is

possible due to the racial socioeconomic disparities and resource inequality encountered by minority in U.S.

2.3. Usage Access

Usage access represents the final result of using a certain technology. It can be measured in length of time using application or devices. Yet, the advance in technology provides diverse of information in different application, such as information retrieve, news, education, media, commerce, gaming. Structure racism have multiple effect in those factors, so this relationship can be hard to confirm. However, structure racism does lead to potential problem in algorithm bias, and in the background of acceleration of technology, this problem likely to become serious. Recent literature demonstrates that the datasets used in algorithms often reflect long-standing structural inequalities in our society [5]. The impact of structure racism on algorithm bias can be observed in form of data bias, which shows the race discrimination in the dataset of AI or model training, moreover, the commercial use of these biased AI and models will further affect the usage access toward minority group. In other word, structure racism deepens digital divide through data bias of algorithm bias.

Research on automated facial analysis algorithms in commercial classification systems. In comparison of two widely used commercial dataset Adience and IJB-A, researcher found the ratio of darker skin female and male data significantly lower than lighter skin female and male. Microsoft achieves the best result with error rates of 12.9% on darker subjects and 0.7% on lighter individuals. On darker subjects, IBM achieves the worst classification accuracy with an error rate of 22.4%. This rate is nearly 7 times higher than the IBM error rate on lighter faces [6]. This shows the error rate in darker skin subject significantly higher than lighter skin subjects. This case of algorithm bias shows the inequality minority facing because of racism caused digital divide.

3. Potential Impacts of the Digital Divide

In the first place, the digital divide deepens the issue of racism. The development of science and technology has facilitated the dissemination of information, and social inequalities have accelerated and complexed. The digital divide impedes job opportunities for minorities and perpetuates all kinds of resource inequalities associated with racial discrimination. The unequal spread of digital technology among different ethnic groups has led to the emergence of information barriers, which makes ethnic minorities have less and more limited access to information. As an indispensable part of social life, information access plays a crucial role in personal development, including entertainment, social interaction, knowledge acquisition, finance etc.

On the one hand, in terms of employment, people with information barriers will be at a disadvantage in the competition for jobs compared to people who have better access to information using digital devices. On the other hand, algorithmic bias makes recruitment systems inherently unfair. Firms are increasingly adopting data analytics, big data technologies, and artificial intelligence to transform and improve their key operations and organizational decision making [7]. For companies that use data analytics and AI in their recruitment systems, structure racism reflects in these employment issue through biased databases. This allows AI analysis to produce false and unfair results, leading to occupational inequality affecting minorities in the workplace. It creates an immoral social atmosphere and further increases the wealth gap based on racism.

In the above analysis of digital divide by racism, both physical access and skill access were strongly correlated with the wealth gap between races. According to the relevance of these data divides to the wealth gap, digital divide will be as intergenerational as poverty. For minority families who suffer from the unequal treatment of the digital divide now, the next generation is likely to suffer the same unequal treatment. In addition, given the impact of existing algorithmic biases on employment, policy, and health, the problem is likely to get worse. As a result of these intergenerational effects, racism continues to grow, and solutions to address or mitigate existing structural racism in the United States are needed to address the risks posed by the current digital

divide. With the popularization and application of AI and big data analytics technologies, these racial discrimination and data divide issues will extend to more areas in the future and complicate the structural racism that already exists.

4. Suggestions

The penetration of structural racism into American society makes the dismantlement of its effects and its derivative problems require the cooperation and joint efforts of the state, society, enterprises and other parts. Effective approaches will activate and support people to vote; learn; speak out to their children, families, friends, and coworkers; organize in their neighborhoods, towns, states, and nation; and support, join, and lead organizations pushing for change [8].

Some researchers have summarized possible solutions and directions for social cognition and policy perspectives, however, for potential correlation of structure racism on digital divide, people need to pay more attention on. Firstly, to reduce the role of the digital divide in deepening racism, the impact of potential algorithmic bias on the job search of ethnic minorities should be eliminated as soon as possible. Government should enhance uniform standard of the use of AI and big data in the recruitment system of each enterprise and promote the establishment of a racial equality database. Companies should also do their best to eliminate algorithmic bias. Secondly, with the further development of science and technology, basic education will become more equal among all ethnic groups, but at the same time, it is necessary to promote the equality of resources among schools, through policy assistance and other means to ensure that the digital divide will not appear. Thirdly, as for inequality in physical devices, this problem is mainly caused by the significant wealth gap between races. Therefore, with the promotion of equal education and equal work opportunities, this problem will be alleviated. But a real solution to inequality of physical access will require results from society in eliminating structural racism.

5. Conclusion

By analyzing the data, this study explores the social inequality caused by racism in the United States and the digital divide that has formed in the context of the information age. In the context of digital segregation crisis, this study analyzes the impact of racism from three aspects: physical access, skill access and usage access. The study found that in physical access, it is reflected in the digital equipment inequality caused by the racial wealth gap, in skill access, it is reflected in the digital skills inequality caused by the racial education resource gap, and in usage access, it is reflected in the algorithmic bias caused by structural racism. Racial digital divide presented by these three aspects illustrates the deep social problems caused by racism in the American society and reveals the huge impact of these problems in the current situation of the development of the Internet and smart devices in the information age and the digital divide caused by unchecked racism in the context of the accelerated development of AI.

To bridge the existing racial divide and curb the deepening of racism, governments need to follow up on the regulation of AI and big data technologies and improve relevant laws to promote database equality to address algorithmic bias. Social awareness of racism and the digital divide needs to be raised, and social institutions encouraged to do their best to avoid potential structural problems of racial discrimination.

This study provides a scientific assessment of the existing problems of racism and the digital divide in American society and predicts its potentially great harm. The analysis of digital divide in the context of American society will be conducive to the study of racism and digital divide. In the future, more analysis and solutions on the digital divide can be provided in conjunction with newer technological developments, such as those in the field of AI, in order to promote social equality and conduct in-depth research on the topic.

References

- [1] Soomro, K. A., Kale, U., Curtis, R., Akcaoglu, M., & Bernstein, M. (2020). Digital divide among higher education faculty. *International Journal of Educational Technology in Higher Education*, 17, 1 - 16.
- [2] Aissaoui, N. (2022). The digital divide: A literature review and some directions for future research in light of COVID-19. *Global Knowledge, Memory and Communication*, 71 (8/9), 686 - 708.
- [3] Pew Research Center. (2021, June 22). Digital divide persists even as Americans with lower incomes make gains in tech adoption. Pew Research Center. Retrieved on September 23, 2024. Retrieved from: <https://www.pewresearch.org/short-reads/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption/>.
- [4] Economic Policy Institute. (2022, June 15). Racial and ethnic disparities in the United States. Retrieved on September 23, 2024. Retrieved from: <https://www.epi.org/publication/disparities-chartbook/#incomecharts>.
- [5] Akter, S., McCarthy, G., Sajib, S., Michael, K., Dwivedi, Y. K., D'Ambra, J., & Shen, K. N. (2021). Algorithmic bias in data-driven innovation in the age of AI. *International Journal of Information Management*, 60, 102387.
- [6] Buolamwini, J., & Gebru, T. (2018, January). Gender shades: Intersectional accuracy disparities in commercial gender classification. In *Conference on fairness, accountability and transparency* (pp. 77 - 91). PMLR.
- [7] Kordzadeh, N., & Ghasemaghaei, M. (2022). Algorithmic bias: review, synthesis, and future research directions. *European Journal of Information Systems*, 31 (3), 388 - 409.
- [8] Braveman, P. A., Arkin, E., Proctor, D., Kauh, T., & Holm, N. (2022). Systemic And Structural Racism: Definitions, Examples, Health Damages, and Approaches to Dismantling: Study examines definitions, examples, health damages, and dismantling systemic and structural racism. *Health affairs*, 41 (2), 171 - 178.