

Potentials and Possible Drawbacks of Adopting Predictive Algorithm AI in the Ethiopian Criminal Justice System: Lessons from the US Experience

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Abstract

Predictive algorithm AI is a type of machine learning that predicts future events by using data and some variables. Predictive algorithms are being applied in different sectors including the criminal justice system such as in predicting crime before it happens, re-offending, flight risk, or recidivism. Ethiopia would benefit from adopting predictive algorithms in the criminal justice system by carefully analyzing the potential and possible drawbacks. The objective of this research is to scrutinize the potential and possible drawbacks of adopting the algorithms in the Ethiopian criminal justice system taking the United States' (US) experience as a lesson. The study employs a qualitative research method with a comparative analysis taking the US as a case study. The US is opted for because the country has a long history of implementing predictive algorithms with a record of the evaluation of the application of the systems in various domains. Examination of the US experience shows that predictive algorithms have immense benefits and some drawbacks mainly related to the data set and the design of the models and best experiences by minimizing the drawbacks and maximizing the benefits can be taken to Ethiopia. The writer suggests Ethiopia's historical, political, and cultural context have to be considered while examining the legal, ethical, and social ramifications of using predictive algorithms. This study recommends the adoption of predictive algorithms with the right design, implementation, and evaluation in place, the adoption of legal frameworks that govern the usage of the systems, and comprehensive data protection law, and the establishment of proper infrastructure.

Keywords: Ethiopia, Criminal justice system, Predictive Algorithm AI, United States (US)

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1. Introduction

A predictive algorithm is a machine learning or artificial intelligence (AI) that enables machines to acquire knowledge from both data and experience and predict future events.¹ Predictive algorithms use existing and current data as inputs and use patterns to produce outputs that estimate the likelihood or the happening of future events. Different predictive algorithm models are being used in a variety of domains, including business, health, education, security, and the criminal justice system to predict and support decision-making in these domains.

The term algorithm is derived from the name of the mathematician “al-Khwarizmi”, who is known to write about algebra and arithmetic in the ninth century.² An algorithm is a methodical process that generates an answer or a resolution to a challenge in a predetermined number of steps so that it can be used to solve problems or questions that have a finite or infinite number of possible cases or values.

AI predictive algorithm is a relatively new type of algorithm that captures patterns and relationships between variables using statistical techniques like data mining, data modeling, machine learning, deep learning, or neural networks to produce probabilities or predictive scores for each case. In some domains, for instance, predictive algorithm models can determine the possibility that a customer will purchase a product, a patient will contract a disease, a machine will malfunction, or a crime will be committed. Additionally, predictive algorithms can offer justifications for their conclusions, such as the most significant influences or the most comparable examples.

There is a long history of the development and use of predictive algorithms. Francis Galton created the linear regression method in the late 19th century to investigate the relationship between height and weight, making it one of the earliest examples.³ Another illustration is the invention of the

¹ Završnik, A. (2021). Algorithmic justice: Algorithms and big data in criminal justice settings. *European Journal of Criminology*, 18(5), 623-642. <https://doi.org/10.1177/1477370819876762>

² 'Algorithm' (n.d.) Britannica <<https://www.britannica.com/science/algorithm>> accessed 3 June 2023.

³Machine Learning: Algorithms, Real-World Applications and Challenges (Springer 2021) <<https://link.springer.com/article/10.1007/s42979-021-00592-x>> accessed 3 June 2023.

logistic regression method, which he used to model binary outcomes like survival or death.⁴ Recent improvements in computing power, data accessibility, and artificial intelligence technologies like neural networks, deep learning, and reinforcement learning have improved predictive algorithms.

The use of predictive algorithms is expanding across many sectors, including security, finance, health, education, and criminal justice sector. Predictive algorithms are used in the criminal justice system to help with decisions regarding policing, bail, sentencing, parole, and probation.⁵ For instance, risk assessment algorithms can assess the likelihood that a criminal will commit a subsequent offense or fail to appear in court, while predictive policing algorithms can analyze crime data and identify hotspots of criminal activity.⁶ To improve decision-making processes' efficiency, accuracy, and fairness, the use of predictive algorithms in criminal justice systems has grown recently. They are used in the criminal justice system at various stages, including pre-trial and trial stages.⁷

Although predictive algorithms are not yet used in Ethiopia's criminal justice system, AI predictive algorithms are becoming more and more popular which will leave the country to start implementing the algorithm in the near future. In 2021, the Federal Attorney General's Office conducted a diagnostic study of the Ethiopian criminal justice system. According to that study⁸, one of the system's biggest problems is the shortage of reliable and thorough data on crime and justice.

There are some experiences of using non-advanced AI systems in Ethiopia at the federal level by the police. These include a Police Clearance Certificate (PCC), which is issued to make sure that

⁴ Cramer, J.S., The Origins of Logistic Regression (December 2002). Tinbergen Institute Working Paper No. 2002-119/4, Available at SSRN: <https://ssrn.com/abstract=360300> or <http://dx.doi.org/10.2139/ssrn.360300> accessed 16 June 2023.

⁵ Andrew Guthrie Ferguson, 'Policing Predictive Policing' (2017) 94(5) Wash UL Rev 1109

⁶ Md A Malek, 'Algorithms assistive decision-making in the criminal courts of the USA: examining procedural legitimacy' (2021) Academia Letters <<https://doi.org/10.20935/AL2146>> accessed 16 June 2023.

⁷ Pamela Ugwudike, 'Predictive Algorithms in Justice Systems and the Limits of Tech-Reformism' (2021) 30(2) Social & Legal Studies 171.

⁸ See the Diagnostic Study of the Ethiopian Criminal Justice System by Criminal Justice System Working Group, March 2021 also available at [Ethiopian Criminal Justice System- Diagnostic Study - 2021 | Ethiopian Criminal Law Network \(ethcrimallawnetwork.com\)](https://ethcrimallawnetwork.com)

the applicant has never partaken in any criminal activity in Ethiopia for employment and other issues or to meet the requirements of the immigration rules to provide an overseas criminal record certificate for a visa application,⁹ facial recognition software, and forensic investigations, which are used to identify suspects and victims of a crime. Even though facial recognition and forensic investigations are also applicable in the federal police investigation stages, there are only new developments in using AI in trial or pretrial proceedings. With an intention to apply AI to various issues, the country has established an AI institute and recently adopted a national AI strategy that aims to harness the benefits of AI for economic growth, social development, and good governance.¹⁰ In addition to this, there is an active plan going on in the Federal Supreme Court¹¹ to apply AI in the court systems including predictive algorithms. To that end, the Federal Supreme Court signed an agreement to accelerate the implementation of a digitally supported judicial service, e-court system with the Ethio Telecom.¹² There is also a long-term plan to use advanced AI systems in the criminal justice system by the Ministry of Justice¹³.

Anyone who is closely following the politics in Ethiopia will conclude that Ethiopia is considering applying AI to different sectors including the criminal justice system.¹⁴ The writer also believes that adopting predictive algorithms in the criminal justice system would be useful because the algorithms are helpful tools to improve system decision-making and resource allocation. However, the Ethiopian AI policy and strategy, the ongoing project, and the plan to implement AI systems do not adequately address how AI particularly predictive algorithms are going to be introduced into the system. Therefore, since the implementation of predictive algorithms in the criminal justice system is inevitable, consulting the experience of some countries especially the US is imperative.

⁹ Mulatu Astarkie and Kamil Dimililer, 'Ethiopian Police Clearance Certification System Using Face Biometrics' (2019) <https://www.researchgate.net/publication/333776698_Ethiopian_Police_Clearance_Certification_System_Using_Face_Biometrics> accessed on May 27, 2023.

¹⁰ See the national AI policy of Ethiopia. Also available at [A NATIONAL AI POLICY \(mint.gov.et\)](https://www.mint.gov.et) accessed on May 28, 2023

¹¹ An interview with a judge at the Federal Supreme Court.

¹² The signing ceremony held on April 4, 2023, Ethio Telecom to provide a reliable and standardized ICT infrastructure including a modern modular data center with reliable power supply, backup network and network security, to ensure judicial services are efficient, effective, modern and accessible to users.

¹³ An interview with a public prosecutor at the Ministry of Justice.

¹⁴ Please watch the You Tube video posted with a content title “ጠቅላይ ሚኒስትር አብይ አህመድ (ዶ.ር) በሰው ሰራሽ አስተውሎት (AI) ዙሪያ የሰጡት ገለጻ” which is posted on November 2 2023. The prime Minister on his speech said “ INSA and AI [institute] are developing AI system for the [Federal] Supreme Court.”

This article examines the possible drawbacks and uses of introducing a predictive algorithm AI in the Ethiopian criminal justice system using the US experience and a few others, as the case may be, as a case study. The article employs a qualitative research methodology and comparative study as a technique. For the comparative study, the United States (US) is taken as a comparative reference. The writer takes the US experience because the US has been at the forefront of using predictive algorithms with broad implementation of several AI models in several states of the country to its criminal justice system. In addition to the broad implementation of different predictive algorithm models, there is a record of evaluation of the adopted algorithms and, as a result, it has gained invaluable knowledge and lessons in this regard that can be applied to Ethiopia.

This study is organized into five sections. The first section is an introduction to predictive algorithms and sets a context about why Ethiopia is about to or should adopt predictive algorithm AI in the criminal justice system. The second section deals with the potential of adopting predictive algorithms in a criminal justice system with the illustration of instances from the US experience. The third section deals with the drawbacks of adopting different algorithm models. The fourth section deals with the lessons that can be taken from the US experience in adopting predictive algorithms in the Ethiopian criminal justice system with a discussion of how the possible drawbacks can be minimized. The last section is the conclusion and recommendations part.

2. The potential of adopting predictive algorithm AI in a criminal justice system

A multitude of issues, such as a lack of financing, corruption, inefficiency, prejudice, and a lack of openness, affect Ethiopia's criminal justice system.¹⁵ Given that they provide decision-makers with more accurate and objective information, increase efficiency and accountability, and reduce human bias and mistakes, predictive algorithms may be able to help with some of these issues in general.¹⁶ In this regard, predictive algorithms could be used to allocate funding for rehabilitation and reintegration programs, to calculate an offender's likelihood of recidivism or violence, to improve

¹⁵ Amnesty International, Amnesty International Report 2020/21: The State of the World's Human Rights (Amnesty International 2021) <<https://www.amnesty.org/en/documents/pol10/3200/2021/en/>> accessed 16 June 2023.

¹⁶ Kristian Lum and William Isaac, 'To Predict and Serve?' (2016) 13 Significance 14, DOI: 10.1111/j.1740-9713.2016.00960. x.

pretrial detention and bail decisions, and to monitor and evaluate the performance of legal institutions. To understand the potential of the implementation of predictive algorithms in the Ethiopian criminal justice system, it is imperative to discuss the merits and demerits of the algorithms that are being used in other jurisdictions.

2.1. Merits of using predictive algorithm AI in a criminal justice system: General Overview

AI Predictive algorithms use existing data and different patterns to predict future outcomes or behaviors, such as the likelihood of committing another crime, the risk of flight, or the ideal punishment for the accused person. The criminal justice system in many jurisdictions is assisted by predictive algorithms that increase its efficiency and effectiveness. The writer will discuss some of the advantages of integrating predictive algorithm AI with the criminal justice system under this subsection.

One of the main merits of using AI's predictive algorithm in the criminal justice system is reducing human bias and inaccuracy. In principle, Predictive algorithms use machines that are objective naturally. However, people who are responsible for making decisions, like judges, prosecutors, police, and parole officers, are regularly influenced by a range of things that could affect their objectivity and consistency, like stereotypes, emotions, tiredness, or personal preferences. These factors could lead to prejudicial or inaccurate decisions against defendants or victims, like incorrect flagging of a suspect, refusing to grant bail, wrong convictions, harsh penalties, or refusing to grant probation or parole. Predictive algorithms, on the other hand, can provide more objective and consistent assessments based on facts and data as opposed to emotions or subjective beliefs. According to a study by Dressel and Farid (2018)¹⁷, an AI system was more reliable and less biased than judges in forecasting whether a defendant would commit a new crime within two years or not. The AI system correctly predicted 67% of the cases and displayed no racial or gender disparities compared to human judges, who were more likely to categorize black defendants and white defendants as high risk and low risk, respectively.

¹⁷ Dressel J and Farid H, 'The accuracy, fairness, and limits of predicting recidivism' (2018) 4(1) Science Advances eaao5580.

The algorithms can also help increase the effectiveness and efficiency of the criminal justice system, which is another benefit. Predictive algorithms can help the system save time and resources by processing massive amounts of data and complex calculations more quickly and accurately than humans. For instance, a study¹⁸ discovered that an AI system could predict the risk of violence for parolees more precisely than conventional methods, which could help decrease the workload and expenses for parole officers and improve public safety. Additionally, compared to humans, predictive algorithms can produce results that are clearer and easier to understand, which can increase the system's accountability. Another study¹⁹ showed that an AI system could produce clear and understandable rules for estimating recidivism risk, which could assist defendants in comprehending the reasoning behind their sentences and, if necessary, appealing them.

Consequently, since they can increase the effectiveness of criminal justice systems, there are merits of using predictive algorithms in a criminal justice system that should be carefully considered and dealt with. The criminal justice system can be made more effective and efficient while also increasing accountability and transparency with the assistance of various predictive algorithm models. To maximize the advantages of applying these systems, having fair and accurate data and models, careful oversight and regulation, and ethical responsibility on the part of human decision-makers are required. The writer will also describe some instances where implementing Predictive algorithms is a success story in the following subsection.

2.2. Instances of successful implementation of AI's predictive algorithm in the US criminal justice system

The most important application of a predictive algorithm is to predict the risk and behaviors of suspects and criminals. With this main purpose in mind, so many predictive algorithm AI models have been developed and adopted by many US states recently. Some successful models are discussed below.

The first instance of a successful model is the Public Safety Assessment (PSA) which was developed by the Laura and John Arnold Foundation in the US. The PSA is a tool used to determine

¹⁸ R Berk and others, 'A Convex Framework for Fair Regression' (2017) 31 Proceedings of the 31st Conference on Neural Information Processing Systems 1.

¹⁹ C Rudin, S Wang and B Coker, 'The age of secrecy and unfairness in recidivism prediction' (2020) 2(1) Harvard Data Science Review <<https://arxiv.org/abs/1811.00731>>

the likelihood that a defendant if released before trial, will commit a new crime, a new violent crime, or will be a flight risk.²⁰ To make decisions the model takes into account nine variables, including the defendant's age, the charge being brought against him or her, and any prior convictions. The PSA does not consider demographic factors like race, gender, or income and it has shown an increase in pretrial release rates, a decrease in pretrial incarceration rates, and maintain public safety outcomes. Because of its immense use, PSA has been adopted by more than 40 jurisdictions in the United States.²¹

Another successful instance of a predictive algorithm in the criminal justice system is the COMPAS (Correctional Offender Management Profiling for Alternative Sanctions) algorithm, developed by Northpointe Inc. in the United States. One hundred thirty-seven (137) variables, which include criminal history, substance abuse, family background, and personality traits,²² in the COMPAS risk and needs assessment tool are used to assess an offender's risk of recidivism, violence, and noncompliance with supervision. COMPAS also makes recommendations for treatment and intervention programs depending on the needs of the offender. In several states in the United States, courts, probation departments, prisons, and parole boards are using COMPAS, which has been shown to have moderate predictive validity and reliability.²³

The third instance of successful application of a predictive algorithm in the criminal justice system is the Harm Assessment Risk Tool (HART)²⁴, created by West Midlands Police in the United Kingdom. HART uses 34 variables, including age, gender, ethnicity, offense type, and prior arrests, and predicts a suspect's likelihood of reoffending after being arrested.²⁵ Based on the likelihood that suspects or criminals commit a new crime within two years, the algorithm divides people into

²⁰ K Bechtel et al, 'Predictive Utility and Differential Prediction by Race in Kentucky's Public Safety Assessment' (2020) 46(4) Law and Human Behavior 349.

²¹ Ibid.

²² Brennan T., Dieterich W., Ehret B. (2009) Evaluating the Predictive Validity of the COMPAS Risk and Needs Assessment System. Criminal Justice and Behavior 36(1):21-40.

²³ Ibid.

²⁴ [UK police are using AI to make custodial decisions – but it could be discriminating against the poor | WIRED UK](#) accessed on 7 May 2023.

²⁵ Oswald M., Grace J., Urwin S., Barnes G.C. (2018) Algorithmic Risk Assessment Policing Models: Lessons from the Durham HART Model and 'Experimental' Proportionality. Information & Communications Technology Law 27(2): 223-250.

low, medium, and high-risk groups. Additionally, HART provides information that helps to decide whether to detain or release someone after they've been arrested or whether to refer them to intervention programs or diversion plans. Researchers have assessed HART and found that it has high accuracy and fairness.²⁶

Predictive Policing (PredPol), created by PredPol Inc. in the United States, is a fourth illustration of AI's predictive algorithm in use in the criminal justice system²⁷. PredPol is a tool for place-based predictive policing that locates areas with a high likelihood of crime using historical crime data. PredPol makes daily predictions using a self-learning algorithm that adjusts to shifting crime patterns. Police departments use PredPol to direct the allocation and deployment of patrols based on the suggestions of the predictive algorithm. PredPol is being used by many police departments to this day which is believed to lower crime rates and boost police productivity.

The above-discussed instances are not by no means exhaustive. Many other predictive algorithm models are applicable in criminal justice systems. The instances highlighted ways in which the predictive algorithm can be used to improve the effectiveness and efficiency of a criminal justice system including the Ethiopian criminal justice system. As a result, it's imperative to ensure that the predictive algorithm in the criminal justice system is carefully planned, implemented, and evaluated. Therefore, the Ethiopian criminal justice system which has so many problems can be improved by implementing carefully evaluated predictive algorithm AI models.

3. The Possible Drawbacks of adopting predictive algorithm AI in a criminal justice system

There are challenges involved in the implementation of predictive algorithms, particularly from the side of the government sector which is basically in charge of running the criminal justice system. To adopt and use predictive algorithms fairly and effectively, the government must ensure that it has adequate resources and is ready for such a task. To that effect, spending money on data collection, quality control, training, evaluation, and supervision is necessary to accomplish this. The implementation of predictive algorithms may have ethical and legal implications like ensuring

²⁶ Ibid.

²⁷ [Predictive Policing Explained | Brennan Center for Justice](#) accessed on 16 June 2023.

transparency, accountability, and the implication in protection of human rights. Thus, irrespective of their immense uses, predictive AI models have some drawbacks as well. The reason why the writer deals with the drawbacks of using predictive algorithms is that taking lessons from other experiences requires considering not only the merits but also the drawbacks. The following section is dedicated to discussing about drawbacks of using a predictive algorithm in general with some specific instances.

3.1. Challenges of using predictive algorithm AI in a criminal justice system

Though predictive algorithm supporters claim that it can improve the criminal justice system's effectiveness, accuracy, and fairness, critics bring up several ethical, legal, and social issues that need to be addressed before applying predictive algorithm AI in this area.

The first challenge is that, even though machines are objective in principle, there is still a possibility of bias and discrimination when using AI in the criminal justice system. AI algorithms reflect the data and assumptions used to train and test the patterns; they are not neutral or objective mainly because the data is fed by humans. The algorithms may produce unfair or inaccurate results that disproportionately affect certain groups of people, such as racial minorities, women, or low-income people if the data are twisted or incomplete, or if the assumptions are wrong or unjustified. For instance, COMPAS was found to be biased against black defendants, who were more likely to be classified as high-risk than white defendants with comparable criminal histories, according to a ProPublica study.²⁸ In a different study by Angwin et al. (2016), it was discovered that COMPAS was also unreliable because it only consistently predicted recidivism correctly for white defendants and black defendants 61% of the time and 66% of the time, respectively.

The second challenge is the lack of accountability and transparency. Most of the predictive algorithm models are developed by private organizations which makes it hard to understand how they operate and how they make decisions. If the system does not know how the algorithms work it in turn impacts the accountability of the algorithms. So, it is really hard to determine who is going to be responsible when the decisions made by the algorithms are incorrect or against the rights of the defendant. Who should be held accountable for the defendant's rights violation if an algorithm incorrectly predicts that a defendant is likely to commit a violent crime and denies bail?

²⁸ See supra Note 22

Should the government, the judge, the data provider, or the algorithm developer be in charge? These questions have not been answered yet.

The third possible challenge is its possible effect on human anatomy and dignity. The predictive algorithms reduced defendants into numerical scores or probabilities without taking the personal realities of people into account. In the criminal justice system, the algorithms may also substitute for or influence human discretion and judgment, which could undermine public confidence in the criminal system's legitimacy. For example, Judges may lose their ability to use sympathy, empathy, or mercy in their decisions if they rely too heavily on recommendations for bail or sentencing from machines. Similarly, parole officers risk losing their capacity to establish rapport, offer support, or promote rehabilitation if they use AI to monitor or regulate the behavior of offenders.

The fourth challenge is the unpredictability and uncertainty of AI's results in the criminal justice system. The lives and rights of defendants and offenders may be seriously affected by errors or unexpected results produced by AI algorithms because these systems are not perfect. For instance, a defendant might be granted bail based on an AI algorithm's prediction that they pose little risk, but they might later commit a violent crime while out on bail. Alternately, an AI algorithm may determine that a criminal is high-risk and refuse to grant parole, even though the offender may have changed and no longer pose a danger to society.

A fifth challenge of using AI algorithms in the criminal justice system is the ethical and moral implications of delegating human decisions to machines. The values and principles that support the criminal justice system, such as justice, fairness, equality, dignity, and human rights especially the right to privacy, may not be respected by AI algorithms. For instance, an AI algorithm might put accuracy before accountability or efficiency before equity. Furthermore, complex or ambiguous situations that call for human intuition or judgment might be beyond the capabilities of AI algorithms. For instance, an AI algorithm might not be able to take into account aggravating circumstances or extenuating circumstances that could influence the degree of guilt or risk associated with a defendant or an offender.²⁹

3.2. Instances of unsuccessful implementation of predictive algorithm AI in the US criminal justice system

²⁹ [Crazy/Genius: AI in the Criminal-Justice System - The Atlantic](#) accessed on 15 June 2023.

There are some instances of the criminal justice system using AI's predictive algorithm ineffectively, where the algorithm either fell short of expectations or had unintended and detrimental effects. In this article, the writer will go over three such examples: the HART facial recognition system, the PredPol predictive policing program, and the COMPAS risk assessment tool.

In several US states, courts and correctional institutions use COMPAS to determine the likelihood that defendants and offenders will re-offend and act violently. The tool creates a risk score ranging from 1 (low risk) to 10 (high risk) using a proprietary algorithm that considers several elements, including age, gender, criminal history, and social ties. The decision-making process for bail, sentencing, and parole is then informed by the score. The COMPAS tool has drawn criticism for being unreliable, opaque, and biased. Despite having similar criminal histories, a ProPublica investigation in 2016 found that the tool was more likely to classify black defendants as high risk and white defendants as low risk.³⁰ Furthermore, because the algorithm underlying the tool is private, its validity and dependability cannot be verified.

Another commercial product created by PredPol Inc. is the PredPol predictive policing software, which is used by police departments worldwide, including those in the US, UK, and Australia. By analyzing historical crime data and identifying hotspots where crimes are most likely to occur, the algorithm employs a machine learning algorithm. The algorithm then creates maps that display the crime area locations and times, giving police officers the suggestion to patrol these areas more frequently. By stopping crimes before they happen, the algorithm promises to lower crime rates and maximize police resources. However, the PredPol program has also been criticized for being unreliable, unethical, and biased. According to a 2019 study by the Human Rights Data Analysis Group, the software had a tendency to replicate existing patterns of over-policing in a black neighborhood and those with low incomes, which served to maintain racial and social

³⁰ Angwin J., Larson J., Mattu S., Kirchner L., 2016. Machine bias: There's software used across the country to predict future criminals. And it's biased against blacks. ProPublica. <<https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>> accessed 6 June 2023.

inequalities.³¹ It also raises ethical issues related to privacy, consent, and accountability because it gathers and analyzes personal data without the participants' knowledge or consent, as well as without any supervision or regulation.

The Metropolitan Police Service (MPS) in London, UK, developed the HART facial recognition system that compares photos of faces taken by CCTV cameras or mobile devices with photos kept in police databases and then generates a list of potential matches using a deep neural network algorithm. Though the algorithm is designed to assist police officers in instantly locating suspects, missing people, or persons of interest, it is criticized for being unreliable, and biased. According to a Big Brother Watch report from 2018, the system had a high error rate, meaning that only some of the matches were accurate.³² The algorithm had a disproportionately negative effect on ethnic minorities, who were more likely to be mistakenly apprehended by police officers, according to the report. Besides, it also violates the rights to privacy, anonymity, and the presumption of innocence, which poses serious risks to civil liberties and human rights.

The challenges of implementing predictive algorithms into the criminal justice system are highlighted in the above instances. While Predictive algorithm AI has the potential to improve the criminal justice system's effectiveness, accuracy, and fairness, it also poses challenges that need to be carefully considered and addressed. To ensure that the predictive algorithm is used in the criminal justice system responsibly and ethically, the weights of the advantages and the disadvantages should be carefully analyzed and implemented in a way that minimizes the drawbacks as much as possible. To that end, more research, regulation, oversight, and education are required in this area. When Ethiopia implements any predictive algorithm in the criminal justice system, it is wise for the system to consider the existing drawbacks to find a way to maximize the advantages of using them.

³¹ Lum K., Isaac W., Ball P., Chen Y., 2019. To predict and serve? Predictive policing and the public good. In: Barocas S., Narayanan A., eds. Fairness and machine learning. fairmlbook.org. <<https://fairmlbook.org/pdf/predpol.pdf>> accessed on May 5 2023.

³² Big Brother Watch, Face Off: The Lawless Growth of Facial Recognition in UK Policing (Big Brother Watch 2018) <<https://bigbrotherwatch.org.uk/wp-content/uploads/2018/05/Face-Off-final-digital-1.pdf>> accessed on May 5 2023.

4. Lessons from the US experience

4.1. Common predictive algorithm models in the US criminal justice system

In the previous sections of this article, different predictive algorithm models are discussed mainly from the US. The US system leads in using predictive algorithms in the criminal justice system in several areas, including policing, sentencing, parole, and risk assessment. The writer wants to show some of the common models and shows a way how these models can be successfully implemented in the criminal justice system in Ethiopia. An overview of some of these algorithms' specifics, including their inputs, outputs, techniques, and restrictions, is provided in this section of the research output by categorizing models into policing, pretrial, sentencing, and punishment models.

The first common predictive algorithm model is the policing algorithm. Policing algorithms are made to assist law enforcement organizations with resource allocation, crime prevention, or suspect identification. These algorithms look for patterns, trends, or anomalies that point to criminal activity or risk using data from sources like crime reports, demographic data, social media posts, and surveillance footage. These algorithms can be applied to target interventions, deploy patrols, or create leads. PredPol, HunchLab³³, and ShotSpotter³⁴ are a few examples of policing algorithms.

The other model is the Algorithm for pre-trial risk assessment which is intended to assist judges in determining whether to release or detain a defendant before trial. These algorithm models generate a score indicating the likelihood that the defendant will miss court or commit a new crime if released based on information about the defendant's age, gender, criminal history, and current charges. The judge's decision or a bail amount or level of supervision is then suggested based on the score. The Public Safety Assessment (PSA)³⁵, the Virginia Pretrial Risk Assessment

³³ [HunchLab — a product of Azavea · Predictive Policing \(gitbooks.io\)](#) accessed on 3 September 2023

³⁴ [Using Gunshot Detection Technology in High-Crime Areas \(ojp.gov\)](#) accessed on 3 September 2023

³⁵ [Public Safety Assessment \(PSA\) - Tool - Risk Assessment Tool Database \(tooltrack.org\)](#) accessed on 3 June 2023

Instrument³⁶, and the Ohio Risk Assessment System (ORAS)³⁷ are a few examples of pretrial risk assessment algorithms.

There are also sentencing algorithms available to help judges choose the appropriate punishment for a convicted offender. Based on information regarding the offender's criminal history, the seriousness of the offense, and personal characteristics, these algorithms produce a score that indicates the likelihood of recidivism or the need for rehabilitation. The judge will then use the score to help guide his or her judgment or to suggest a sentence length or format. In 2010, Andrews and Bonta created the Level of Service Inventory-Revised (LSI-R) and the Correctional Offender Management Profiling for Alternative Sanctions (COMPAS)³⁸, and the Minnesota Sentencing Guidelines³⁹ are a few examples of sentencing algorithms.

In addition to the above, algorithms for determining whether to grant or deny parole to incarcerated offenders are known as parole algorithms. These algorithms generate a score that indicates the likelihood that the offender will commit another crime or violate the terms of their parole if released based on information like their criminal history, institutional behavior, and parole plan. The parole board then uses the score to help guide its decision or to suggest a parole release date or level of supervision. The Wisconsin Risk/Needs Assessment (WRNA)⁴⁰, the Parole Release and Revocation Instrument (PRRI)⁴¹, and the Parole Guidelines Score (PGS)⁴² are a few instances of parole algorithms.

³⁶ Stacey Feindt, 'Detained by Data: A Critical Analysis of the Virginia Pretrial Risk Assessment Instrument' (2019) <https://scholar.umw.edu/student_research/283>

³⁷ [Ohio Risk Assessment System \(ORAS\) - Tool - Risk Assessment Tool Database \(tooltrack.org\)](https://www.tooltrack.org/) accessed 6 September 2023.

³⁸ See Supra note 22

³⁹ See Minnesota Sentencing Guidelines Commission, 2019.

⁴⁰ See supra note 21

⁴¹ See Supra Note 19

⁴² E Rhine, J Petersilia and KR Reitz, 'The Future of Parole Release: A Ten-Point Reform Plan' in M Tonry (ed), Crime and Justice: A Review of Research (2016) Minnesota Legal Studies Research Paper No 16-03 <<https://ssrn.com/abstract=2672033>>

A responsible sector in Ethiopia can take the experiences of the implementation of the common AI predictive algorithm models during the development and deployment of predictive algorithms in the criminal justice system.

4.2. Best experiences of the US on using predictive algorithms that can be taken as a lesson to Ethiopia's criminal justice systems

Predictive algorithms use machines that are objective in principle. However, just like the algorithms have immense uses, the implementation of predictive algorithms poses moral, legal, and social issues, such as the possibility of bias, discrimination, opacity, and accountability.⁴³ The drawbacks and the uses of those models depend heavily on how they are developed. AI algorithm models' development involves a process of steps that include using existing data, creating patterns or algorithms, and training machines repeatedly. The data applied to create the algorithm models is fed by human beings which makes the objective machine lose its objectivity in some situations. Therefore, the design, implementation, and evaluation of the predictive algorithm make the predictive algorithm model better at serving the criminal justice system with fewer drawbacks. The writer will discuss those in detail in the following sections.

A. Design

Selecting the data sources, variables, models, and techniques that will be used to produce predictions is a crucial step in the design of predictive algorithms. The validity, reliability, and fairness of the predictions are significantly impacted by the design decisions. Therefore, it is crucial to include relevant parties in the design process, such as practitioners in the criminal justice system, researchers, policymakers, and impacted communities. The local context and culture, as well as the legal and ethical frameworks that control the use of data and algorithms, should also be taken into account.

The Public Safety Assessment (PSA), a tool for assessing pretrial risk that forecasts the likelihood of defendants awaiting trial failing to appear, engaging in new criminal activity, and engaging in new violent criminal activity, represents one of the best examples of how the US has designed predictive algorithms. The Laura and John Arnold Foundation (now Arnold Ventures) created the PSA in coordination with top academics and authorities in the field of criminal justice. The PSA

⁴³ Ibid.

makes use of nine variables, including age, current charge, and prior convictions, that are derived from administrative data that are typically accessible. The PSA does not take into account elements like income, education, or employment that might serve as stand-ins for racial or ethnic identity or socioeconomic status. Judges and other decision-makers can easily interpret and use the transparent, standardized scoring system that the PSA offers.⁴⁴

B. Implementation

Predictive algorithms must be implemented by incorporating them into the current procedures and workflows of the criminal justice system. For the implementation process to be successful, users of predictive algorithms like judges, prosecutors, defense attorneys, and probation officers must receive adequate training, direction, and support. Additionally, it calls for clear and uniform policies and procedures that outline how predictive algorithms should be applied and communicated in various scenarios.

The Risk Assessment Information System (RAIS), a web-based platform that supports the use of various risk assessment tools in Virginia, is one of the best experiences the US has had with the implementation of predictive algorithms⁴⁵. The Virginia Criminal Sentencing Commission (VCSC), in collaboration with the Department of Corrections (DOC), as well as other organizations, created the RAIS. For various purposes and populations, including sentencing, probation supervision, and parole release, the RAIS makes a number of validated risk assessment tools available. Additionally, the RAIS offers user-friendly interfaces, automated scoring and reporting capabilities, mechanisms for quality control, and data analysis tools. The RAIS makes it easier for criminal justice professionals in Virginia to adopt and use risk assessment tools.⁴⁶

C. Evaluation

Predictive algorithms are evaluated by analyzing their effectiveness, consequences, and outcomes over time. The evaluation procedure necessitates gathering and examining pertinent information and feedback from various sources and viewpoints. Additionally, it calls for the use of appropriate metrics and techniques that can assess the precision, equity, and efficiency of predictive

⁴⁴ Stevenson MT, 'Assessing Risk Assessment in Action' (2018) 103 Minnesota Law Review 303

⁴⁵ ¹ RAIS, 'About RAIS' <<https://www.vcsc.virginia.gov/RAIS/about.html>> accessed 17 June 2023.

⁴⁶ Ibid.

algorithms. Additionally, it necessitates ongoing evaluation and optimization of predictive algorithms based on fresh data and understanding.

The ProPublica investigation into COMPAS, a commonly used risk assessment tool for predicting recidivism, represents one of the best experiences of the US in evaluating predictive algorithms. In 2013 and 2014, ProPublica obtained more than 10,000 risk scores COMPAS assigned to defendants in Broward County, Florida. Over two years, ProPublica compared these ratings with the actual results.⁴⁷

If AI predictive algorithms are designed, implemented, and evaluated with care and caution, predictive algorithms can provide the criminal justice system with immense advantages. The US's best predictive algorithm's successful uses can offer the Ethiopian criminal justice system imperative lessons and examples, but they cannot be simply copied or transferred without taking into account the unique needs and circumstances of the Ethiopian context. In addition adopting the right design, implementation, and evaluation process, to respect the human rights and dignity of all those who are possibly impacted by predictive algorithms, it is crucial to engage in a collaborative and participatory process that includes all stakeholders in the criminal justice system.

4.3.Ways of Minimizing the drawbacks of adopting predictive algorithm in the Ethiopian criminal justice system

As already pointed out, the main aim of this research is to suggest the adoption of predictive algorithms and/or when adopted to maximize the advantages of the algorithms and to minimize the drawbacks as much as possible by taking the US experience as a lesson. The context of the criminal justice system in the US is different from Ethiopia's in so many aspects. Therefore, it would be wrong to conclude all the drawbacks in the US are also going to be problems in Ethiopia. The main drawbacks of adopting Predictive algorithms are some algorithms being biased, problems related to accountability and transparency, unpredictability, and some of the algorithms having ethical problems.

One of the drawbacks in the US is the algorithms being biased against black defendants. This challenge may not necessarily be an issue in Ethiopia. There is no such thing as black and white in the Ethiopian context but still, there can be discrimination based on other variables. This

⁴⁷ See Supra note 22.

problem can be resolved through the right design of the algorithm. The bias basically emanates from the data set that is used to train the algorithm and, therefore, designing the algorithm and identifying the data set carefully would help minimize this drawback.

The other risks of adopting predictive algorithms are accountability and transparency. This drawback is reported mainly because, as shown in so many sections of this research, the algorithms are developed by private companies and how the algorithms are working is opaque. In the Ethiopian context, this problem can be resolved by making the government develop or at least closely follow up on the development of the software by private companies and by making it known to the public how it works.

Its effect on the right to privacy, the presumption of innocence, and the rights of suspects and accused persons is another risk associated with the adoption of predictive algorithms. To minimize this effect, due care should be taken in adopting the algorithms so that the systems are consistent with the Ethiopian constitution. More to this, a policy and legal framework about how the algorithms shall be introduced should be adopted in addition to developing a comprehensive data protection law.

The other problem that can be observed in the Ethiopian criminal justice system is the lack of data that is going to be used to develop algorithms. The government can use the existing hard data with a few soft data to start adopting some models. Starting collecting and storing comprehensive data directly related to the criminal justice system now will be used as a data set for the future.

5. Conclusion and Recommendations

AI Predictive algorithms have become common recently in the criminal justice system to assist the efficiency and effectiveness of the system. With the help of these algorithms, the criminal justice system can make data-driven, well-informed decisions in policing, pretrial and trial procedures, and prison administrations. The criminal justice system may be able to handle complex and delicate cases with greater efficiency, accuracy, and fairness by using AI predictive algorithms.

The Ethiopian criminal justice system has problems including the inability to handle various cases with efficiency and effectiveness. AI predictive algorithms may be a useful tool to improve outcomes and the decision-making process to address the problems of the justice system. Although

they have not yet been used in Ethiopia's criminal justice system, predictive algorithms are becoming more and more common in many jurisdictions. Additionally, intending to apply AI to various issues, the country has recently adopted a national AI strategy that aims to harness the benefits of AI for economic growth, social development, and good governance. There is also an active plan going on in the federal Supreme Court to apply AI in the court systems including predictive algorithms. Moreover, the implementation of predictive algorithms in the criminal justice system is unavoidable because of globalization, the fast development of AI, and the need to make the system more efficient and effective. These instances show that the country is planning to implement AI in the criminal justice system which calls for analysis of the best experiences of other countries to take lessons from. The US justice system is one notable example, which has been a pioneer in implementing such algorithms and has gained crucial knowledge and understanding that could be helpful as a lesson for Ethiopia.

Different AI predictive algorithms are implemented in the US criminal justice systems in different states. The most important ones are the Public Safety Assessment (PSA), COMPAS, HART, PredPol, Metropolitan Police Service (MPS), Parole algorithms, and sentencing algorithms. Any criminal justice system could benefit from the use of predictive algorithms because they can help overcome some of the shortcomings of human reasoning and decision-making even though there are some obstacles to their implementation, which demand careful thought and attention. Generally, predictive algorithms may reduce human bias and error and increase the effectiveness and efficiency of the criminal justice system, among other advantages. The risks of bias and discrimination, the absence of accountability and transparency, the effect on human autonomy and dignity, the unpredictability, and the moral and ethical implications of giving human decision-making to machines are a few of the challenges. Thus, it is essential to develop and use predictive algorithms in a way that limits their negative effects and maximizes their positive effects on the Ethiopian criminal justice system.

Predictive algorithms are being used more frequently in the US criminal justice system. These algorithms, which offer data-driven insights and recommendations for decision-making and resource allocation, can help in a variety of systemic areas, including policing, sentencing, probation, and parole. Several states use various AI predictive algorithms with various names and features. Ethiopia can benefit from the US's experience using AI predictive algorithms by adopting

the right design, implementation, and evaluation of such algorithms among the installation of proper infrastructure.

Ethiopia must establish a legal framework that regulates their development and use. Particularly, data collection, processing, sharing, and protection; design, testing, validation, and auditing of algorithms; use, oversight, and review of algorithms; and assessment, monitoring, and evaluation of the impact of algorithms should all be governed by a clear set of rules and regulations. Additionally, Ethiopia must also improve the understanding, use, and management of predictive algorithms among key stakeholders in the criminal justice system including judges, prosecutors, attorneys, police officers, correctional officers, researchers, civil society organizations, and the general public.

Finally, the writer suggests the adoption of only some of the predictive algorithm models that do not involve sentencing and bail decisions. Accordingly, Predictive policing algorithms like PredPol, Risk assessment algorithms like HART, and parole algorithms should be introduced first and based on the careful evaluation of these systems and the availability of infrastructures and data, the other types of predictive algorithms can be introduced through time.