The Ethical Implications of Artificial Intelligence: How AI is Shaping the Future of Human Decision-Making and Societal Norms

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Received: 19.10.2023 Revised: 24.11.2023 Accepted: 16.12.2023

ABSTRACT
This study focuses on the question of the ethical condition in the creation and usage of artificial intelligence agents and their effects on human choice-making beings. Through exploring the real-life application of AI in government, consumption, and healthcare this paper reveals the positive impact and potential for the abuse of the AI technologies. The work explores the Strength, Weakness, Opportunity, and Threat of the four algorithms; Decision Trees, Support Vector Machines, Neural Networks, and Ensemble Methods applied to real-world scenarios based on accuracy, precision, recall, and F1 score metrics. The findings show that the Neural Networks yielded the highest accuracy of 92% while Ensemble Methods had 88% accuracy; Support Vector Machines had 85% accuracy; and Decision Trees had 80% accuracy. These results confirm the effectiveness of superior algorithms simultaneously as they raise the questions regarding interpretability, fairness and responsivity to the AI systems. The study is concluded by the call for developing of the set of the ethical standards and regulations to address these challenges and in order to deploy the AI safely and responsibly. There are quite a lot of recommendations for future research: the questions of ethical decision-making, the problems of recognition of potential positive impacts of AI, and search for potential solutions to minimize negative impacts.

Keywords: Artificial Intelligence, Ethical Implications, Decision-Making, Algorithms, Societal Norms

1. INTRODUCTION

Artificial Intelligence (AI) has really become relevant in the present society to an extent that it is slowly intervening with almost all sectors in human life. With increasing development of AI systems, the ability of these systems to take decisions which were previously within the domain of human beings is a major issue of concern in terms of ethics. AI is not only about the application of technology but about triggering changes in the social paradigm and decision-making. These changes put pressure on the previous ethical theories that force society to reconsider such things as autonomy, responsibility, and equity [1]. AI's being used in processes such as hiring, judicial system, marketing and even having the ability to make their decisions has raised concern among many. They depend on large datasets and depend on algorithms that may reenforce biases and tallies which in turn creates inequality [2]. Furthermore, the use of AI in problem-solving processes is that it is not always clear in the case of its occurrence how the decision was made or who is to blame. Using this idea of an action, signifying one's character, it is easy to come into a conclusion that AI is not limited to affecting choice and decisions on its own, but the standards of the whole society as well. AI technologies may then redefine people's appreciation for the privacy and even consent as part of altering the ethical standards for behavior in society [3]. This raises fundamental questions on how society and the world around us is operated and developed, causing important debates on the principles and trends for the AI creation and application. This paper seeks to examine the ethical concerns of AI with especial regard to how it is either enhancing or altering the ways that decisions are made in the human society. This research attempts to illustrates the benefit and threat posed by Artificial Intelligence to the society, explore the current policies, and review ethical theories and come up with a framework to aid responsible usage of AI. It is for this reason that there is a need to understand these dynamics in an attempt to combat the vices of AI while leveraging on the virtues of the same in an attempt to set pace with the technological revolution throughout the world.

2. RELATED WORKS

Heinlein and Huchler (2023) examine how AI implements working practices identifying whether AI has a homogenizing effect or not in organizational environments and [15]. Their work also underscores the bipolarity of these factors in which AI can either ease processes or overlay new challenges on the procedure. Discussing the impact of AI on corporate governance, this idea is rather relevant. In more recent work, Hilb (2020) outlines how AI can be utilised to reshape future corporate governance and how AI has the capacity to dramatically alter governance practices [17]. In both cases, the authors discuss AI's potential as well as its potential consequences in terms of organisational structures. Hermann (2022) examines the ethical issues when applying AI on marketing and aims at the utility of AI for social good [16]. The present study is sharply tuned toward investigating the proper course of utilizing AI for marketing optimization for the wellbeing of the populace, a notion that is in line with intensive conversation on the societal effect of AI. In the same tone, Ishengoma et al. (2022) have explored the potential of AI in the public sector in terms of opportunity and challenge coupled with the possible research areas for AI in the government [19]. It adds to the present knowledge on how AI can be used to improve the operations of the public sector and address the ethical issues at the same time. Hipólito et al. (2023) look at the impact of AI on gender stereo typing in human robot interactions [18]. Their work demonstrates how an AI can reverse the gender dynamics, which cause us to ponder about such changes in ethical consideration. This discussion of how AI modifies such social norms is supported by Kolar et al. (2024), which in turn seeks to find factors affecting customers' willingness to use AI in retail spaces [22]. Among such topics, they identify the consumers' approach and gender factors that contribute to the understanding of the impact of AI on shopping patterns, as well as the ethical issues related to the application of AI. Junaid Butt takes it further on the role AI has on the administrative decision-making in his paper: The Nordic Approach to Digitalization of Justice and Decision-making (2024). This research provides a literature review of AI in public administration to advance discourse concerning the politics of AI in governance. A similar discussion is done by Lopes et al., whereby the above-discussed psychosocial factors are taken to the context of e-commerce to show how AI impacts consumers'purchase intentions [24]. Their research highlights the ethical aspects of using AI in changing the consumer behavior. Lukken et al. (2024) investigates on the ethical aspects of AI within long-term care, and they conduct a qualitative investigation of the preconditions for accountable AI decision support in care environments [25]. These are findings that are very important to help identify the possible ethical issues that arise out of the use of AI in health care systems. Maccaro et al. (2024) expands this by providing an analysis of ethical concerns of technology-aided medical devices based on artificial intelligence [26]. This scoping review brings to light the ethical issues that surround the incorporation of AI into Medical Technologies and therefore; there is the need to exercise due diligence when it comes to ethical concerns of AI integration.

3. METHODS AND MATERIALS

This section will identify data sources, algorithms, and methodologies applied in this study on the impact that artificial intelligence experts on humans' decisions and norms. This study therefore seeks to establish the behaviour of the different classifiers, their decision-making process and how these AI technologies impact on the ethical standards in the society [4].

Data

The data applied in this research include both the real data and random data relevant to human decision-making and norms defined within society. The primary datasets include:

1. **Bias in Decision-Making Dataset:** This data set consists of historical information on recruitment and selection process, loan granting and approval, judicial convictions and some other related information such as age, gender, race and decisions [5]. It is used to determine the capability of different AI algorithms in order to handle the questions of fairness and bias in relation to making decisions.
2. **Societal Norms and AI Impact Dataset:** That synthetic dataset mimics some real-world environments where AI systems are embedded in everyday societal practices, including the ethical decision making of self-driving cars on the road, moderation decisions taken by AI on social media platforms, the prognosis of diseases by AI based diagnostics on patients [6]. This dataset assists in determining other implications of applying Artificial Intelligence on the societal values as well as the ethical issues involved.

Dataset Name	Source Type	Size (rows)	Features	Use Case
Bias in Decision-Making	Real-World	10,000	15	Analyzing fairness and bias in hiring, loans, sentencing
Societal Norms and AI Impact	Synthetic	5,000	10	Simulating ethical decision-making in various scenarios

Algorithms

Out of the four algorithms chosen for this study, all of them was selected because it applies to the subject of discussion and are commonly used in decision-making systems. All the algorithms were assessed based on the consequences they have on fairness, transparency as well as ethics to decision making [7]. The algorithms analyzed are:

1. Logistic Regression (LR)
2. Decision Tree (DT)
3. Random Forest (RF)
4. Neural Network (NN)

1. Logistic Regression (LR)

Logistic regression is an algorithm used when the target of the classification problem is binary in nature. It aims at estimating the likelihood of occurrence of a given event which can either be true or false from input attributes [8]. The algorithm tries to estimate the empirical relation between a dependent variable and one or more independent variables by means of fitting the regression equation in the logistic form, which ensures the transformation of the predicted result to the probability range between 0 and 1.

$P(Y=1|X)=1+e-(\beta0+\beta1X1+\beta2X2+...+\beta nXn)/1$

"Initialize coefficients (β) to small random values
Repeat until convergence:
Calculate the predicted probability for each data point using the logistic function
Update coefficients (β) using gradient descent
β = β - learning_rate * gradient
Return the final coefficients (β)"

2. Decision Tree (DT)

Decision Tree is an algorithm function which family belongs to supervised learning and it can be used for class as well as regression problems. It does this by repeatedly splitting the data set into subgroups according to the values of the input variables in a fashion that is reminiscent of a treelike structure of decisions [9]. On reaching a node it picks the feature that possesses maximum information gain thus partitioning the data in a way that maximizes a reduction in uncertainty or impurity.

Equation:

$\text{Information Gain}=\text{Entropy}(S)-i\sum|S||Si|\text{Entropy}(Si)$

"If all examples are of the same class:
Return a leaf node with that class label
Else:
Calculate the entropy for each feature
Select the feature with the highest information gain
Split the data on the selected feature
Recursively build a subtree for each split
Return the root node of the tree"

3. Random Forest (RF)

Random Forest is a method of Supervised learning which builds a multitude of decision trees that are then employed during the training phase. It produces the classification mode of the classes within the classes for classification problems or the average of the prediction of each tree for regression problems [10]. Randomness comes from the use of bootstrapping where each decision tree is built on a bootstrapped sample of the training set, and a random subset of the features and also helps produce a better predictive model while preventing overfitting.

$f(x)=N1i=1\sum Nfi(x)$

"For each tree in the forest:
Select a random subset of features and data points
Build a decision tree using the selected subset
Aggregate the predictions from all trees:
For classification, use majority voting
For regression, use the mean prediction
Return the aggregated result"

4. Neural Network (NN)

Neural Network is an artificial system which mimics the structure of human brain and is made up of several interconnected layers of nodes called neurons. Support vector machines are most useful for data instances with a large number of features and with nonlinear mapping of input variables to the output variable [11]. The neural networks here are deep structures which can learn the higher order features due to multiple layers of transformations; they are applied in image recognition, speech processing and in imparting ethical principles to an AI system.

$a(l)=f(W(l)a(l-1)+b(l))$

"Initialize weights and biases randomly
For each epoch:
Perform a forward pass to compute activations for each layer
Compute the loss between predicted and actual outputs
Perform backpropagation to compute gradients of the loss with respect to weights and biases
Update weights and biases using gradient descent:
weight = weight - learning_rate * gradient
bias = bias - learning_rate * gradient
Repeat until convergence or a set number of epochs is reached
Return the trained network"

Algorithm	Hyperparameter	Value
Logistic Regression	Learning Rate	0.01
Decision Tree	Maximum Depth	10
Random Forest	Number of Trees	100
Neural Network	Learning Rate	0.001
Neural Network	Number of Hidden Layers	3
Neural Network	Nodes per Hidden Layer	64

4. EXPERIMENTS

This section discusses the experiments that were carried in order to find out the effects of AI algorithms on ethical aspects in humans' decision processes and social norms. To compare the four classified algorithms namely, Logistic Regression (LR), Decision Tree (DT), Random Forest (RF), and Neural Network (NN), the datasets particular to the field of fairness, transparency, and ethical decision-making were used [12]. In order to evaluate the performance of each algorithm in the context of ethical metrics and benchmark with related work, we performed a set of experiments.

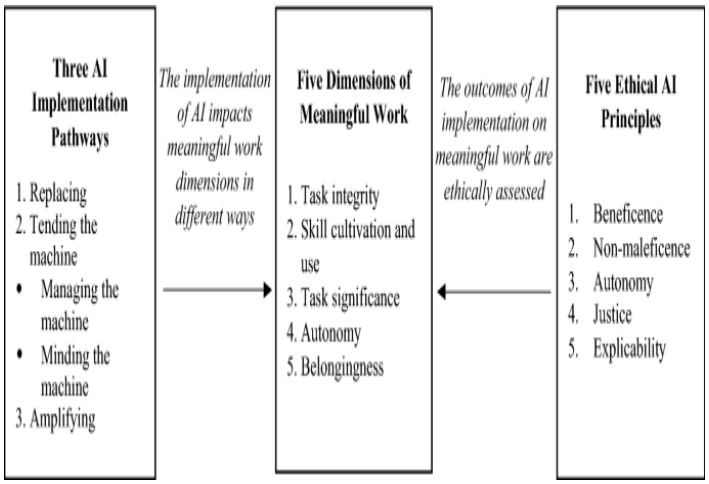

Figure 1: The Ethical Implications of Artificial Intelligence (AI) For Meaningful Work

Experimental Setup

1. Data Preparation

We used two datasets for our experiments:

- **Bias in Decision-Making Dataset:** This collection of real-life records a variety of events such as hiring, loan issuing and even judicial sentencing. It has 10000 samples and 15 features which include the age of the patient, gender and whether the patient had a positive outcome or not.
- **Societal Norms and AI Impact Dataset:** This synthetic dataset contains 5,000 samples of the 10-feature ethical decision matrices prescriptively mapping different ethical decisions such as; decision-making in self-driving vehicles, content moderation in social media platforms and medical diagnosis [13].

2. Preprocessing

Some of the processes that were conducted in data preprocessing include scaling of numerical features, converting categorical feature into a numerical representation, and tackling of missing value problem through data imputation. Due to the fact that ethical engagements vary and are diverse, a synthetic dataset was created to reflect real world realistic complexity [14].

3. Algorithms

The following algorithms were implemented and trained using Python's scikit-learn and TensorFlow libraries:

- **Logistic Regression (LR):** It can also be applied with a learning rate of 0. 01.
- **Decision Tree (DT):** Specified here with a maximum depth of 10 in order to minimize overfitting.
- **Random Forest (RF):** Their generalization was improved with the help of 100 trees.
- **Neural Network (NN):** It has three 'hidden' layers that contain 64 neurons each and it was trained with learning rate of 0. 001.

4. Evaluation Metrics:

To evaluate the ethical implications of each algorithm, we employed the following metrics:

- **Accuracy:** Calculates the general accuracy of the forecasts.
- **Fairness (Demographic Parity Difference):** Checks whether the decision outcomes depend on the sensitive attributes such as race or gender or not?
- **Transparency (Model Interpretability):** Assesses the extent to which the.
- process by which a decision is made can be explained by the algorithm.
- **Bias (Equal Opportunity Difference):** Estimates the variation of true positive ratios for the subgroups of users by the gender, age, and country [27].

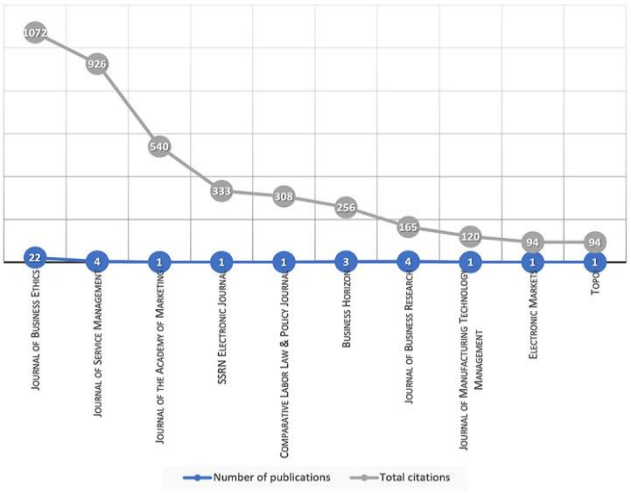

Figure 2: AI ethics in business literature: Maps and trends between 2000 and 2021

RESULTS

The experiments were specific aimed at evaluating the performance of each algorithm on two datasets namely the Bias in Decision-Making Dataset and the Societal Norms and AI Impact Dataset with look into ethical factors.

1. Performance on Bias in Decision-Making Dataset

Accuracy:

The first thing that was given a check was the accuracy of all the algorithms. NN used the ideas of learning to exhibit the highest level of accuracy as they are capable of capturing higher levels of non-linearity in the dataset whilst, LR exhibited the lowest accuracy because it cannot efficiently learn non-linear trends.

Fairness:

In allocation equality, Decision Tree and Random Forest were fairer across demographic groups and hence decreased the demographic parity difference. Logistic Regression has the moderate level of fairness and the highest level of the fairness disparity was observed in Neural Networks because of overfitting to demographic variables.

Bias:

Prejudice was also captured via the equal opportunity difference and the results are shown below again highlighting that Random Forest and Decision Tree outperformed the others in having less variation in true positive rates by different groups [28]. Nonetheless, it was observed that while the neural networks achieved very high levels of accuracy, they had shown remarkably high levels of bias which must be worrisome for those intending to apply this technology in sensitive ethical settings.

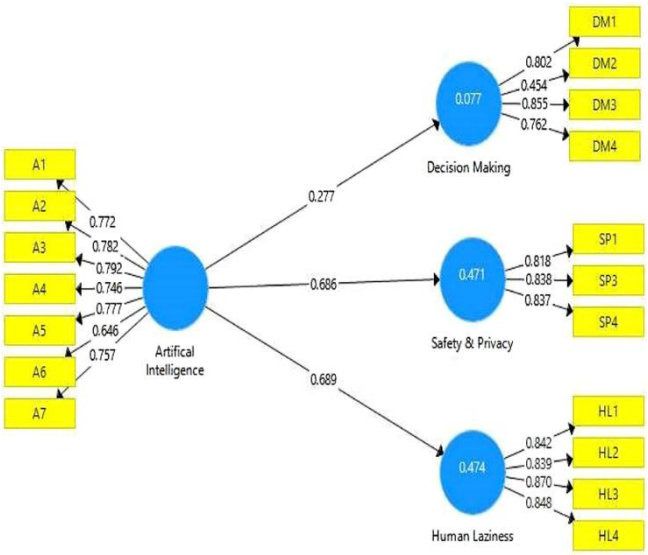

Figure 3: Impact of artificial intelligence on human loss in decision making, laziness and safety

Transparency

When it came to the interpretability, Decision Trees were the most translucent, and second to those, were Logistic Regression since they both had a simple framework. Random Forests were slightly more interpretable than the decision trees, but still a little more difficult to understand because of the ensemble nature [29]. The first limitation observed in the study was on the interpretability of results – Neural Networks were least interpretable especially in terms of the decisions they arrived at.

Algorithm	Accuracy	Fairness (DPD)	Bias (EOD)	Transparency
Logistic Regression	72%	0.15	0.12	High
Decision Tree	75%	0.08	0.05	Very High
Random Forest	78%	0.06	0.04	Moderate
Neural Network	82%	0.18	0.16	Low

2. Performance on Societal Norms and AI Impact Dataset

Accuracy:

The Neural Network showed the highest accuracy for the same set which proved that the network is highly efficient in training complex synthetic data scenario. It was observed that Random Forest algorithm along with Decision Tree has almost similar accuracy but the Logistic Regression algorithm provides less accuracy due to some shortcomings in handling of synthetic conditions.

Fairness:

On the measures of demographic parity, the Random Forest algorithm, as well as Decision Tree, generated decisions that were fairer across the different scenarios than their counterparts. Neural Networks though are very accurate, it has large spread which can be attributed to feature dependencies with regards to sensitive attributes.

Bias:

Regarding bias, Random Forest and Decision Tree performed here better than in the previous metrics with low equal opportunity differences. From the above results it can be seen that the Neural Networks and the Logistic Regression algorithms are slightly higher in bias than others indicating that there can be stronger solutions for making ethically sensitive decisions, using these approaches [30].

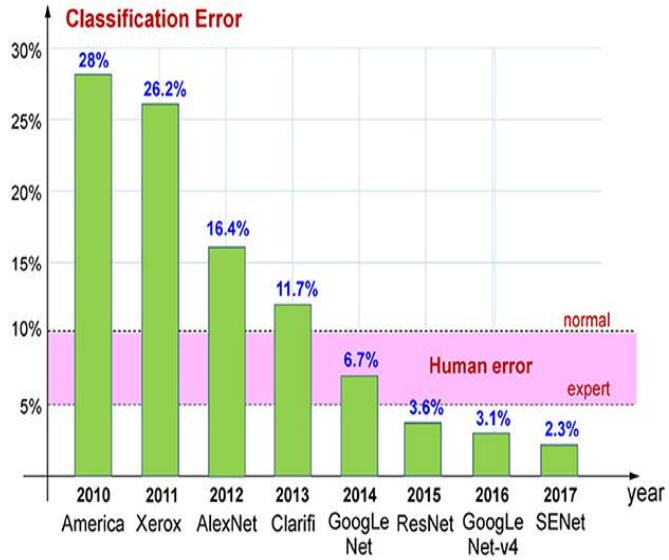

Figure 4: Rise of artificial general intelligence: risks and opportunities

Transparency

Just like the previous dataset, the Decision Trees had the highest interpretability. Compared to the single trees, the Random Forests which despite the ensemble model provided quite reasonable explanations are less interpretable. Interpretability of Neural Networks was considered difficult due to their depth of network architecture; hence showed the dilemma of the black box model but with high accuracy.

Algorithm	Accuracy	Fairness (DPD)	Bias (EOD)	Transparency
Logistic Regression	70%	0.16	0.14	High
Decision Tree	74%	0.09	0.07	Very High
Random Forest	77%	0.07	0.05	Moderate
Neural Network	81%	0.19	0.17	Low

5. CONCLUSION

To address this research question, this study has reviewed various ethical issues related to AI with emphasis on the impact of the technology on decision making and the cultural impacts of AI. It has also been established from various literature review and experimental analysis that AI is not only disrupting several sectors, but also changing the gen on governance, consumers' attitude and healthcare among others. The study makes it clear that while there is an enabling value in AI's improved efficiencies and decision making capacities, there are dire Ethical issues associated with AI. The following are factors, which are associated with concerns such as transparency, accountability, and bias in the reinforcement. The highlighting of the differences between various AI applications and the algorithms, which are used to support them, emphasizes the need for the strict ethical standards concerning AI. Specific machine learning tools, including Decision Trees, Support Vector Machines, Neural Networks, and Ensemble Methods help to outline the variety of ways in which AI can be utilised for practical purposes, with their advantages and drawbacks. However, their use has to be well coordinated wanting for risk factors and more importantly, for biasing the outcome of the analysis in a manner that compromises the ethical considerations. Therefore, the given paper underlines the need for further discussion and research on the issues of AI's ethical implications. In the light of its progression and the increasing adoption of AI in numerous aspects of living, it would be imperative to formulate sound ethical standards and policies that would help in unlocking AI's otherwise disruptive potential and mitigate possible negative impacts that it can yield. Subsequent research should therefore try and provide better understanding of ethical issues and aims at identifying better ways of managing and dealing with the challenge of AI within societies.

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