

Artificial Intelligence Powered Facial Recognition in the Public Eye

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Abstract:

Artificial Intelligence's use in facial recognition has led to improvements in efficiency for many different groups, including law enforcement, however its use in society has been met with controversy due to the general public's distrust in different entities using the technology. Our research focus seeks to understand why the public may distrust facial recognition AI or find its usage unethical, as well as determining the different cases in which the general public would trust the technology. We aim to study this through a non-experimental research design that distributes surveys to the public measuring their levels of trust in facial recognition AI. Understanding our research focus through this non-experimental design will allow AI users to better understand the cases in which they can use AI ethically without upsetting the general public or violating any essential rights.

Introduction:

With the rapid development of artificial intelligence (AI) technology and its powerful potential to recognize faces through image scanning, there also arises conflict with the portion of the general public who oppose or fear its implementation into society (Smith, 2019). Due to it being a potential tool for entities like law enforcement, technology companies, and advertisers (Smith, 2019), the AI is sought out by these organizations for their operations as it would increase their productivity and efficiency. However, there have been numerous surveys conducted with one such study indicating that only around 56% of Americans trust law enforcement to use AI-powered facial

recognition responsibly, while only about 36% and 18% trust technology companies and advertisers respectively (Smith, 2019).

% of U.S. adults who say they trust the following groups _____ to use facial recognition technology responsibly

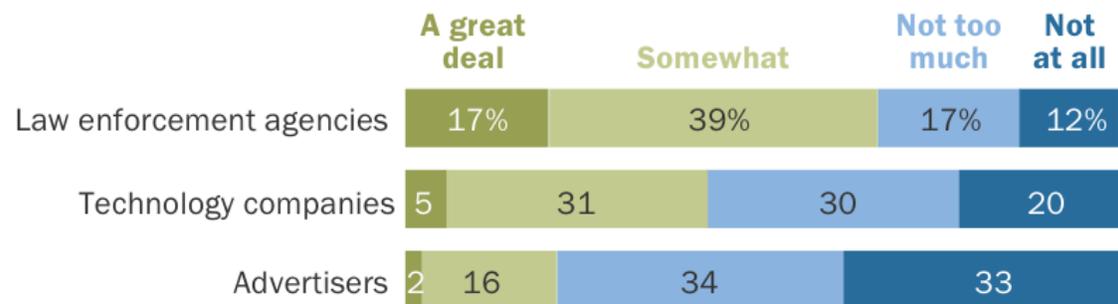


Figure 1: Survey results indicating the general public's trust of different organizations to use facial recognition AI responsibly. (Smith, 2019)

Moving forward, we aim to fill the gap in literature regarding the cases in which facial recognition AI is deemed ethical and responsible to use by the general public. Currently, this lack of knowledge makes it such that creators and utilizers of AI-powered technologies are not fully aware of the cases in which the general public would distrust their use of AI. There are a few studies out there that have analyzed specific case scenarios such as using it to prevent bookstore theft (West, 2018) and for police to assess security threats (Smith, 2019), however, this information alone is not extensive enough to fill these gaps in knowledge. By filling these gaps, we can help inform the next steps of developers and users of facial recognition AI technology. This would allow for better construction of their AI to meet certain guidelines and establish boundaries for

where it can be used, hopefully making the public feel more comfortable regarding its use and implementation. Additionally, it can help future researchers answer questions regarding how people learn to trust new technologies, whether that be over time or with experience. For these future researchers, knowing why people distrust AI would be an important step of understanding that must come prior to finding solutions regarding how to improve public trust. Due to the potential findings that our research will uncover for law enforcement, technology companies, AI developers, future researchers, and the like, we actively seek to answer our research question: In what cases would the general public deem it ethical to use facial recognition AI software?

Due to these low trust levels amongst the public, our research aims to better understand why the general public distrusts AI-powered facial recognition particularly in the hands of certain entities like law enforcement. Additionally, our research aims to understand reasons behind why those who support the technology choose to do so. We aim to better understand this topic as it is important to know the potential repercussions of the implementation of facial recognition AI in everyday society. Additionally, by understanding the reasoning behind why certain groups distrust facial recognition AI in the hands of law enforcement, technology companies, and other groups, improvements can be made to the practices of these groups such that the general public will be willing to accept its implementation. The technology has the potential to improve efficiency and productivity especially in law enforcement (Hazenburg, 2019) and researching this topic could be crucial for finding ways that the technology could be implemented and used to its full capability while still being approved of by the general public.

Relevant Literature:

There were a number of things that we had to understand prior to designing an experiment to test our research question regarding facial recognition AI technology. These things included knowing the technology's current trust rates, understanding some of the general public's expressed concerns about the technology, and the current ethical guidelines that inform its current use in society.

Trust Rates of Facial Recognition AI:

In Kohl's (2020) article, he discussed a survey he had conducted concerning public perception of scenarios where facial recognition would be acceptable. Some of the situations proposed included implementation by airlines, TSA, banks, school security, and law enforcement (Kohl, 2020). After analyzing the results, Kohl (2020) found that a majority (66 percent) of the people were actually in favor of using facial recognition AI, believing that law enforcement's use of it is appropriate. However, another article by Smith (2019) of the Pew Research Center found differing results. Smith (2019) found that only around 56 percent trusted law enforcement agencies to use these technologies responsibly. Although both surveys produced results indicating that the majority of people approve of facial recognition AI use, these two similar surveys yielded results differing by almost 10%. As a result, the true rate of approval cannot be accurately predicted by just these two surveys alone.

Another survey the group reviewed explored how different regions of the world viewed facial recognition technology. Neudert, Knuutila, and Howard (2020) from Oxford University published an article that showed that people in the western part of the world are more likely to be against the software. This is interesting to note because having

such regional differences could inhibit the future growth of the technology and keep it from making the strides necessary to make it viable for global society.

Along with who it's used by, trust in AI also depends on the application in which it is used. Polonski (2018) published an article describing the time that IBM tried to implement a supercomputer to help cancer doctors with diagnoses and proposed treatments. The program ended up backfiring since doctors were often hesitant to take the advice of the computers due to distrust of the machines (Polonski, 2018). Cases like the one shown in this article showed how people's distrust in the machinery in certain contexts will prevent it from developing to a level where it is beneficial to society. Trust levels have also been affected due to recent instances where artificial intelligence has gathered data on individuals without proper consent. Hung et al. (2017) discussed in his article how Smart TV's are harvesting data from kids without them knowing they're being scanned, nor what the data is being used for. This caused a huge privacy issue and exposed an area of AI that has been neglected, leading to an increased mistrust of AI and its uses in cases like Smart TVs. Due to occurrences like these, trust in AI has become very dependent on what it is being used for, especially if that use is unknown to the people being analyzed.

Current Concerns Regarding Uses of Facial Recognition AI Technology:

Facial recognition, as defined by Klosowsky (2020), is defined as "software that maps, analyzes, and then confirms the identity of a face in a photograph or video by matching the face against a database of other faces." With its rise in use within society, it has begun to impact the public in a significant manner which has led to severe consequences. One notable example is the incorporation of facial recognition AI into

body-worn cameras (BWC) on police officers. The goal of BWCs is to record the situations officers are involved in and allow departments to analyze the images to understand the entire situation (Hood, 2020). While this seems like a great idea, it has received a lot of backlash

since the technology is currently not reliable enough to be included with BWCs.

This can be seen by the numerous cases of the AI in BWC's misidentifying

innocent people in public,

with some cities even

banning the use altogether

due to privacy concerns in

addition to false

identifications (Hood, 2020).

Not only have cities started

to ban this technology in

BWCs, but also some big

tech companies who create

their own AI systems have

begun restricting who has access to their

technology. These companies, such as

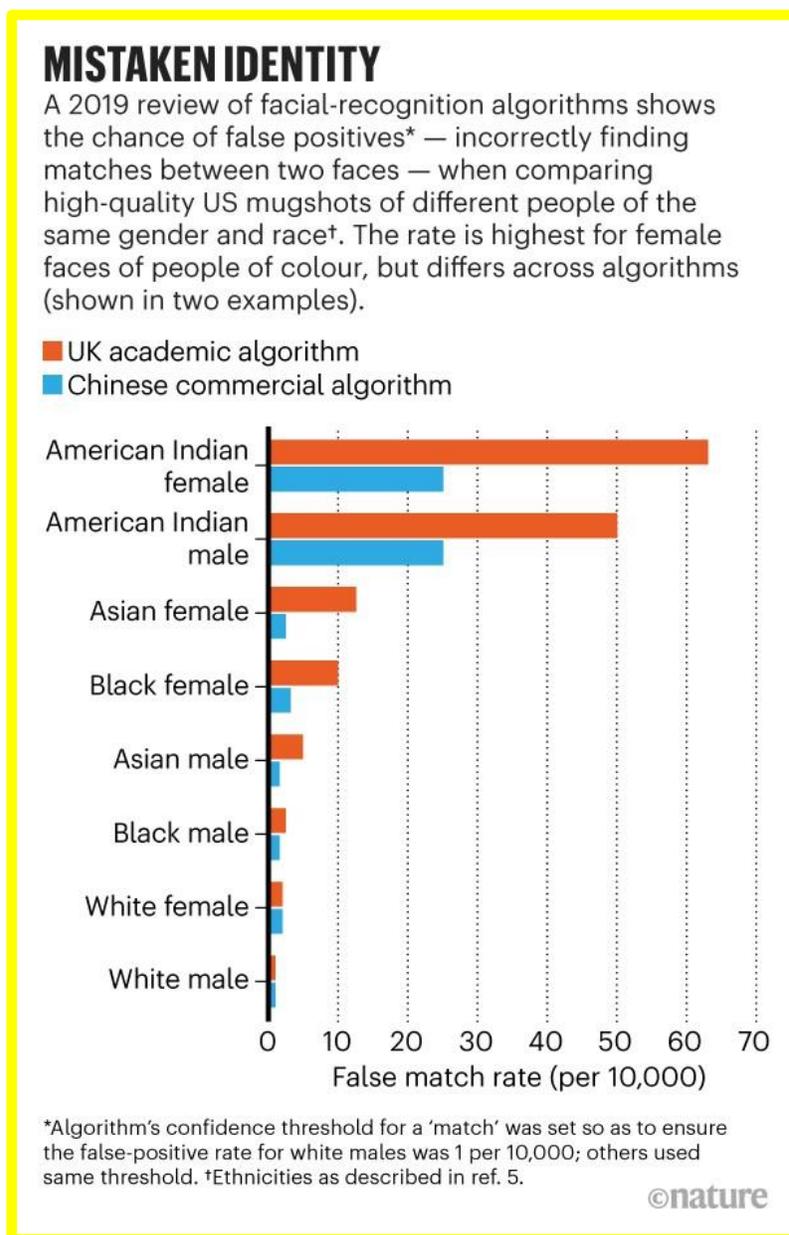


Figure 2: Mistaken Identity: Rates of AI misidentification amongst different races (Grother, 2019)

Microsoft and Amazon, have temporarily stopped selling their AI technology to police departments until there are more laws regulating it (Greene, 2020). There are several factors which led to this decision, the main one being that the facial recognition software packages performed much worse at identifying women and people of color (Castelvecchi, 2020). Its inaccuracies and bias based on gender and race impacted multiple demographic groups and it's reasonable to recognize that people want to prevent it from being misused before being released to the public. Even with these inaccuracies, some companies such as NEC and Clearview AI plan to continue providing these AI services to the police (Skelton, 2021). The major issue is that these companies, which are still distributing their technology, claim that their AI systems can accurately match people's faces up to 75 percent of the time (Hill 2020). It is unclear, however, how often the technology delivers false matches since it has not been thoroughly tested by an independent party such as the Nation Institute of Standards and Technology, a federal agency that rates AI algorithm performance (Hill 2020).

It is also important to understand how facial-recognition algorithms are trained in order to function properly (Castelvecchi, 2020). This kind of technology is trained and tested by analyzing large data sets of images which are captured multiple times under different lighting conditions and angles in order to be fully trained (Noorden, 2020). However, there have been concerns with this as well, most notably the fact that the majority of facial images today are collected without asking permission or consent. This has resulted in numerous completed project's data sets being taken down online which is another aspect that needs to be considered when using AI (Noorden, 2020).

Ethical Guidelines Informing AI Use:

In some cases, law enforcement agencies are permitted to collect facial images without the consent from those analyzed due to some non-disclosure agreements they have regarding the data that they collect (Joh 2018). When details like this are made known to the general public, it has the potential to cause people to further distrust law enforcement's use of facial recognition AI. To try and reduce this distrust in AI from the general public, many different guidelines regarding ethical and proper AI use have been published. These guidelines include documents by the intelligence community ("The Intelligence", 2020), INTERPOL (Hazenburg, 2019), and the U.S. federal government (Finklea, 2020). The Intelligence Community's ("The Intelligence", 2020) ethical guidelines recommend testing all AI data through risk evaluation and bias checking prior to implementing it so its use remains ethical. The guidelines from INTERPOL (Hazenburg, 2019) specifically target practices in policing, saying that although the technology is very useful in matching criminal suspect facial profiles, the police must still be wary to balance their desire to create a secure community with the need to protect individuals' privacy. Lastly, there are numerous laws listed in the U.S. Law Enforcement Federal Guidelines for Facial Recognition Technology (Finklea, 2020) that detail what is permissible in regards to using AI in policing. Though these guidelines have acted as a good basis for promoting ethical and responsible usage of AI, the inconsistency of their implementation, such as in the previous Smart TV example (Hung et al, 2017) and the lack of legislation mandating they be followed ("The Intelligence", 2020) keeps them from optimally improving trust in AI by the public.

Research Goals:

Moving forward, we seek to improve our understanding of why nearly 50% (Smith, 2019) of the general public still does not trust facial recognition AI use despite the fact that ethical guidelines (“The Intelligence”, 2020), policing privacy and security guidelines (Hazenburg, 2019), and Federal Government sponsored facial recognition AI guidelines(Finklea, 2020) are being followed. Given the trend set in the medical industry, creating rules and boundaries should increase the trust in AI powered technology yet that trend has not appeared within the field of facial recognition (Luxton, 2015). Additionally, we do not know why certain groups of people distrust facial recognition technology more than others, nor why this distrust comes to be in the first place. We surmise that these things may have come about due to the errors in the technology that seem to show bias against certain demographics (Najibi, 2020) and due to cases of AI misidentifying individuals in the past, however, we cannot know for certain until further research is conducted. Through our research, we hope to help fill the gaps in literature that lead to unanswered questions such as our research question: In what cases would the general public deem it ethical to use facial recognition AI software? We seek to answer this question so that we can better understand the cases in which the general public would distrust AI, the reasoning behind why this distrust exists, and why some demographics may distrust AI more than others.

In order to answer our question, the next step is to develop different ways to investigate the research question. The two options available are to follow either an experimental or non-experimental approach. Both of these methods have their pros and cons that will help dictate which design best fits the needs of the proposed research

question. After evaluating the basic strategies of both, we can then manipulate their characteristics to ensure it specifically addresses our research question and produces results that we can use to draw conclusions.

Possible Research Designs:

The two methods that serve as potential options to help explore the research question are experimental and non-experimental designs. For the experimental design, there needs to be manipulation, control, random assignment, and random selection. Without these four characteristics, it is not possible to have a true experimental design. For the non-experimental design, the research would lack the specific use of an independent variable or control group. It would simply consist of using the people participating in the study to gather data without specifically manipulating some form of the study.

Experimental Design Overview:

To properly create an experiment that measures public opinion of facial recognition software, our research question would have to be tweaked slightly. Our research question for the experimental design question would have to be as follows: “Does awareness of being scanned by facial recognition AI and the potential consequences of that affect the general public’s trust and opinions on the use of the technology?” A possible experimental design that could measure this tweaked research question would be a survey experiment which would start by first finding a full contact directory of every person living in a certain region and randomly sampling a group of people within that region. Preferably, this region would be somewhere relatively large, such as the state of Virginia. This would increase the diversity of the opinions we are

able to evaluate and would hopefully be more representative of the entire nation. If we were to focus on the state of Virginia in particular, we could randomly sample all adults from a Virginia resident directory to take a survey. Reaching out to the entire adult population would hopefully generate enough responses to gather valuable data.

Experiment Specifics:

The survey would be a detailed form that measures the person's stance on the use of AI for facial recognition. Questions on the form could include ones like how much they would trust the AI on a scale of 1-10, questions with ranging levels of agreement to how ethical the survey taker thinks facial recognition AI is, and reactionary questions to multiple different scenarios of AI usage. Those scenarios could take the form of trust calibration scenarios where the survey taker would have to choose whether a human or AI would be better suited to perform a given task (Kazuo and Seiji, 2020). Additionally, by including similarly formatted questions in our form that have been asked in previous national surveys by Smith (2019) and Kohl (2020), we can ensure that we have some questions that have been proven to work in addition to having more targeted questions of our own. One third of these survey takers would then be randomly assigned to the first treatment group, one third to the second treatment group, and the remaining third to the control group, and then be left to go about their business for a period of time. The next day, each survey taker would be told that they were scanned with the facial recognition software without their knowledge after the survey. Those in the control group would not be told anything else, while the first treatment group would be told that the facial recognition software marked them as having a non-criminal status and those in the second treatment group would be told that they were marked as an AI identified

potential suspect for a criminal case. All subjects would then be asked to take the survey again after being told they were scanned, and being told their criminal status in the case that the subject was in one of the treatment groups. In this experiment, being identified as a suspect or not would be the independent variable, whereas the dependent variable would be the change in the survey taker's responses after being told their status. The difference in survey responses before and after the treatment was applied, as well as across the control and treatment groups would be compared, and disparities in responses would be noted. These differences in responses across the groups and between pre and post treatment can be analyzed to see if being scanned by facial recognition software and being identified as a potential criminal or not affects a person's opinion either positively or negatively on the use of facial recognition AI depending on how the person was identified.

Issues with the Experimental Design:

There are many limitations present in researching our topic in this manner due to the ethics of running an experiment like this. Even if this experiment could be done in theory, falsely identifying people as criminals without them knowing they are participating in an experiment beyond the survey would be incredibly unethical. Regardless of whether the status is true or not, it would cause the subject emotional distress and potential harm, which should be avoided in any study. Without regard to any ethical considerations, however, this experiment could effectively answer the tweaked research question we proposed.

Non-Experimental Design Overview:

Due to the issues with our experimental design we would like to propose an approach for a non-experimental study, specifically a case study with a cross-sectional survey. This involves attempting to gain a deeper understanding of one particular case (Creswell and Poth 2018), specifically hoping to answer our research question. For this design, the process would include simply asking as many people as possible to express their thoughts on their opinions about AI and specifically its use in facial recognition. The best way we can think to accomplish this is to create a survey but without a treatment and control group, which lends itself very well to a non-experimental design. Similarly, to our experimental design, we would use publicly available contact information to reach out to as many people as possible and ask them to complete our survey. For the sake of this example we will again stick to the state of Virginia, which is ideal because of the diversity of its population both in demographics and political views. This region will hopefully randomize the subjects that will choose to participate in the survey and give us the best sense of general public opinion.

Non-Experimental Design Specifics:

The research question we would hope to answer with this study design is what the public's opinion about the use of AI in facial recognition and perhaps which tasks they would approve of it being implemented in. The study participants would answer a wide variety of questions about various aspects of AI in relation to its use for facial recognition. Some of these questions would be open-ended and others would ask respondents to rate how much they agree with statements on a scale of one to seven (where a one is strongly disagree and a seven is strongly agree). We would then combine the responses and attempt to create some common parameters and

boundaries that came up during the survey, as well as perhaps identify the tasks for which people deemed AI-powered facial recognition to be acceptable. This approach would address our research question by gathering information about the perception of AI among the general public at a specific moment in time.

Limitations of the Non-Experimental Approach:

While this study design avoids the ethical concerns that plague the experimental design, we run the risk of not collecting enough data to fully understand the general public's opinion. While it will provide the opportunity for people to help us answer our research question, there is no way to guarantee that the survey results will be conclusive enough to provide a clear answer. In particular we wanted to examine whether demographics could play a role in developing trust with AI and a lack of participation from target demographics could make it difficult to find a definitive answer to that question. However, these are only minor issues and most likely will not be a major issue. The diversity present in the Virginia population combined with how we will create our survey should guarantee that we collect a wide variety of quality responses.

Best Approach:

The design that best pertains to our research question is the non-experimental design. Since the research question involves the opinionated responses of numerous individuals, the design of the experiment would not lend itself to answering that question. The experiment is incredibly limited in terms of the types of data we would be able to collect and fails to answer our research question with as much detail as the non-experimental approach. The non-experimental study would show how individuals

respond to the uses of AI-powered facial recognition technologies as well as general opinions that people may share about its implementation. The nature of our research question makes it incredibly difficult to evaluate those situations in real time. For example, it would be highly unethical to use our experimental design of telling people that they have been scanned with AI and then misinforming them about the results in order to see if their opinions on AI would change as a result. Surveys would be the most efficient method to obtain information and help answer our research question. It would also remove all of the ethical quandaries related to our experimental design. As a result, we are left with a non-experimental approach, specifically the cross-sectional case study survey design.

Next Steps:

Moving forward, numerous things would need to be done prior to carrying out our non-experimental study. Because our research design is centered around using surveys to get a gauge on the public's opinion on facial recognition AI, we must seek out the best ways to format our surveys and the best questions to ask to measure those opinions. Improving our knowledge on survey design could come from doing a number of things, including taking a class on survey design, doing additional research regarding proper survey design, and seeking help from experienced researchers and peers. Additionally, we could look through some of the surveys we reviewed previously to see how they formatted and asked their questions such that we can gain some inspiration and guidance as to how we should create our survey. Using that survey knowledge, we would then be able to create survey questions that will help to answer our target questions, which are the general public's overall trust in AI, their reasons behind why

they do or do not trust them, and for what cases the general public would trust facial recognition AI use. Once these surveys have been written out, we would need to create a scoring system such that the data can be qualified (i.e. making it such that a high score indicates the survey taker trusts the technology, while low scores indicates distrust). Then, the results of these surveys can be analyzed and run through a code that outputs analyzable, quantified data that could be used to better understand the general public's trust in facial recognition AI. These surveys, once created and made quantifiable, must then be taken and distributed to the public to take. We must then find a source or method in which we can reach out to a large sample size of the general public in Virginia in an unbiased way, such sending them to people's mailing addresses or emails, having them opt in to take an online survey, or another method not yet determined by the team. Once a method is determined, surveys can be distributed, taken by the survey takers, and results collected by our research team to be analyzed. Using this data, we will be better able to understand why the Virginia area's general public trust levels of AI are so low, and for what cases they would determine AI to be more or less trustworthy.

Conclusion:

AI is rapidly becoming essential for advancement of many different types of technology. Facial recognition technologies are just one such advancement, but have been met with much more controversy than most other implementations, such as its use in body-worn cameras (Hood, 2020). This is most likely due to the security and privacy concerns brought about, with ideas of constant surveillance (Hung et al, 2017) and a violation of human rights circulating throughout the media and the minds of the public.

This is not to mention the concerns people have with the current state of the technology and its ability to accurately identify subjects, particularly minorities (Castelvecchi, 2020). With this being the case, it is crucially important to understand what people actually think about facial recognition, and we hope to identify the implementations for which the general public would find AI acceptable to use. By determining the cases in which the general public deem it ethical to use facial recognition AI software, AI powered facial recognition technology will be able to take the next leap in its development and advance further later on.

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