The Role of Artificial Intelligence in Decision Making: College Admissions

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Ghislain Ventre

Spring, 2024

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor

Bryn E. Seabrook, Department of Engineering and Society

STS Research Paper

Introduction

The pivotal decision to admit a prospective student into their dream university rests in the hands of a select few. Recent shifts in affirmative action policies (Totenberg, 2023, June 29) have brought to light questions about the criteria and biases influencing the life-altering decision made by admissions officers and admissions committees. Is it primarily determined by quantifiable metrics such as SAT scores or grade point averages (GPAs), or does the weight of an application lie more on a compelling essay, offering insight into the multifaceted lives of the thousands of applicants, or is it a more holistic approach combining the two elements? Despite efforts to mitigate bias, the admissions process remains susceptible to subjective influence and as a result an inequitable reviewal process across different applicants. The following research and discussion aims to scrutinize the college admissions decisions process for undergraduate admissions utilizing the sociotechnical framework developed by french sociologist Bruno Latour, known as the Actor-Network Theory (Latour, 2007) to explore how Artificial Intelligence (AI) might mitigate biases present in the admissions process by replacing or supplementing human judgment with algorithmic decision-making. Analyzing the interconnectivity of the elements crucial to the admissions process through ANT can help answer the primary question of the paper: How does Artificial Intelligence play a role in the sociotechnical decision making process of college admissions?

Research Methodology: Investigating College Admissions through Interviews, Studies, and Current AI Usage

The "Results and Discussion" section of the paper provides an analysis of an interview conducted with a former UVA admissions representative, shedding light on the decision-making process involved in accepting or rejecting prospective students. The interview examines the existing flaws and asserts the benefits of the current state of the process, while also addressing the impact of affirmative action on the admissions process. The interview is followed by a study conducted by Michigan professor Michael Bastedo: "Cognitive Bias and Repairs in Admissions Decision Making." The study uncovers existing cognitive biases present in the decision-making process and proposes solutions in order to reduce the uncovered biases. The research then explores a significant limitation encountered when the admissions office at the University of Texas at Austin utilized an AI algorithm trained on biased admissions data. Finally, the paper will provide current statistics and findings on AI usage in the admissions process as of 2023 to contextualize the current climate of AI and admissions. Using the ANT throughout, the paper will draw connections between the interview and the research conducted on AI to understand how the decision-making process is flawed or successful, and if there are alternative methods of conducting admissions, with AI as a leading contributor, or otherwise. ANT allows for a fully comprehensive understanding of the importance of the different actors within the admissions system and the agency they exert on the decision-making process. Keywords used to facilitate the research include: College Admissions Process, Artificial Intelligence, Decision-Making, Bias and Actor-Network Theory.

Understanding the Current Admissions Process and an Overview of AI

Before delving into the question addressed in the paper, it is important to first understand the current state of the undergraduate admissions process and the elements that are vital to how admissions officers come to the decision whether to accept or reject a student to their university. The admissions process begins when a student sends application information digitally to the school or schools of their choosing, information consisting, but not limited to, SAT scores, GPA, MCAT scores, letters of recommendation, written essays, extracurriculars, etc. (JP, 2023). One could argue that the admissions process for a student begins well before the actual submission of their application, whether intentionally or unintentionally, the events that shape a student's life and the actions they take can and do influence the strength of their application. Once the relevant information to the application is received, an initial screening process is completed in which students are "sorted" in order to narrow-down the selection. Some universities will use a "rating" system or "rating scale" to facilitate this sorting process, but it is important to note that these techniques vary from university to university. Regardless of the usage of a scale, universities generally break up a student's characteristics into a measure for objective qualifications like grades, number of AP/H/IB courses, test scores; and a separate measure for personal characteristics and essays (Garrou, 2024). From there a decision is made to either accept, reject, or mark that student for consideration later. The "holistic" approach to admissions aims to capture all elements of each applicant, forming a complete picture of that individual in order to best arrive at the final decision.

Looking at AI, it is often used in industry to automate tasks in order to reduce costs and improve efficiency. More recently AI has taken the form of ChatGPT, a generative AI language model that uses machine learning to learn from vast amounts of data provided to it in order to

generate new content or make predictions on new data. It is important to note that currently AI models are only as strong as the data provided to them, which could be limited or biased and in turn impact the model (Ben, 2023, March 28).

Actor Network Theory and the Admissions Decision Process

Actor-Network Theory (ANT), a framework developed by French sociologist Bruno Latour along with scholars Michel Callon, Madeleine Akrich and sociologist John Law, is an approach that focuses on understanding how relationships between various actors, both human and non-human, shape the construction of social reality (Latour, 2007). The ANT challenges a common viewpoint of sociologists at the time that humans and their connections are separate from non-humans and their connections. The ANT instead suggests that everything is of equal value and part of the same "network" and that everything connects to each other in some way. An example that serves to make sense of the concept is that of a phone; without the capabilities of the phone, some existing human connections would cease to exist.

ANT also suggests that every network has agents, and every agent has its own sub-agents that can be further broken down into its own networks and so on and so forth. The second point draws criticism due to the way networks and agents can continuously be broken down to a point of redundancy (Elder-Vass, 2015). The task is to focus upon one actor-network and unravel all the individual forces while knowing how deep to go, how far to investigate to maintain relevance.

In the context of the research paper, the actor-network of the utmost importance is the network involved in making admissions decisions. The network encompasses various actors, including the student submitting the application, the admissions officers and committees

reviewing the application, and even the university that is receiving the student. The topic of interest is whether adding the new element of Artificial Intelligence to the decision-making network will prove to be beneficial or detrimental to the existing actors. Existing research does not focus on the decision-making process, but new research on the network of AI and ChatGPT is surfacing every day and can be applied to understand how that interaction could play out.

Results and Discussion

Artificial Intelligence is a tool that must be used ethically to render the college admission decision making process more efficient and effective by reducing the amount of bias and fatigue present with a human - centered approach. The capabilities of AI, when implemented diligently, provides each college applicant with an equitable reviewal process. The solution comes in the form of Augmented Intelligence where the decision is not left solely in the hands of either the human or AI actors. Instead, the decision is impacted by a combination of both actors, where AI aids in presenting the most relevant information and suggests a course of action for an applicant based on the fit with the respective university as well as the likelihood of that applicant finding success there. Application of AI within the decision-making process needs to be implemented with the understanding that AI is subject to as much bias as humans, and as a result must be thoroughly tested to ensure that future applicants do not face worse consequences restricting their ability to a fair application process.

Interview with a UVA Admissions Officer

Through an interview with an admissions officer that served on the admissions team at the University of Virginia (UVa) from 1993-2000 and more recently on the admissions team at

George Washington University from 2015-2016 (Garrou, 2024), an understanding as to the many different elements that go into making an admissions decision can begin. The elements of the undergraduate admissions process go deeper than those introduced in the background section, now looking at the admissions process through the lens of an admissions officer.

The process of becoming an admissions officer at a given university varies from university to university. In the case of the interviewee, their integration into the team began when they were a 4-th year undergraduate student at the University of Virginia, through a work-study job with the Undergraduate Admissions office. After graduating, they worked as an admissions representative at the Savannah College of Art and Design for 3 years as a recruiter. Eventually, they returned to the UVa admissions team while finishing their Master's in English at UVa, applying for a 3-month Reader position, 8 years after receiving their undergraduate degree. Their experience with the institution as a graduate and undergraduate student, as well as a successful interview in which they conducted a mock admissions application, led to their role as Assistant Dean of Admissions with the UVa Undergraduate Admissions office (Garrou, 2024).

The pathway the interviewee took to working in admissions at the UVa appears logical, as they were already deemed a "fit" within the UVa culture and community when they were accepted as an undergraduate student. The admissions officer recruitment process only serves to emphasize the importance of the human element when reviewing applications and making admissions decisions. Reviewers are not only assessing the ability of an applicant to academically succeed at a university, but also the ability for a student to integrate and contribute within the diverse culture present at the university. It is important to stress that the culture at a university will vary significantly from university to university which inhibits the potential for a solution born through AI that can be applied to any and all universities. The overlapping

networks of each university is not impossible, but given current capabilities, it is more plausible that each university would form its own network of actors as they employ an algorithm trained on data specific to that given university.

Once the interviewee became an admissions officer, they were matched to a designated territory in which they would interact with the high schools and students of that region, with preference going to senior ranking officers. It is important to note that officers with different ethnic backgrounds were appointed to regions in which they had a level of cultural familiarity as a means to better understand and work with the students of that given region. The interaction between admissions officers and high school students contributes to the establishment of connections between actors, known as translation under ANT. A network where admissions officers are replaced by AI would sever the connections that otherwise serve to prepare, inform, and encourage prospective applicants through informational and counseling sessions. The role of an admissions officer extends further than reviewing applications, and hence must not be overlooked when considering the role of AI in the decision making process.

Breaking down the admissions process with information provided from the interviewee, the complexities that make up the decision-making process, as well as how AI can serve to assist the process, are uncovered. The first section, involving the quantifiable metrics, is a portion of the admissions process that is the best candidate for AI assistance. That is due to the fact that a majority of candidates can simply be filtered out based on their meeting a certain threshold for GPA or test scores set by the university. While the interviewee acknowledged that certain thresholds are firm, representing a level where a student would struggle academically at the university, there is more context that is required when making admissions decisions. Provided with most applications is a school brochure or counselor form. The counselor form provides

important information on the highschool of the applicant, such as demographics, top possible GPAs, courses offered, % of students going to 2 and 4 year colleges, and decile (replacing class rank) for different percentiles. The context provided in the counselor form is important when evaluating applicants as not every applicant has the same background or was given the same opportunities as another applicant. Therefore, while the quantitative portion of the application is a stronger candidate for AI, the implementation is not as simple as a blanket threshold that pushes forward all applicants meeting those criteria. Certain weighting needs to be applied based on the school brochure to ensure each candidate is fairly evaluated.

The decision-making process is made even more complex when evaluating the written portion of the application process. According to the interviewee, the essay reading method is one that develops over time with more experience. A focus of the essay reading is to provide a clearer image of the student by the end of the essay, bringing many of the elements of the application together in order to paint a picture of the person applying that goes deeper than the numbers. With the sheer number of applications that are received and reviewed each year, a certain level of fatigue is expected, with the interviewee acknowledging that there is some level of skimming that occurs, which can be effective, but not as much as taking the time to read every word thoroughly. That being said, after reading applications for many years, certain patterns stick out that allow admissions officers to distinguish between applicants. The interviewee asks themselves “Do I remember it 5 minutes later?” They also mentioned capturing certain “intangibles,” such as a “love of learning” (Garrou, 2024). The ability to capture the emotion of writing within the field of AI is known as “sentiment analysis,” and centers around determining a positive, negative, or neutral sentiment within writing (IBM, 2023). The ability of AI to analyze essays written by humans at the same level of an admissions officer is unclear, however,

drawbacks such as the inability to detect the use of irony or sarcasm, negation, or idiomatic language (IBM, 2023) suggest that there is still room to improve at present. If, however, AI algorithms trained on past applicants are able to capture the elements that make for successful applications, it would not only cut down significantly on the time required to review the many applications, but it would, most importantly, provide each applicant with an equal reviewal opportunity void from the fatigue faced by human actors.

Cognitive Flaws and Biases Present in a Human Centered Approach

Looking now at a study (Bastedo, 2017) of the admissions processes of multiple universities conducted by Michael Bastedo, a professor at the University of Michigan, more of the human flaws and biases in the admissions process are uncovered as well as a discussion into the solutions to help mitigate them. An emphasis is placed early on as to the usage of a holistic evaluation, mirroring the findings of the interview above, in order to provide a full picture of the applicant. The findings of the study show three different cognitive repairs, strategies that seek to correct systemic bias, which help uncover some of the issues present in admissions processes. The first repair involves language monitoring. Language monitoring dictates how notes are taken by admissions officers in regard to a student's application to reduce the likelihood of making poor decisions later on. A student having “bad grades” is described as having “low grades for us” or a “red flag” is described as “raising questions.” Language like the examples above seek to offer a neutral means to describe an applicant, but noticeably brings into question the ambiguity present when multiple officers are reviewing a single applicant. The need for extra care when noting aspects of an application is eliminated if only one actor, AI, is needed to conduct the overall review. The second repair focuses on reducing cognitive closure, described as an

individual's aversion towards ambiguity, or wanting to make a decision before considering all of the information available (Bastedo, 2017). Cognitive closure is dangerous to the admissions process and the concept of a holistic review, with the effects only worsened the more applications an officer reads as applications "blend together." The final repair involves error correction which leads to gamifying, overcorrection, and anxiety with findings showing that the quality of information, the way in which that information is transformed and then subsequently presented, is important to bias mitigation. All of the three aforementioned biases and limitations of the ways in which human actors process the information provided on an application are prime candidates for AI intervention.

Harmful Usage of AI in the Admissions Process

AI intervention, however, comes with its own sets of risks and biases. AI, trained on data cleaned and prepared by humans, is subject to biases of its own. AI trained on biased data can lead to distorted outputs and potentially harmful outcomes (Holdsworth, 2023). As an example of bias present in AI, and a cautionary tale of AI implementation in the admissions process, in 2013, the University of Texas at Austin implemented a machine-learning system called GRADE (GRaduate ADmissions Evaluator) aimed at helping make decisions as to who got into its Ph.D. program and who did not (Burke, 2020). GRADE's algorithm, trained on past patterns of the university's acceptance decisions, showed a bias towards wealthy, white applicants, and as a result of facing criticisms on how admissions decisions were reflective of the flawed system, the university was forced to stop using the algorithm. While GRADE succeeded in rendering the admissions process more efficient, cutting the total time reviewing files by 74% (Burke, 2020), achieving a more efficient process never supersedes an equitable admissions process. The failure

of GRADE brings into question one of the most significant concerns when considering AI usage in the admissions process, an algorithm that is trained to accept applicants only based on the past data of students applied to universities. A poignant quote by Yasmeen Mustafa, a Ph.D student at the University of California, Irvine captures the importance of the failings at UT: “How many years of POC computer science students got denied?” The ever changing nature and diversity of prospective applicants, is why the network is ever-changing and not stable. Existing actors within the system are forced to grow and change, and as such any new actors added to the system must also be able to grow and change, otherwise the entire network is at risk of failing.

Current AI Usage in the Admissions Process

The capabilities of machine learning, and notably AI have grown significantly since GRADE’s implementation in 2013, and even since its shut down in 2020. Both the motivations driving GRADE’s initial implementation as well as the concerns related and leading to GRADE’s shut down still exist today, however, with recent popularity in AI, are they being overlooked? According to a study conducted by Intelligent, 50% of admissions officers are currently using AI in their review process, with 80% planning to incorporate AI usage sometime in 2024 (Intelligent, 2023). AI is being used to run essays through AI-powered detectors, AI is also used to review transcripts and recommendation letters, conducting keyword searches and minimum thresholds for GPA and test scores, with even 60% of admissions professionals using AI to review personal essays as well (Knox, 2023). The motivation boils down to the increased efficiency of the admissions process when utilizing AI tools, same as in 2013 at the University of Texas at Austin. The benefits of AI are undeniable, however, concerns arise with regards to ethical issues surrounding the use of AI. Warriness of AI usage risks becoming a “broad,

sometimes resigned, acceptance of AI" (Knox, 2023), blind acceptance cannot happen. ANT seeks to open up the black boxes of social processes by examining the interactions and connections between actors, AI is at risk of becoming an actor in which the interactions are placed within a "black box." If the outputs of AI are blindly accepted and incorporated without proper checks and balances, the network involving the admissions process risks following the same path that GRADE did.

Further concerns involve the ways in which the admissions process itself will be shaped if AI is included as an actor in the decision-making process. The admissions process is at risk of being gamified with the algorithms being centered around keyword searching. Keywords, highlighted or flagged by the AI algorithm, and hence which to use in the essay or as extracurriculars - key is having dedicated counselors which is often more common at wealthy, private schools. More common in large public schools over smaller, private schools. "80% of admissions officers responding to the survey said AI often made the final decision on a student's admission," clarified however that the findings are likely tied to the rote decision of culling stacks of applications to more manageable numbers.

Future Research of AI use in the Admissions Process

Future research on the topic of AI utilized in the admissions process will be able to analyze the results of admissions processes and decisions influenced by AI. Results on AI usage within the admissions process can inform the ways in which AI eliminates the limitations of human-centered admissions processes. Further research on how the AI model will be trained for equitable and forward looking admissions, accounting for both the current state of admissions, as well as applicants many years down the road. More granular studies will allow for an analysis

into the different types of universities that exist, such as the differences in the admissions processes between public and private universities, as well as ivy league schools. Certain methods for how AI can be applied will vary significantly from university to university, and as such, is of great importance for future research.

Conclusion

The admissions process is currently going through a significant evolution in how admissions officers are conducting their reviews of student applications. With the evolution, the growing usage of AI becomes more and more apparent, and with it the even more important question of ethical usage arises. AI usage is inevitable, it must not come, however, at the expense of the many applicants hoping to attend their dream universities. As such, implementation of AI solutions must be conducted in a manner that accounts for the many intricacies of the applications process in order to emphasize an equitable opportunity for all applicants, while still utilizing the invaluable skills of admissions officers in making the final admissions decisions. It is a pivotal moment in time in which ethical usage of AI must be emphasized to avoid biased decision making and encourage forward looking algorithms that adapt with new waves of applicants.

References

Bastedo, M. (2017, October 9). Cognitive Bias and Repairs in Admissions Decision Making. NSPA2017-presentation (ymaws.com)

Ben, A. (2023, March 28). *Council Post: How AI Is Integrating Into The Workforce*. Forbes. Retrieved October 27, 2023, from https://www.forbes.com/sites/forbestechcouncil/2023/03/28/how-ai-is-integrating-into-the-workforce/?sh=6613c7934da9

Burke, L. (2020, December 13). *The Death and Life of an Admissions Algorithm* [Review of *The Death and Life of an Admissions Algorithm*]. Inside Higher Ed. https://www.insidehighered.com/admissions/article/2020/12/14/u-texas-will-stop-using-controversial-algorithm-evaluate-phd

Carroll, Noel. (2021). Augmented Intelligence: An Actor-Network Theory Perspective.

Elder-Vass, D. (2015). Disassembling Actor-network Theory. *Philosophy of the Social Sciences*, *45*(1), 100-121. https://doi.org/10.1177/0048393114525858

Garrou, A. (2024, March 16). Interview with a UVA Undergraduate Admissions officer serving from 1993-2000 (A. Garrou, Assistant Dean of Admissions).

Gutiérrez, J.L.M. On actor-network theory and algorithms: ChatGPT and the new power relationships in the age of AI. *AI Ethics* (2023). https://doi.org/10.1007/s43681-023-00314-4

Holdsworth, J. (2023, December 22). *What is AI Bias? | IBM*. Www.ibm.com. https://www.ibm.com/topics/ai-bias

IBM. (2023). *What is sentiment analysis? | IBM*. Www.ibm.com. https://www.ibm.com/topics/sentiment-analysis

Intelligent. (2023, September 27). *8 in 10 Colleges Will Use AI in Admissions by 2024*. Intelligent. https://www.intelligent.com/8-in-10-colleges-will-use-ai-in-admissions-by-2024/

JP. (2023, August 23). *Factors in the Admission Decision*. National Association for College Admission Counseling (NACAC). https://www.nacacnet.org/factors-in-the-admission-decision/

Knox, L. (2023, October 9). *Admissions Offices Deploy AI*. Inside Higher Ed. https://www.insidehighered.com/news/admissions/traditional-age/2023/10/09/admissions-offices-turn-ai-application-reviews

Latour, B. (2007). *Reassembling the social: An introduction to actor-network-theory*. Oup Oxford.

Totenberg, N. (2023, June 29). *Supreme Court Guts Affirmative action, Effectively Ending race-conscious Admissions*. NPR. https://www.npr.org/2023/06/29/1181138066/affirmative-action-supreme-court-decision