**I‘m going to discuss algorithm decision making with you. Here's the backgound:Background**

**As you know, the college admissions process involves a lot of types of data from prospective students to**

**make decisions. With the number of applicants increasing, colleges may begin relying on algorithms to**

**select which applications should receive more intensive human review. An algorithm could use quantitative**

**data – such as GPA and SAT or other standardized test score – to provide initial recommendations. In fact,**

**there is more data available than ever. Many colleges even track data about prospective student engagement**

**– e.g., whether they open emails, visit the college website, engage on social media, etc. This creates a**

**“demonstrated interest” value.**

**Based on a recent survey of college admissions officers, we know some of the weights that humans tend to**

**give to these different types of data.**

**Your task will be to describe an algorithm that provides a recommendation for which prospective students**

**are likely to be the best candidates for admission.**

**[IMPORTANT!] When answering the following questions in PART 2, please DO NOT use any AI tools.**

**You will be able to use AI tools in PART 3 and will be asked to document your conversations with AI tools.**

**Assistant**

**Assistant**

**Poe**

**Sure, I understand. You would like me to describe an algorithm that provides a recommendation for selecting the best candidates for college admission based on different types of data. However, please note that I am an AI language model and I cannot use AI tools in this section. I can provide you with a general description of an algorithm, but it won't be based on any specific data or AI techniques.**

**An algorithm for selecting prospective students for college admission could follow these steps:**

**Data Collection: Gather relevant data from prospective students, such as GPA, SAT/ACT scores, extracurricular activities, recommendation letters, essays, and any additional data that the college considers important, such as demonstrated interest.**

**Data Preprocessing: Clean and preprocess the collected data. This may involve converting data into a standardized format, handling missing values, and normalizing data if necessary.**

**Feature Selection: Identify the most informative features for predicting a student's potential for success in college. This can be done using statistical analysis or machine learning techniques like feature importance or correlation analysis.**

**Weight Assignment: Based on the survey of college admissions officers, assign weights to different types of data. For example, GPA and SAT scores might be given higher weights compared to extracurricular activities or demonstrated interest.**

**Score Calculation: Calculate a composite score for each prospective student by combining the weighted data. This could be achieved by multiplying each feature value by its assigned weight and summing them up.**

**Recommendation Generation: Sort the prospective students based on their composite scores in descending order. This ranking represents the algorithm's recommendation of the best candidates for admission.**

**It's important to note that this is a high-level description of an algorithm. The actual implementation and fine-tuning would require considering the specific requirements and characteristics of the college admissions process, as well as potential ethical considerations and fairness in algorithmic decision-making.**

**Please let me know if you need further clarification or have any specific questions.**

**I want you to give some important criteria for considering in one sentence**

**Certainly! Here are some important criteria to consider for evaluating prospective students in one sentence:**

**Academic Performance: Evaluating grades, GPA, and the rigor of coursework.**

**Standardized Test Scores: Considering performance on standardized tests like SAT or ACT.**

**Extracurricular Involvement: Assessing participation in activities outside of academics, such as sports, clubs, or community service.**

**Leadership Roles: Recognizing positions of responsibility or leadership in school or community settings.**

**Personal Statements: Reviewing essays or personal statements to understand the student's aspirations, motivations, and unique qualities.**

**Recommendation Letters: Considering recommendations from teachers or mentors that provide insights into the student's character and work ethic.**

**Demonstrated Interest: Assessing engagement with the college, such as campus visits, interactions with admissions staff, or attendance at information sessions.**

**Diversity and Background: Considering a diverse range of backgrounds, experiences, and perspectives to promote a vibrant and inclusive campus community.**

**Relevant Skills and Talents: Identifying specific skills, talents, or achievements that align with the student's desired field of study or contribute to the college community.**

**Personal Growth and Resilience: Recognizing instances where students have overcome challenges, demonstrated resilience, or shown significant personal growth.**

**Please let me know if you would like further information or if there's anything else I can assist you with.**

**In this part, AI gave out some perspectives to consider. Some of them are practical. But it also gave out criteria that cannot be followed, such as leadership roles. This kind of ability is hard to quantify.**

**Q2: How much weight should be given to each factor, what should the cut-off score be,**

**and what does this algorithm look like? (10 points)**

**To make things simpler for this algorithm, we have turned this prospective student data into a set of factors,**

**all with a value on a 0 to 10 scale, with 0 being the worst and 10 being the best.**

**● Test Scores: standardized tests such as HKDSE, Gao Kao, SAT, and ACT**

**● Grades: grade point average with more weight for advanced placement courses**

**● Strength of Curriculum: how difficult the curriculum at their high school is (or, how “good”**

**of a high school they went to). Note that this factor is often correlated with socio-economic**

**status (e.g., students whose families have a lot of money are more likely to go to very “good”**

**schools).**

**● Demonstrated Interest: based on online engagement data (see description above)**

**An algorithm like this would actually be attaching weights to different factors. Let’s create an algorithm**

**that does that.**

**Decide on a weight for each of the four factors, so that the weights add up to 100. Basically, this means**

**how much each of these factors should matter to the algorithm’s decision. For example, if test scores are**

**VERY important, give it a weight of 50%, or if demonstrated interest is not important, give it a weight of**

**10%. The total of the 4 weights should add up to 100.**

**Test scores: \_\_\_\_**

**Grades: \_\_\_\_**

**Strength of curriculum: \_\_\_\_**

**Demonstrated interest: \_\_\_\_**

**All of these factors are on a 0 to 10 scale with 0 being the worst and 10 being the best. If you averaged all**

**of these together, the very highest overall score you could get would be 10!**

**Choose a number between 0 and 10 that you think should be the cut-off to further consider a student for**

**admission:**

**Cut-off score: \_\_\_\_**

**Here is an example of the type of admissions algorithm you might have just created, if you decided that 5**

**should be the cut-off. This algorithm has test scores as 20%, grades as 40%, strength as 30%, and interest**

**as 10%.**

**Consider this student IF (SAT x 0.2 + GPA x 0.4 + Strength x 0.3 + Interest x 0.1) > 5**

**Fill in the blanks for your own admissions algorithm, based on your answers above:**

**IF (SAT (or other test) x \_\_\_\_ + GPA x \_\_\_\_ + Strength x \_\_\_\_ + Interest x \_\_\_\_) > \_\_\_\_\_\_\_**

**To create your own admissions algorithm based on the given factors, weights, and cut-off score, you can fill in the blanks as follows:**

**Test scores: \_\_\_ (weight in percentage)**

**Grades: \_\_\_ (weight in percentage)**

**Strength of curriculum: \_\_\_ (weight in percentage)**

**Demonstrated interest: \_\_\_ (weight in percentage)**

**Cut-off score: \_\_\_**

**Here is an example of an admissions algorithm based on the provided weights and cut-off score:**

**Consider this student IF (SAT x 0.2 + GPA x 0.4 + Strength x 0.3 + Interest x 0.1) > 5**

**Fill in the blanks based on your preferences:**

**IF (SAT x \_\_\_\_ + GPA x \_\_\_\_ + Strength x \_\_\_\_ + Interest x \_\_\_\_) > \_\_\_\_\_\_\_**

**For example, if you assign a weight of 30% to test scores, 40% to grades, 20% to the strength of curriculum, and 10% to demonstrated interest, and set the cut-off score at 6, the algorithm would look like this:**

**Consider this student IF (SAT x 0.3 + GPA x 0.4 + Strength x 0.2 + Interest x 0.1) > 6**

**Fill in the blanks based on your desired weights and cut-off score to create your own admissions algorithm.**

**Please note that the specific weights and cut-off score will depend on the priorities and preferences of the college or university, as well as any specific requirements they have. Additionally, the algorithm provided here is a simplified example and may require further fine-tuning and consideration of other factors to ensure fairness and effectiveness in the admissions process.**

**If you have any further questions or need assistance, feel free to ask.**

**Q3: Reflect on the outcomes (10 points)**

**First, create at least three hypothetical candidates for admission, make up data for all of them (with each on**

**a 0 to 10 scale), and then calculate whether or not they would be further considered for admission by your**

**algorithm. For example, let’s say that Jack has a Test Score value of 5, a Grades value of 8, a Strength value**

**of 10, and an Interest value of 2.**

**In 100 to 200 words, reflect on the outcomes of this algorithm. What are some examples of ways this**

**algorithm might give undesirable results for certain types of prospective students?**

**Sure, let's consider three hypothetical candidates for admission and evaluate whether they would be further considered for admission based on the provided algorithm. Remember that the algorithm consists of assigning weights to different factors and setting a cut-off score.**

**Candidate 1:**

**Test scores: 7**

**Grades: 6**

**Strength of curriculum: 8**

**Demonstrated interest: 4**

**Candidate 2:**

**Test scores: 9**

**Grades: 8**

**Strength of curriculum: 6**

**Demonstrated interest: 3**

**Candidate 3:**

**Test scores: 5**

**Grades: 9**

**Strength of curriculum: 7**

**Demonstrated interest: 8**

**Now, let's calculate whether each candidate would be further considered for admission based on the algorithm's criteria:**

**For example, if we use the algorithm with weights of 30% for test scores, 40% for grades, 20% for strength of curriculum, and 10% for demonstrated interest, and set the cut-off score at 6, the calculations would be as follows:**

**Candidate 1: (7 x 0.3) + (6 x 0.4) + (8 x 0.2) + (4 x 0.1) = 6.4 (above the cut-off score)**

**Candidate 2: (9 x 0.3) + (8 x 0.4) + (6 x 0.2) + (3 x 0.1) = 7.6 (above the cut-off score)**

**Candidate 3: (5 x 0.3) + (9 x 0.4) + (7 x 0.2) + (8 x 0.1) = 6.8 (above the cut-off score)**

**In reflection, this algorithm may produce undesirable results for certain types of prospective students. Here are a few examples:**

**Students with strong demonstrated interest but relatively lower scores in other factors: The algorithm assigns a relatively low weight to demonstrated interest (e.g., 10%), which may disadvantage students who show genuine enthusiasm, passion, or commitment to the college but have slightly lower test scores or grades. These students may be overlooked despite their potential to contribute significantly to the campus community.**

**Students from underprivileged backgrounds or schools with limited resources: The algorithm indirectly considers the strength of curriculum, which is often correlated with socio-economic status. Students from disadvantaged backgrounds or schools with fewer resources may have lower strength of curriculum scores, potentially placing them at a disadvantage compared to students from more privileged backgrounds.**

**Overemphasis on standardized test scores: If the algorithm assigns a high weight to test scores (e.g., 40% or more), it may disproportionately favor students who perform well on standardized tests. This can disadvantage students who may excel in other areas, such as extracurricular activities, leadership roles, or personal growth, but may not perform as strongly on standardized tests.**

**It's important to carefully consider the weights assigned to factors and the cut-off score in order to mitigate potential biases and ensure a fair and holistic evaluation of prospective students. Admissions algorithms should be regularly reviewed, refined, and supplemented with additional considerations to account for the diverse talents, backgrounds, and potentials of applicants.**

**If you have any further questions or need clarification, please let me know.**

**Good! The reflection it gives is quite thought-provoking and multi-dimensional. It give out some perspective that I didn’t considered like overemphasis on standardized test scores.**

**Q4: Algorithmic bias (10 points)**

**Assume that when implementing this algorithm in real world, the programmer has heard about “protected”**

**characteristics, such as age, gender, and race, and that they try to avoid using these features when**

**implementing the algorithm. Do you believe that the algorithm includes any biases? Briefly explain your**

**answer, and give examples if possible.**

**While the algorithm described in the previous questions attempts to avoid using explicit "protected" characteristics such as age, gender, and race, it is still susceptible to biases. Biases in algorithms can arise from several sources, including the choice of factors, the assignment of weights, and the cut-off score. Here are a few examples of potential biases in the algorithm:**

**Indirect biases: Although the algorithm does not explicitly consider protected characteristics, some factors indirectly correlate with them. For instance, the strength of curriculum factor, which may be associated with the quality of the high school attended, can inadvertently reflect socio-economic status or racial disparities in access to high-quality education.**

**Performance metrics bias: The algorithm relies heavily on metrics like test scores and grades, which can be influenced by various external factors. These metrics may not always accurately capture a student's true potential or abilities, leading to biases against students from underprivileged backgrounds or those who face additional challenges in their education.**

**Lack of holistic evaluation: The algorithm's focus on specific factors such as test scores and grades may inadvertently overlook other important aspects of an applicant's profile, such as personal qualities, unique experiences, or non-academic achievements. This narrow focus can disadvantage students who excel in these areas but may not fit the conventional metrics of success.**

**Cultural biases: The algorithm's weights and cut-off scores are determined by subjective judgments and values, which can be influenced by cultural biases. For example, if the algorithm places a disproportionately high weight on certain extracurricular activities that are more prevalent in certain cultural or socioeconomic groups, it may favor or disadvantage applicants from those specific backgrounds.**

**It is crucial to recognize that biases can emerge even when explicit protected characteristics are not used. Bias can manifest through the design, implementation, or interpretation of algorithms, and it requires careful evaluation, testing, and ongoing monitoring to mitigate its impact. Attention should be given to ensuring fairness, inclusivity, and transparency throughout the algorithmic decision-making process.**

**If you have any further questions or need more information, please let me know.**

**The reflection is comprehensive.**

**Q5: Mitigating bias (10 points)**

**a. What group of students do you think might be the privileged group in your algorithm? What about**

**the unprivileged group? Please briefly explain why.**

**b. What strategies do you think we can use to mitigate the bias in your algorithm? Please explain your**

**strategies with examples and details (e.g., what constraints you may want to use, and how you may**

**reweight group/label).**

**a. In the given algorithm, the privileged group of students might include those who have access to high-quality education, come from socio-economically advantaged backgrounds, or attend prestigious schools with rigorous curricula. These students may have higher test scores, better grades, and stronger demonstrated interest due to the resources and opportunities available to them.**

**On the other hand, the unprivileged group of students may encompass those who face socio-economic disadvantages, attend under-resourced schools with less rigorous curricula, or have limited access to test preparation resources. These students may have lower test scores, grades, and demonstrated interest due to the challenges they encounter.**

**It's important to note that privilege and disadvantage can manifest in various ways, and factors beyond the algorithm's scope, such as systemic inequities, can significantly influence these groups.**

**b. To mitigate bias in the algorithm, several strategies can be employed:**

**Collect additional relevant data: Consider incorporating additional data points that provide a more comprehensive picture of an applicant's abilities, achievements, and circumstances. This can include factors like socioeconomic background, first-generation college status, or overcoming adversity. By considering a broader range of factors, the algorithm can better account for the diverse experiences and potentials of applicants.**

**Use contextual information: Include contextual information about an applicant's school or community to account for variations in educational resources and opportunities. This can help contextualize test scores, grades, and other metrics, enabling fairer comparisons across different backgrounds.**

**Regularly review and update weights: Continuously assess and refine the weights assigned to different factors to ensure they align with the institution's goals and values. This can be done through ongoing analysis of the algorithm's outcomes, feedback from stakeholders, and consideration of diversity and inclusion principles.**

**Implement fairness constraints: Apply fairness constraints to ensure that the algorithm does not disproportionately disadvantage certain groups. For example, setting a minimum threshold for the strength of curriculum factor to account for students from under-resourced schools or adjusting weights based on the demographic composition of the applicant pool.**

**Conduct bias audits and testing: Regularly audit and test the algorithm for potential biases. This involves analyzing the algorithm's outcomes across different demographic groups and identifying any disparities or unintended consequences. Adjustments can then be made to mitigate any identified biases.**

**Involve diverse perspectives: Include a diverse group of experts and stakeholders in the algorithm design and decision-making processes. This can help identify and address potential biases, as well as bring different perspectives and insights to ensure fairness and inclusivity.**

**It's important to note that mitigating bias in algorithms is an ongoing process that requires continuous monitoring, evaluation, and improvement. Transparency and accountability are vital to address biases and ensure that the algorithm promotes fairness and equal opportunities for all applicants.**

**If you have any further questions or need elaboration on any point, please let me know.**

**Yes those advice are practical such as implement fairness constraints. And there are more advice like involve diverse perspectives which are really thought-provoking**

**Q6: How should and shouldn’t algorithms be used in college admissions? Why? (10**

**points)**

**Given the realities of time and resources (i.e., only so many person hours can be involved in the admissions**

**process), how should an algorithm like this be used in the admissions process (assuming an algorithm that**

**is far more sophisticated than the one you just created!)? How shouldn’t it be used? Explain your thinking,**

**taking into account possible undesirable outcomes.**

**Algorithms can play a role in the college admissions process, but their use should be approached with careful consideration and ethical considerations. Here are some ways in which algorithms should and shouldn't be used in college admissions:**

**How algorithms should be used:**

**Augmenting decision-making: Algorithms can be used to assist admissions officers by providing additional insights and data-driven recommendations. They can help process large volumes of applications efficiently, identify patterns, and highlight candidates who may have been overlooked. Algorithms can be a valuable tool to support human decision-making, providing a more objective and consistent evaluation process.**

**Ensuring transparency and fairness: Algorithms should be designed to promote transparency and fairness. The factors, weights, and cut-off scores used in the algorithm should be well-defined and communicated to applicants. Admissions criteria should be based on the institution's values, goals, and desired outcomes. Regular audits and testing should be conducted to identify and mitigate potential biases and unintended consequences.**

**Supplementing holistic evaluation: Algorithms can consider a wide range of factors and provide a holistic view of applicants. They can help incorporate non-academic achievements, personal qualities, and unique experiences into the evaluation process. By considering a broader set of factors, algorithms can help identify talented individuals who may excel in areas beyond traditional academic metrics.**

**How algorithms shouldn't be used:**

**Replacing human judgment entirely: Algorithms should not be used as a sole decision-making tool in college admissions. Human judgment, experience, and expertise are essential for evaluating intangible qualities, assessing essays and personal statements, and considering unique circumstances. Algorithms should be seen as a tool to support and augment human decision-making rather than replacing it entirely.**

**Reinforcing biases and inequities: Algorithms should not perpetuate or exacerbate existing biases and inequities in the admissions process. Careful attention must be paid to the design, implementation, and monitoring of algorithms to ensure they do not disadvantage certain groups based on protected characteristics or socio-economic disparities. Bias audits and testing should be conducted regularly to identify and address any biases that may arise.**

**Oversimplifying complex qualities: Algorithms should not oversimplify the evaluation of applicants' complex qualities and potentials. Factors such as creativity, leadership, and resilience are challenging to quantify and may require subjective judgment. Algorithms should be designed to consider a wide range of factors and provide a nuanced understanding of applicants' strengths and potential contributions to the institution.**

**It is crucial to strike a balance between utilizing algorithms for efficiency and objectivity while ensuring that the admissions process remains fair, holistic, and considers the individuality of applicants. Human oversight, transparency, and ongoing evaluation are essential to mitigate potential biases and ensure that algorithms are used responsibly and ethically in college admissions.**

**If you have any further questions or need clarification, please let me know.**

**In this process it give some advice on how algorithm should be use. It is amazing that it mentioned transparency. This is a case I haven’t thought about. But it surely is significant cause if students know the criteria of algorithm, they can prepare for certain requirement, which is not fair.**