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AI Based Student Enrollment System

1. Performance Metrics

The University may choose to prioritize Revenue (By giving less scholarship or increasing enrollment), Research Output, Admission of groups in need, International Enrollment. It may also decide to focus on specific Schools for the above metrics as well.

For me, all of these are valid priorities of a University at various phases of its existence or situations as all of these contribute to Ranking, Student Satisfaction, Development Funding, etc.

2. Environment of the System

The AI would be exposed to the inputs mentioned below about all the available past data of enrolled students. It would also be exposed to a curated "Outcome" score for each Performance Metric for previous semesters.

e.g, For the Batch of Summer 2018 Senior Project quality increased 10%, average CGPA of this batch increased by 0.2, but Revenue Increased only 5%. and so on.

3. Actions of the System

The system will assign each applicant an acceptance score which would reflect the overall priority of the University for the semester.

4. Algorithm and I/O of the System

Supervised Learning would be used as the System has labelled input scores and labelled, expected outputs. We can divide the inputs that AI is exposed to into 3 categories. 1. Mindset 1. Ability 1. Others

While reviewing the applicant, the admission committee assigns a set of scores:

4.1 Mindset

- **Interest** : score which reflects the student's enthusiasm.
- **Knowledge** : of topics more advanced or besides the standard academic syllabus which require effort.
- **Participation** : Number of applications at relevant competitions and organizations.
- **Experience** : in situations/jobs that demonstrate discipline.

4.2 Ability

- Relevant Secondary and High School Results.
- Admission Test Results.
- Achieved Results in relevant competitions.
- Publicly viewable personal/group projects.

4.3 Others

- Gender, Race, Zip Code
- Family Income
- Scholarship : needed or not. (As it affects Revenue)
- International Student or not. (As it affects University Ranking)
- Influential Background or not. (As it affects access to potential funds/opportunities)
- A Bias score for groups in need (single parent, minority group, disability, etc)

The output would be a percentage value for each student where 0% means the AI does not suggest admission at all, and 100% meaning complete affirmation.

5. Potential Unfairness

Since the system does not solely focus on Ability as the only criteria, there are bound to be students who might be academically qualified but not get accepted due to the requirement metric set by the University during an admission period.

5.1 Individual Fairness

A student might "fool" the admission system into thinking they have a good mindset for a program, by faking participation certificates in obscure competitions.

5.2 Group fairness

If revenue is prioritized too much, then a student from a lower income family might not get admitted even if they are academically performant.

5.3 Fairness through unawareness

The system, here needs to be aware of the background of the students for example, for the University to promote minority enrollment.

5.4 Equal outcome

The System does not have a "button" to ensure Equal Outcome. The university can only choose to prioritize one metric above others. Promoting minority enrollment may not necessarily balance different group enrollment equally as there are always the other metrics to consider.

5.5 Equal opportunity

The AI cannot ensure it but will still choose to assign a higher percentage to the group the University wants to promote. The reasons are the same as 5.4.

5.6 Equal impact

Utility of Students who are accepted may vary, but its up to the university's teaching/guiding policies on how each group are affected and how they learn once admitted.

6. Sources of Bias in training

The scores e.g denoting quality of a personal project of the student or "Interest" of the student in a program is highly subjective to the person who is analyzing the applicant. Typical issues also remain such as the scorer's own bias when quantifying the metrics, considering bias against race or gender or examination board. If these biased scores are fed to the system, subjective, yet important criteria like Discipline, Perseverance and the Mindset of the student in general can affect their admission chances. The AI technology for this is currently at its infancy so these metrics are still best left to the Humans.

7. Best Practices for a Fair and Unbiased System

Since some of the analysis of the applicant has to be done manually, the admission committee needs to be trained to take into biases during review. Also, enforcing 5.3 during preliminary review of the subjective "Mindset" category might be preferred.

The final decision is up to the admission committee as the AI only suggests Percentages for each student. They might just choose to admit a student who received a lower percentage in special cases as well. While it might mean that someone else might lose their spot, a classical interview by trained officials with the "special case" or shortlisted students may be necessary.