

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

Applicant has worked as a research assistant at Princeton, MIT, and Harvard, machine learning engineer intern at Apple Inc., a lot of prizes and medal won in various competitions, working in the field of computational mathematics which is very important in the science and engineering, are the strengths. Applicant has few publications and presentations so far in this field and has only decent grade not perfect.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Excellent

Explanation to Applicant

Applicant's proposed research project is persistent cohomology in machine learning. Applicant has lay out specific plan on the research project which is very convincing to me and of course it has direct impact on our society as well, Clearly denounced the Russia and Ukraine war which is very important.

Summary Comments

Applicant is interested in working in the field of computational mathematics which is one of the very important field in this era. Having good background at academia, work experiences in the machine learning, and artificial intelligence, I clearly see applicant's bright future in this field. So I would rate excellent in both categories.

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Explanation to Applicant

The applicant has a very strong academic record evidenced by strong performance in advanced coursework and letters that speak to the applicant's engagement and thoughtfulness in class. The applicant has several different undergraduate research experiences that have resulted in publication, demonstrating strong potential for success as a graduate researcher. The applicant's research plan is technically detailed and well-organized, relies on an available data set, and the proposed doctoral institution is qualified to support the proposed activities. The proposal could be strengthened by (i) a stronger link between the predicted project outcome of "insight into the brain" and the stated motivation of "more robust, efficient, and interpretable AI models", (ii) explaining the significance of the desired stability guarantees for persistent sheaf cohomology, and (iii) a discussion/acknowledgment of the ethical concerns/risks of modeling the relationship between "measures of cognitive function" and features such as age and sex.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

The applicant has a strong record of engagement in educational outreach to various minoritized or vulnerable populations,

including an impressive leadership role in a student organization that sought to support Ukrainian refugees, for which the applicant is commended by the letters of support and by a university-wide award. The broader impacts of the research plan, however, rely on the claim of "potential to transform many fields" that is not adequately described in the research plan, and vague future plans for open source publications, open source code, and outreach. The proposal could be strengthened by (i) providing a clearer link between the proposed research activity and the transformation of other fields, and (ii) pointing to a record of past open source activities or research outreach to non-specialists or providing more specific plans for such future activities. The applicant also states that they are a researcher in ethical AI, but does not discuss ethics in either the descriptions of past research or the plan for future research. The proposal would be strengthened by the inclusion of this.

Summary Comments

The applicant is strong across multiple areas: academics, research, and educational outreach to vulnerable populations. The research proposal is well written but perhaps includes too many technical details at the expense of clearly articulating the potential impact/significance of the project, especially as pertains to impact across fields. The applicant has demonstrated strong student organization leadership skills; evidence of the applicant's potential to grow into a scientific leader in ethical AI would be strengthened by discussion of some of the issues in ethical AI relevant to the applicant's previous or proposed research.

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Explanation to Applicant

Topological machine learning extended from ongoing work, challenging but achievable research goals.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

Focus on academic aspect of topological data analysis, underrepresented groups engagement, would be better if talking more about connections to real world applications.

Summary Comments

Clear research plan, excellent academic performance, experience in interdisciplinary areas.

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Explanation to Applicant

Applicant demonstrates a high degree of self motivation: In high school they completed self study to test into and attend magnet high school. The applicant excelled in high school and presented project to prime minister of India and president of Russia. In college the applicant has been involved in numerous research projects, with a focus on applications of machine learning techniques.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Excellent

Explanation to Applicant

Applicant started student organization in response to Russian invasion of Ukraine and has received high praise and recognition for their efforts.

Summary Comments

The applicant stands out for their strong internal motivation; the strongest I have seen in all of the applications I have read. Their intellectual merit is stellar and their outreach efforts around the war in Ukraine are laudable as well.