Pioneer academics

101 Greenwood Avenue, Ste 170
Jenkintown, PA 19046
+1 (855) 572-8863

# Pioneer Research Program Evaluation Form

## Scholar Information

| | |
|---|---|
| **Scholar's Full Name:** | Aadi Biren Shah |
| **Scholar's Research Concentration** | Explorations in Algorithmic Game Theory |
| **Title of Scholar's Research Paper** | A Game-Theoretic Approach to Situatig Strategies of Increasing Adversarial Robustness in Image Classification |

## Grading and Academic Oversight Section

**Program grade conferred by professor: A**
**Full grading rubric approved by Pioneer Academics and Oberlin College*

**The Pioneer Research Program's college accreditation and academic oversight are conducted collaboratively with Oberlin College:**

| | |
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| **Listing on Common Application:** | "Summer Program, Credit Awarded Directly by Oberlin College" |
| **Course Title on Coalition Application:** | "099" "Pioneer Research Course" |
| **College Course ID on UC Application:** | "INST 099" "Pioneer Research Course" |

## Comprehensive Evaluation Section

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|---|---|
| **Evaluator Name & Full Title:** | Shaddin Dughmi, Associate Professor |
| **College/University & Department:** | Computer Science, University of Southern California |
| **Full Educational Background of Evaluator:** | B.S., Computer Science, Cornell University, 2004.<br>Ph.D., Computer Science, Stanford University, 2011. |

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**Please briefly explain the nature and requirements of the research paper and your interaction with the scholar:**

The goal of the research paper is to explore an existing or novel thread of research pertaining to algorithmic game theory. This exploration can take multiple forms, depending on the interests of the scholar and the nature of the research direction at hand. One form is a survey of prior work in that area, followed by proposing novel research questions that emanate from the prior work. Another form involves more original research, where the scholar identifies an unexplored or under-explored set of research questions, briefly surveys the related prior work, then embarks on answering those questions through original work. The research work can involve formal mathematical reasoning, computational experiments, or a combination thereof.

Aadi's research paper surveys the predominant approaches to adversarial machine learning. These approaches are viewed as strategies in a game played between the classifier and an adversary, and are classified into 3 natural categories. Then the 3 categories of approaches are compared and contrasted in their performance on adversarial data and clean data, with the tradeoffs between them pointed out and discussed. Then, future work pertaining to combining the approaches is proposed.

**Please rate the scholar in the following areas:**

| | Excellent | Good | Average | Below Average | Poor |
|---|---|---|---|---|---|
| Ability to form original ideas and concepts | X | | | | |
| Ability to communicate thoughts in an effective and articulate manner | | X | | | |
| Ability to synthesize and organize information from disparate sources | X | | | | |
| Level of scholar's curiosity, aptitude, and industriousness | X | | | | |

**Based on the scholar's performance through Pioneer, how would you rate this scholar's potential for undergraduate-level academic work at a top college/university, relative to other undergraduate students whose academic work you have mentored?**

| | |
|---|---|
| One of the best I have encountered, top 5% _X_ | Excellent, top 10% ___ |
| Very Good, top 25%___ | Good, top 50%___ |
| Below Average____ | |

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**Describe some of the scholar's strengths:**
Excellent work ethic, and passion for data science. Great intuition for data science and machine learning. Impressive high level grasp of the literature.

**Describe some areas in which the scholar can improve:**
More precision and clarity in the use of technical terminology.
Scholar faced a lot of indecision in choosing a research direction, as if holding out for the perfect topic or trying to solve every interesting question at once. I impressed upon him the importance of setting achievable and concrete goals , pursuing those one at a time, then letting the chips of science fall as they may. To his credit, I think he took this feedback to heart.

**While the second half of the research work was one-to-one with the professor, the first half involved a small research cohort of 3-6 scholars. Describe the contribution that the scholar made to the research group discussion and learning:**
Aadi frequently asked good questions during the group discussions, and was engaged throughout the program.

**Would you recommend this scholar to a college admissions officer at a top college or university? Why or why not?**
Absolutely. Aadi is very bright and passionate about data science and machine learning. His understanding of the area is well beyond that to be expected at his educational level. His work ethic is also excellent, and he is very ambitious in wanting to answer fundamental questions. He has my very strong recommendation for admission to top programs in computer science, data science, and related disciplines.

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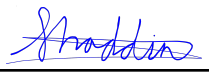
| **Evaluator's Signature:** |  |
| **Evaluator's Printed Name:** | Shaddin Dughmi |
| **Date of Evaluation:** | 9/28/2023 |
| **Evaluator's email & phone:** | shaddin@gmail.com, (650)387-9265 |

Pioneer Academics affirms that the scholar whose research paper is attached has followed Pioneer Academics' protocols for developing original research and that their paper has met Pioneer Academics' standards for authenticity. The grading and evaluation have met the standards collaboratively defined by Pioneer Academics and Oberlin College & Conservatory. If there are any questions regarding the work's academic integrity, please contact us at academic.integrity@pioneeracademics.com or by calling (855) 572-8863. We will conduct an immediate review and respond to your questions promptly.