

AG2PI SEED GRANT - PROJECT FINAL REPORT

PROJECT NAME	Democratizing the access to artificial intelligence solutions for underrepresented and non-expert communities
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PROJECT PRINCIPAL INVESTIGATOR	TODAY'S DATE	PROJECT START DATE	DATE OF COMPLETION
Joao Dorea	08-30-2023	12/1/21-02/28/23	02/28/23
TEAM MEMBERS (co-PI, co-I, personnel)	COLLABORATORS		
Dr. Tiago Bresolin (University of Illinois), Rafael Ferreira (University of Wisconsin-Madison)			

NOTE: this report will only be shared with the AG2PI Executive Board and USDA.

ACCOMPLISHMENTS

Please provide a short summary of the conclusions (both successes and failures) made from your project. Include a description of how this project will provide benefits to the agricultural genome to phenome community and, possibly, to a broader audience. You should include both qualitative and quantitative details, as necessary, to support your conclusions. Include a short accomplishment statement in non-technical language and do not include names.

This is not a technical report. Please keep to no more than 6-8 sentences (e.g., 1-2 sentences per point, above).

Our project's primary objective was to develop a platform using artificial intelligence (AI) for image analysis geared towards non-experts. We successfully created this platform employing deep learning techniques for image classification. When tested at two events, the platform engaged a combined total of over 950 participants, mostly K-12 in the Wisconsin Community, indicating its usability and relevance.

While the platform was generally well-received, its adoption among non-experts highlighted areas for improvement. Ensuring its functionality and user-friendliness for the intended demographic remains an ongoing task. We worked towards these suggestions and added a more friendly interface to it.

Our team's work was acknowledged with an award at the US Precision Livestock Conference. We submitted and presented an article. Our study presentation won the best oral presentation award and generated a lot of interest and discussion from the audience. Additionally, a workshop organized in conjunction with AG2PI team yielded valuable data regarding the adoption and utility of AI tools in agriculture. This feedback will influence further development and research directions.

The benefits to the agricultural genome to phenome community are direct. Our platform can assist the research prototyping for phenotyping generation across kingdom that will ultimately be used to connect genomic data and observable traits. Our platform offers a user-friendly tool to analyze images using advanced computing, which has potential applications in agriculture.

1. Platform Development for Image Analysis:

- Developed a platform leveraging deep learning for image classification aimed at non-experts.

2. Public Demonstrations:

- Presented the platform at the **UW Science Expedition** with over 530 visitors attending our station. Link: <https://twitter.com/jrrodorea/status/1647247756853911553/photo/1>
- Showcased the platform at the **Wisconsin Science Festival** with an engagement of over 424 visitors. Link: <https://twitter.com/jrrodorea/status/1581294544695439361>

3. Academic Publications and Recognition:

- Published an article in the **US Precision Livestock Conference (Knoxville-TN)** titled, "**Democratizing the access to artificial intelligence solutions for underrepresented and non-expert communities**".
- Best Oral Presentation award at the Precision Livestock Conference for presenting our AG2PI project.

4. Workshops and Data Collection:

- Organized a workshop in collaboration with the AG2PI team, including Nicole Scott and Eric Lyon.

(HINT: You can expand sections as necessary by pulling down on the square in the lower right corner of each box)

- Conducted a survey during the workshop to glean insights for future research, emphasizing the democratization of AI tools in agriculture. These findings were subsequently incorporated into our article for the US PLF Conference.

5. Team Participation in AG2PI Meetings:

- Attended two AG2PI meetings to present the results and progress of our project:
 - Meeting 1: Ames-Iowa, 2022
 - Meeting 2: Kansas City, Missouri, 2023

Products

Please list any products from this project. This may include (but not limited to) publication, concept/white paper, workshop, conference presentation, website, publicly available data or pipelines, etc. Reminder: you are required to make your products available to the broader stakeholder community using standard USDA practices, open source, FAIR, or other models. Metrics may include number of participants or times accessed, etc. Include links to recordings, DOI, etc. when possible. For presentations and posters, provide authors, date, location and presentation title.

ACTIVITY / PRODUCT	DESCRIPTION (include URL, if applicable)	OUTCOME / METRICS
Platform Development	Developed a platform leveraging deep learning for image classification aimed at non-experts.	Cloud platform ready for deployment for image classification. Platform tested for more than 900 people, including demonstrations, workshop, and lectures.
Public Demonstration	Presented the platform at the UW Science Expedition . Link: https://twitter.com/jrdorea/status/1647247756853911553/photo/1 Date:	A total of 530 visitors. Most of the visitors K-12.
Public Demonstration	Showcased the platform at the Wisconsin Science Festival . Link: https://twitter.com/jrdorea/status/1581294544695439361 Date:	A total of 424 visitors. Most of the visitors K-12.
Publications	Published an article in the 2023 US Precision Livestock Conference (Knoxville-TN) titled, " <i>Democratizing the access to artificial intelligence solutions for underrepresented and non-expert communities</i> ". Date:	Article published and presented at 2023 US PLF Conference
Awards	Best Oral Presentation award at the Precision Livestock Conference for presenting our AG2PI project.	The conference had more than 300 participants. A total of 3 awards or granted and our project was awarded with the best oral presentation
Workshop and Data collection	Organized a workshop in collaboration with the AG2PI team, including Nicole Scott and Eric Lyon	A total of 181 people from 52 different countries registered for the workshop.
Workshop and Data collection	Conducted a survey during the workshop to glean insights for future research, emphasizing the democratization of AI tools in agriculture. These findings were subsequently incorporated into our article for the US PLF Conference.	Feedback from the audience. Results of the survey used in the article published in the US PLF Conference
Team Participation in AG2PI Meetings	Attended two AG2PI meetings to present the results and progress of our project: Meeting 1: Ames-Iowa, 2022 Meeting 2: Kansas City, Missouri, 2023	Workshop discussion/ networking / Article submitted to Genome Biology
Grants Secured	The AG2PI board of directors provided a letter of support highlighting the importance of the tool for AI for Ag demonstrations. The tool was included as important component of an extension project, which resulted in USDA funded grant that will leverage the tool for education and outreach activities.	USDA-IDEAS funded grant

Audience

With whom has this work been targeted to and shared? Please describe how this project and its products have been disseminated to a community of interest. Include any outreach activity or information sharing as well as training or professional development opportunities provided in this project.

Our grant prioritizes the education and distribution of AI tools to lower adoption and usage hurdles in agricultural communities. We emphasized demonstrations, lectures, and workshops. Our audience ranged from researchers and graduate students at the AG2PI workshop to K-12 students at the Wisconsin Science Festival and UW Science Expedition. The outreach activities are detailed in the previous section (Products).

Challenges

Have you experienced any challenges or delays? Please provide the actions you took to resolve them, if possible.

A primary challenge for our project is its reliance on a GPU server. We initially used third-party cloud computing to develop our platform. However, the grant's funding is insufficient to sustain hardware for long-term platform implementation. Consequently, we've focused on creating code and infrastructure adaptable to any GPU cluster. Looking ahead, we intend to collaborate with HPC centers such as Cyverse and CHTC to utilize their computing infrastructure.

CONTINUATION OF WORK

Next steps

How do you/your team plan to continue moving this project forward? Include how AG2PI can assist in your forward momentum.

We've secured a \$1M USDA-IDEAS grant titled: "Development and Implementation of a Computer Vision System to Monitor Metabolic Disorders in Dairy Cows During the Transition Period". Two-thirds of this grant's budget is dedicated to education, extension, and outreach. The AG2PI tool we developed will play a crucial role in disseminating AI knowledge and educating undergraduate, graduate, and K-12 students.