



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: What Model Performs The Best When Using Artificial Intelligence to Detect Pneumonia Using Chest Radiographs

Finalist's Name: Kapil Bhandaram

School and City: Campus Middle School Englewood CO

Sponsor's Name: Vidya Bhandaram

Category: Biomedical Sciences (BMED)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

The American Lung Association states that pneumonia causes more than 50,000 deaths and 1 million hospitalizations yearly. Accurate and efficient diagnosis of pneumonia can increase access to early treatment, reduce hospitalization, and increase access in rural, remote areas, especially during times of high demand, such as a pandemic. Could we use AI for pneumonia detection, and if so, with what accuracy? Methods: I used a de-identified database of 2400 chest radiographs, and I learned to apply AI models to those radiographs. The database is located in "Notebooks" in Google Collaboratory. I first created variables to hold training and testing data using X_train and y_train and y_test and X_test. In my notebook, each model uses 80% of the data for training and 20% of data for testing (a specific code randomizes the data) Then, I train one of 5 models using a .fit function and then get predictions for the testing model using the .predict function. Then, after testing each model, an accuracy score for the model using the y_test data and the X_test data is obtained. Accuracy data is compared between models, namely, K nearest neighbor (plot with 5 nearest points or solutions), logistic regression (line of best fit), Decision Tree classifying (decision tree-based model), Neural Network, and Convolutional Neural Network. Based on accuracy, I could decide which model performs best for medical use. The Convolutional Neural Network had the highest accuracy of 82.75%. Risks: No risks were associated with this project as the database and model predictions are electronic, with no patient contact. Future directions: I intend to create an app for pneumonia detection based on the best model.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

3/7/24

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.