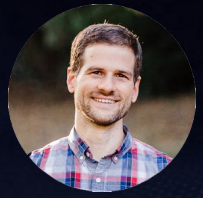
JLab AI Hackathon

Pete Alonzi (UVA), Thomas Britton (JLab), Chris Tennant (JLab)

March 5, 2020





AI for Nuclear Physics | Jefferson Lab

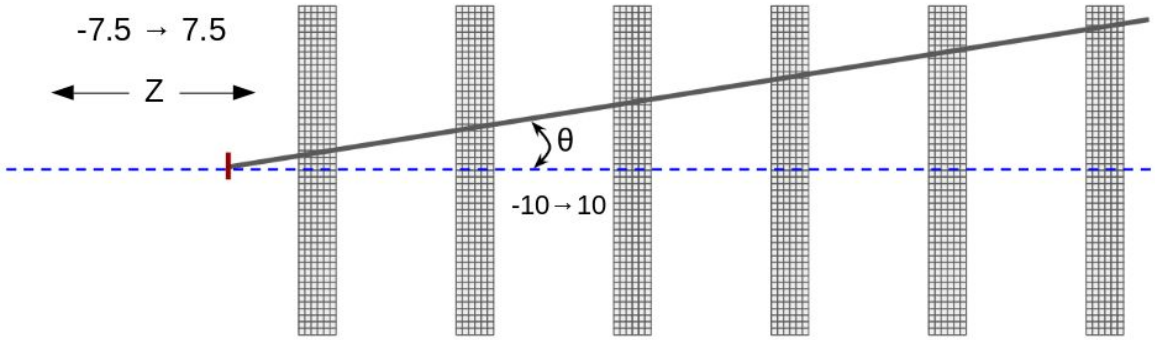
Jefferson Lab | UVA SCHOOL of DATA SCIENCE | U.S. DEPARTMENT OF ENERGY | Office of Science | JSA

Guidelines and Rules

- Goals:
  - ✔ Foster community engagement
  - ✔ Leave Hackathon knowing more about AI than when you came in
  - ✔ Have fun!
- Team: consists of 4 people or less
  - ✔ Assemble your own teams
  - ✔ Need an associated team name
  - ✔ However, if you do not have a team, come see Thomas, Chris or Pete
  - ✔ You must "register" your team by sending an e-mail to: jlabaihackathon@gmail.com with the name of your team and individual members
- Note: to be eligible for prizes, you must:
  - ✔ Meet the definition of a team (i.e. cannot have greater than 4 people)
  - ✔ Be willing to present results on Thursday at the Workshop

Challenge Theme

- We took a toy detector (6 chambers of 6 planes of 100 wires)
- We fire particles at this toy detector in hopes of measuring properties of them

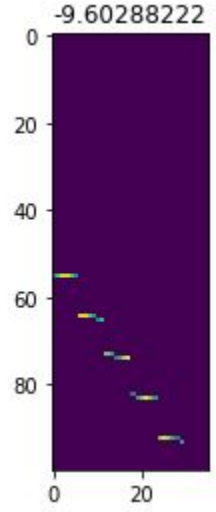


*The organizers lied. We placed “holes” in the data and had competitors’ networks analyze tracks beyond the stated bounds to reward robust solutions

Problems 1 and 2

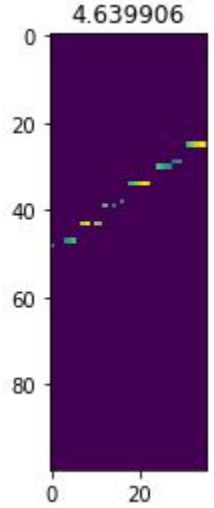
- Given the output from our toy detector find the angle (θ) of a straight track using Linear Regression.

✔ Problem two was the same problem using a Neural Net



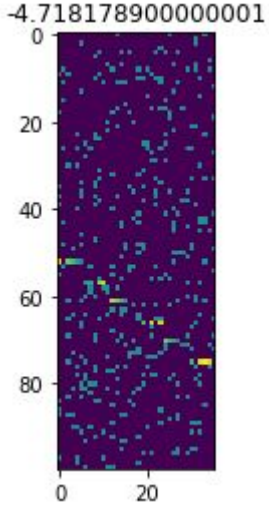
Problem 3

- Real detectors are not 100% hit efficient. Develop a neural net to extract z and θ from an inefficient detector.



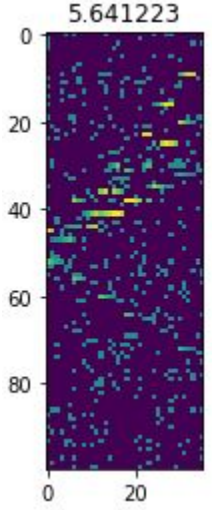
Problem 4

- Real detectors have noise as well as being inefficient. Develop a neural net to extract z and θ from a noisy and inefficient detector.



Problem 5

- Real tracking detectors may be tracking several particles. Develop a neural net to find the z and θ values for every track present (1-4).



Scoring

- the challenge had 5 parts
- each part was worth a maximum of 50 points
- answers for each part were submitted by e-mailing to jlabaihackathon@gmail.com with the Team Name in the subject
  - ✔ in the event of a tie score, the e-mail timestamp served as tie breaker (early entry wins)
- a Live Leaderboard was on display throughout competition
  - ✔ it's possible to re-work a part of the problem and re-submit an answer
- solutions were accepted until 2:30PM EST

Prizes

1st Place

- ✔ Intel Neural Compute Stick 2

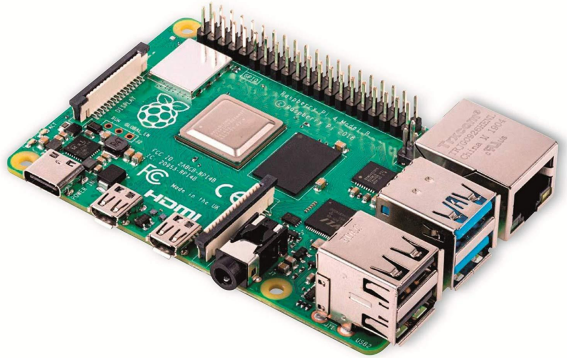
Discover Efficiencies
Deploy exceptional performance per watt per dollar while operating without cloud compute dependence

Develop with Flexibility
Prototype with low-cost edge devices with USB plug-and-play simplicity using common frameworks and tools

Productize Effectively
Prototype with Intel® Neural Compute Stick 2 and productize with Intel® Vision Accelerator design products

2nd Place

- ✔ Raspberry Pi 4



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And the Winners Are…

Team Name	Overall Score
Palpatine	186.79
Oxpecker	152.86
ChaosFactor	123.17
Wookiee1	105.60
Be-a-Better-Hacker-Team	50.00
Sebastian	14.35
LSV	2.85
JAKL	2.07


Python for Data Analysis
McKinney
O'REILLY
Hands-On Machine Learning with Scikit-Learn & TensorFlow
Deep Learning with Python
A.I.
for Nuclear Physics Workshop
Share on Social
#JLabAI
#JLabHacks


Krispy Kreme
utz
Cheese Curls

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And the Winners Are…

- **Team Palpatine**
  - ✔ Cade (Michigan State University)
  - ✔ Jake (University of Virginia)
  - ✔ Jose (Argonne National Laboratory)
  - ✔ Miu (Boise State)
- **Team Oxpecker**
  - ✔ Will (Christopher Newport University/JLAB)
  - ✔ Gagik (JLAB)
  - ✔ Alex (JLAB)
  - ✔ Tyler (Old Dominion University)

Acknowledgements

- Amazon Web Services

- University of Virginia, School of Data Science

https://datascience.virginia.edu/

JEFFERSON LAB

AI

Every Wednesday
CC F324-325
12-1PM

jlab.org/ai/lunch_series

LUNCH SERIES

Project is supported by the JSA Initiatives Fund Program, a commitment from the JSA owners, SURA and PAE Applied Technologies.