

Starting a Research Program at Navajo Technical University

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(In collaboration with Dianna Mullet)

Background

- Most administrators and faculty members view NTU as a pure teaching school
- Research activities are virtually not supported by administrators
- There is a lack of understanding of what research entails

Background (continued)

- Generally, students have not been exposed to research and do not understand what is involved
- Many do not understand the difference between computer science and information technology
- The use of mathematics in computer science is not understood

Objective

- Some faculty members have been pushing to get research off the ground
- Our goal is to start this with four students:
 - Two will be able to learn about cryptography and enhance their programming skills
 - Two will learn about machine learning and enhance their mathematical skills

Problems

- So far, only a certificate program in computer science
- Associate's program waiting for approval
- Basic mathematics in A.S. program

Goal 1

- Starting with two students and explore the field of machine learning
- Meetings would be in seminar form
- Initial papers would have to be basic, since many of our students take statistics and linear algebra in their third or fourth year.

Goal 2

- Have a project on improving programming skills of students
- Students would learn about cryptography by implementing the German enigma machine in a modern programming language
- Would be of interest for our students because of the role Navajo code talkers played during World War II

About myself

- Mathematics and theoretical computer science
- Looking to find my own topic to work in machine learning
- Work mainly in isolation...
- Formal verification, distributed systems, quantum computing, homotopy type theory

Dianna Mullet

- Degrees in mathematics, chemistry, psychology
- Interests in higher education research, assessment, underserved population of students
- Develops culturally relevant curricula and learning environment for gifted underserved students

German Enigma

- Students inquired about cryptography
- The actual study of cryptography might be too theoretical
- Implementing an existing system may give them a good idea about what cryptography is
- To get an idea about research, they should try to see what and how things can be improved.

Machine Learning

- Many students have only taken “basic mathematics” in high school
- Starting a group in machine learning will help students to work independently and and to get a feel for what research is
- Eventually, it would be extremely nice if we could come up with an actual research topic to work on

Suggestions?

- Initial material on machine learning should not be too technical for our students, but should give some feel about the subject
- Any suggestions?