



RET Site: Cyber Security Initiative for Nevada Teachers (CSINT)

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Introduction

Target Course: Algebra 2 Honors

Target Audience: High School Students

Lesson Summary: Students will examine the basics of biometrics, it's processes, and vocabulary pertaining to biometrics. Students will participate in class discussions about identification, as well explore concepts of algorithms through mathematics activity and how they are used in biometric systems. Students will then conclude with biometric facial recognition and fingerprint detection demonstrations.

Exploration of Identification

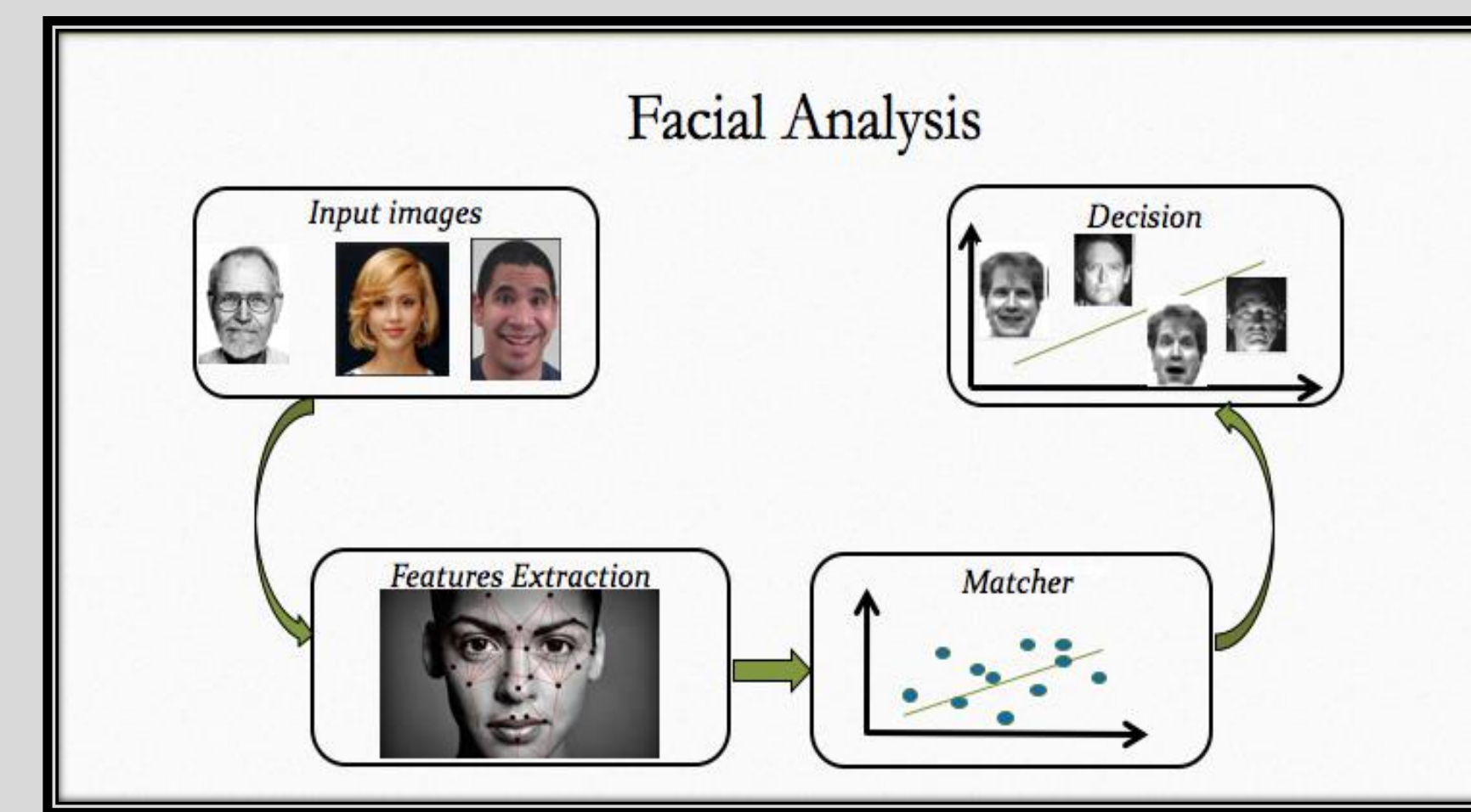
• Students will discuss the following topics:

- ❖ **What is Identification-** Discussion on how we categorized identification through brainstorming. Then provide a formal definition post student discussion
- ❖ **Why do we need identification-** What are risks that are posed by not having identification? What are risks that are posed by having different forms of identification? (ex: divers license, passports, password, car keys, finger print etc.)
- ❖ **How do we Identify-** What are the types of biometrics that we can or do use currently? (ex: facial recognition, fingerprint detection, iris scanning, hand geometry, voice recognition, etc.)



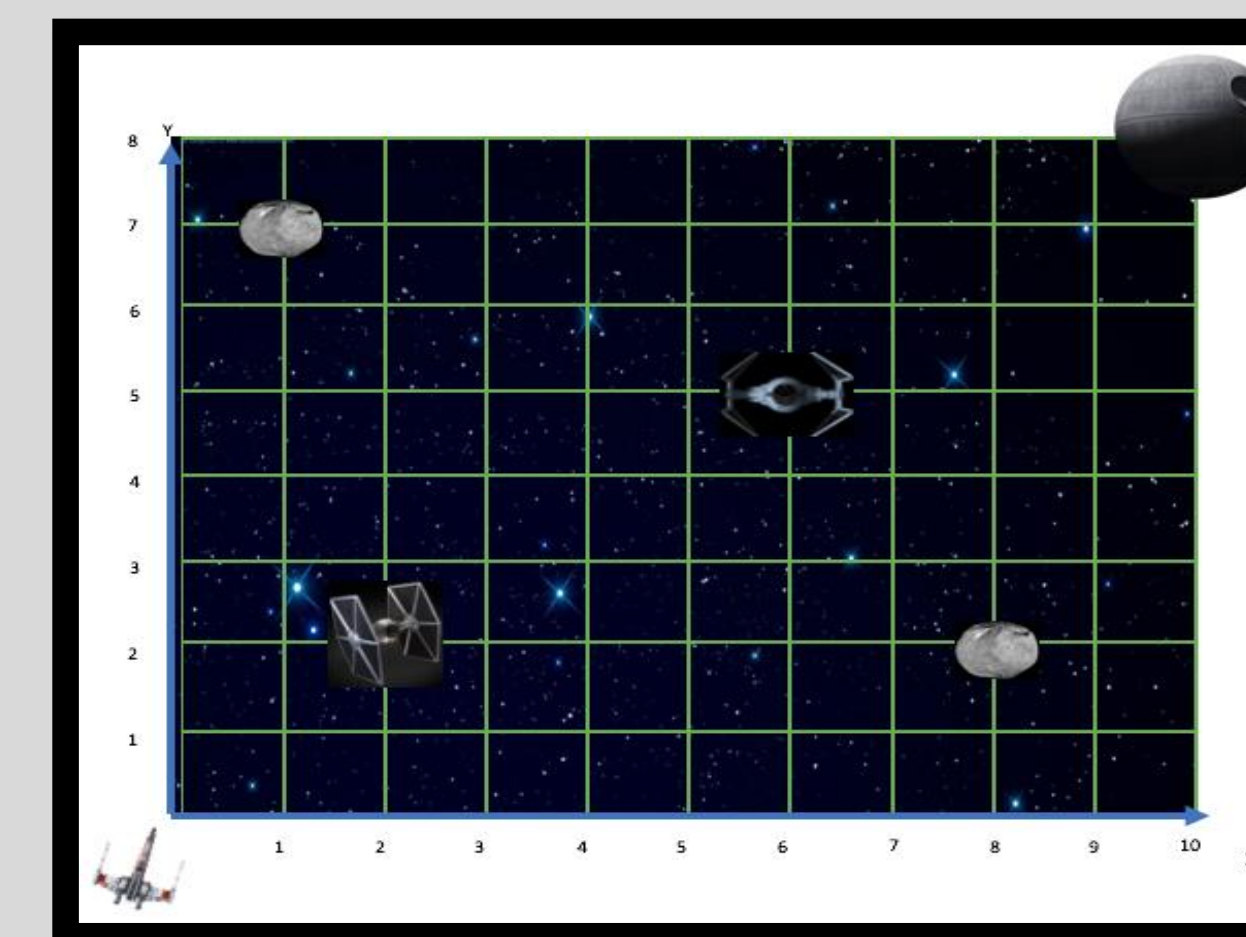
Biometrics for Identification

- ❖ Why should we use biometrics in identification? We can use biometrics for identification as it is more unique and harder to steal than possessions
- ❖ Students will discuss the pros and cons of using biometrics including ease of access, efficiency, uniqueness, as well as security risks, and possible issues with biometric processing.
- ❖ Biometrics 4 step system



Connection to Mathematics

- ❖ Define Algorithm -We write Algorithms to tell a computer how to proceed in a program
- ❖ Pseudocode and Flowcharts
- ❖ Star Wars Algorithm Introduction Activity
 - ❖ Students will be given a grid where they will have to write a pseudocode to fly a drone through the grid correctly with specific commands. At the end of the activity students will have a better idea of what an algorithm is and how it can be used in programming.



- ❖ Flowchart Algorithm for facial recognition/finger print detection(let the kids brainstorm ideas on how a computer might be able to distinguish one face or fingerprint from another)

Biometrics Demonstration

- ❖ Have kids scan faces and fingerprints to create database
- ❖ Students will discuss identification vs verification
- ❖ Let's try and work the system
- ❖ (Matlab and Neuro Technology)
 - ❖ Test facial recognition against photo
 - ❖ Test different lightings/backgrounds
 - ❖ Scans of Partial fingerprints
 - ❖ Do finger prints captured by tape work?



Reflection

- ❖ Students will be given a reflection exit ticket with multiple choice questions to demonstrate their knowledge learned
- ❖ Students will also answer reflection questions that include the following:
 - ❖ In a few sentences, write about something new that you learned about today.
 - ❖ How does the process of biometrics make you feel? Safe? Vulnerable? Are there ways we need to improve biometrics?
 - ❖ Biometrics is just a taste of the whole computer science world and computer science is all around you. Do you think it would be a benefit to learn more about it?