Teacher Guide: Face Recognition

Lesson Plan

Topic: Exploring the links between art, maths and face recognition

Duration: 60 minutes

Learning Objectives

1. Explain how face recognition combines maths, art, and neuroscience.

2. Understand how computers represent images using binary and numerical data.

3. Apply basic mathematical operations to compare facial representations.

Materials Needed

- Worksheet 1: Digital Mirror Art Handout (and Teacher Solutions)
- Worksheet 2: Face Recognition Activity (and Teacher Solutions)
- PowerPoint slides: Maths in the Wild: Digital Mirror
- Paper and pencils for sketching and calculations

Lesson Outline:

1. Introduction (15 min)

Hook: Worksheet 1.

- Get the students sketch the different emotions in the worksheet

- Brief discussion during sketching:

    o Ask: "What are the differences between the different Emotions"
      Answer "Eyes and Mouth

    o Ask: "Which emotions look most like each other?"
      Focus on Happy, Angry and delighted as they will be part of the second
      worksheet

    o Discuss: "Is this related to Maths?"

2. Overview(5 min)

- Slides 1-3 –AI and the Evolution of Portraiture.

- Brief discussion:

    o How has portraiture evolved from artistic painting to digital representation?

    o Ask: "How do you think a computer sees your face?"

- State objectives of the lesson.

3. Concept Exploration (10 min)

- Use Slides 3–7:
    - Art: Capturing essence in portraits (Slide 4).
    - Neuroscience: Fusiform Face Area – how the brain recognizes faces (Slide 5).
    - Maths: Binary representation of faces (Slide 7).
- Explain:
    - Pixels → Numbers → Binary → Mathematical comparison.

4. Activity: Face Recognition Maths (20 min)

- Slides 7-18 and Worksheet 2.
- Tasks:
    1. Sketch a happy, sad, and delighted face.
    2. Convert each sketch into a grid of numbers (0s and 1s).
    3. Perform comparisons:
        - Happy × Happy
        - Happy × Sad
        - Delighted × Sad
    - Discuss: Which faces are most alike?
- Link to slides 12–17 (comparing images mathematically).

5. Discussion & Reflection (10 min)

- Slides 19-23:
    - Highlight interdisciplinary nature: Maths, Art, Neuroscience, Computer Science.
- Ask students:
    - "What surprised you about how computers recognize faces?"
    - "Where else might this technology be used?" (security, social media, etc.)
    - "Have you heard of a deepfake?"

Assessment:

- Observe participation in discussion and activity.
- Check worksheet for correct numerical representation and comparisons.