



IGNITE MY FUTURE

LESSON TITLE

About Faces

Guiding Question: How does perspective change our understanding?

SUBJECTS

English/Language Arts
Social Studies

COMPUTATIONAL THINKING PRACTICE

Developing and
Using Abstractions

COMPUTATIONAL THINKING STRATEGIES

Find Patterns
Abstraction

MATERIALS

[Facial Expression Transfer](#) dataset

Computers with Internet access

A projector and screen
or smartboard

Chalkboard or whiteboard

[Real-Time Expression
Transfer for Facial Reenactment](#)
teacher resource

Ignite Curiosity

- What would happen if we could change a video of a world leader to have them act however we wanted and nobody could tell?
- Is it always easy to recognize if a video is real or fake?
- What are some of the special effects used in the movies to change how people look? Could these special effects have other uses outside of entertainment?

In this lesson, students will use the computational thinking strategies of finding patterns and abstraction to develop a tool a news-consumer can use to identify if a video has been altered by expression transfer technology. In **THINK**, students act as journalists tasked with watching a series of videos made with this technology. They will use the computational thinking strategy of abstraction to identify indicators of videos that have been altered. In **SOLVE** students use the patterns they identified in Think to create a scale that rates the likelihood that a piece of media content has been manipulated. In **CREATE** students use the scale they developed in Solve to construct an online test that news watchers can use to help them discern if the content they are watching is real or manipulated. In **CONNECT**, students identify how content manipulation connects to careers and to problems of tomorrow.

Students will be able to:

- **Analyze** data to describe the characteristics of modified videos,
- **Evaluate** patterns and common features of these videos in order to develop a rating scale, and
- **Create** a test a news-consumer can use to identify videos made using expression transfer technology.



Students act as journalists that are researching sources for a news story. They will study footage of selected expression transfer videos in order to abstract out general indicators of facial manipulation.

1 Read the following scenario to students:

Imagine that you are journalists writing a news story about some strange videos that have recently appeared on the internet. In these videos, many important world leaders are singing pop songs in the middle of their speeches! It has caused a media uproar and many news watchers are confused. Why would these leaders break into song in the middle of serious speeches? Is this some kind of contagious global sing-a-long or have these videos been digitally manipulated with expression transfer technology? Expression transfer software allows a person to alter clips of previously-recorded video by transferring their own expressions onto the face of the speaker. This innovative technology has positive uses, like helping correct audio/video matching in movies, but it also comes with a big risk: anyone can transfer their facial expressions to a video of an important leader, making it look as though they said or did something that they didn't. This means that it will be harder for people to trust the leaders and media of the future.

As today's leading journalists, it is up to you and your colleagues to devise a scale that a news-watcher can use to figure out if a video has been manipulated using expression transfer technology. Can you keep the public's trust by helping them to spot fake videos? Let's see how well you do!

2 Divide students into pairs. Instruct each pair of students to examine two photographs of expression transfer technology in use: [this picture of George W. Bush](#) and [this picture of actor Arnold Schwarzenegger](#). You may choose to print these photographs ahead of time or project them onto a screen or smartboard for all students to see.

Have each pair complete the following tasks:

- Identify and write down the steps of how these facial expressions were manipulated as best they can.
- Come up with 5 words that describe the person's expression in each photo (before manipulation and after manipulation).
- On a scale of 1-10, with 1 being not difficult and 10 being very difficult, rate how difficult it would be for a normal person to identify that the image had been altered.

3 Ask students the following guiding questions:

- How can you tell if a news article or online video is real or fake?
- What are some possible benefits of expression transfer technology? What are some risks?
- Why is it important to know how to distinguish actual news content from manipulated news content?

4 Instruct each student pair to partner with another student pair, forming groups of four. Distribute the [Facial Expression Transfer](#) dataset. Assign one of the following four roles to each student in the group:

- **Scribe**—writes down as much detail as possible about the video
- **Sceptic**—looks for evidence that proves the video has been manipulated
- **Believer**—looks for evidence that proves the video is real
- **Judge**—uses the scribe's notes and listens to the arguments of the sceptic and the believer in order to issue a final judgement on whether or not the video has been manipulated

 Find more easy-to-implement resources to integrate computational thinking practices into your classroom by visiting ignitemyfutureinschool.org



- 5 **Provide** each group with 10 minutes to watch the videos and come to a judgement on whether they are real or manipulated.
- 6 **When all groups have completed the task**, check for understanding by asking students the following questions:
 - What were your final judgements about each of the videos—were they real or manipulated?
 - Across all of the videos that you determined were manipulated, what was some common evidence used?
 - Across all of the videos that you determined were real, what was some common evidence used?
- 7 **Explain to students** that this process of generalizing characteristics is a form of abstraction. Abstraction is a computational thinking strategy that is useful for developing one approach that can solve many different problems. Considering that there are many different forms of news (video, photos, articles and social media, to name a few), what are some common characteristics we can abstract that can help us spot manipulated content?



Students use the computational thinking strategies of abstraction and finding patterns to develop a scale that news consumers can use to determine if news content is accurate.

- 1 Draw** a T-chart on the board.
- 2 Have the sceptic** from each student group come up and write one characteristic of manipulated news content on the board (extreme facial expressions, lags between expressions and words, inconsistent shadows, pixelation, appears out of context, etc.).
- 3 Have the believer** from each student group come up and write one characteristic of real news content on the board (authentic facial expressions, lists reputable sources, words and expressions match, etc.).
- 4 Divide students** into new groups of three to five. Provide each group with 10 minutes to develop a rating scale with assessment criteria that helps a user to determine if a video was manipulated with facial expression transfer technology.
- 5 Once students have developed their scales**, check for understanding by having students answer the following questions:
 - What patterns did you find in the data on the board and how did that inform the creation of your rating scale?
 - How does the computational thinking strategy of finding patterns serve as a useful tool in identifying manipulated video content?
 - Do you think that a person using this rating scale will always be able to determine with 100% accuracy if a video has been manipulated? Why or why not?
 - What elements of news content are subjective? How does our own worldview shape how we interpret news and media?



Students use their rating scales to develop an online test that news consumers can use to identify videos that have been made using expression transfer technology. They work in groups to create thorough test questions that would help a user spot fake videos.

1 In their groups, instruct students to turn each piece of criteria on their rating scales into a multiple-choice question.

Ex: if a group's rating scale includes the criterion "Eye Expression," a possible multiple-choice question could be: Which of the following choices does the speaker's eye expressions most closely resemble?:

- Moderate eye movement NOT in keeping with other facial expressions
- Moderate eye movement in keeping with other facial expressions
- Lots of eye movement NOT in keeping with other facial expressions
- Lots of eye movement in keeping with other facial expressions

2 Using their rating scales, students should evaluate how to assign point values to each answer choice that would indicate the likelihood that the video uses or does not use manipulation.

3 Provide groups with 5-10 minutes to compile their questions into a quiz and develop a scoring key for the quiz. This can be done on paper or in a word processing tool.

Optional extension: students can use the free online application [Kahoot](#) to develop their quiz.

4 Instruct each group to pass their quiz to the group immediately to their left.

5 Have each group analyze the image below and complete the quiz. Once they have completed the quiz, instruct the group to score their answers using the key provided.



6 Ask each group for their determination: is the video real or manipulated? Once each group has responded, ask the following questions:

- Why are the computational thinking strategies of abstraction and finding patterns useful for analyzing media?
- Why is it important that we have tools to help us identify accurate media? What sources do you trust?



Select one of the strategies listed below to help students answer these questions:

- **How do this problem and solution connect to me?**
- **How do this problem and solution connect to real-world careers?**
- **How do this problem and solution connect to our world?**

- 1 Write** the three questions on PowerPoint or flip chart slides and invite students to share out responses. Display chart paper around the room, each with one question written on it. Ask students to write down their ideas on each sheet.
- 2 Assign** one of the questions to three different student groups to brainstorm or research, and then share out responses.
- 3 Direct** students to write down responses to each question on a sticky note, and collect them to create an affinity diagram of ideas.

How does this connect to students?

Students may not realize it, but many of the videos they watch and photos they see online have been digitally manipulated. By learning about digital manipulations such as facial expression transfer, students will become more informed consumers of media and will be better able to evaluate the veracity of news content.

How does this connect to careers?

Public Officials such as detectives, lawyers and judges need a clear understanding of what constitutes authentic evidence and what has been digitally manipulated to serve the justice system appropriately.

Reporters searching for sources and looking to verify information need to be able to distinguish truth from fiction as they evaluate the veracity of a video or image.

Artists, particularly animators, can use facial expression transfer technology to create realistic images and videos that evoke a wide range of human expression.

How does this connect to our world?

Technologies enabling the manipulation of videos have improved at a rapid rate and will continue to do. Technologies like facial expression transfer have the potential to proliferate rapidly throughout society, spreading misinformation and guiding people to the wrong conclusions. Media literacy will be increasingly important for students as they mature and navigate a complicated information landscape.

National Standards

COMMON CORE ELA STANDARDS

CCSS.ELA-LITERACY.WHST.6-8.2.A

Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

CCSS.ELA-LITERACY.WHST.6-8.2.B

Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

CCSS.ELA-LITERACY.WHST.6-8.2.C

Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

CCSS.ELA-LITERACY.WHST.6-8.2.D

Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS.ELA-LITERACY.WHST.6-8.2.E

Establish and maintain a formal style and objective tone.

CCSS.ELA-LITERACY.WHST.6-8.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented.

THE COLLEGE, CAREER, AND CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS: GUIDANCE FOR ENHANCING THE RIGOR OF K-12 CIVICS, ECONOMICS, GEOGRAPHY, AND HISTORY

Dimension 4, Communicating Conclusions

By the end of grade 8:

D4.3.6-8.

Present adaptations of arguments and explanations on topics of interest to others to reach audiences and venues outside the classroom using print and oral technologies (e.g., posters, essays, letters, debates, speeches, reports, and maps) and digital technologies (e.g., Internet, social media, and digital documentary).

D4.4.6-8.

Critique arguments for credibility

D4.5.6-8.

Critique the structure of explanations.

K-12 COMPUTER SCIENCE FRAMEWORK

Practice 4. Developing and Using Abstractions

Abstractions are formed by identifying patterns and extracting common features from specific examples to create generalizations. Using generalized solutions and parts of solutions designed for broad reuse simplifies the development process by managing complexity.

Expression Transfer Dataset

As you view the following videos and images, take notes to record your ideas and responses to the guiding questions for each source on this sheet.

[New York Times Video: Manipulating Faces from Afar](#)

In this video, you will learn about the new technology that has allowed for facial manipulation and its possible uses.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

[Daniel Craig Facial Reenactment](#)

This series of images shows how one image of actor Daniel Craig has been manipulated to show Craig wearing various expressions.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

[President Obama Facial Reenactment](#)

This series of images shows how images of President Barack Obama can be manipulated using another person's facial expressions.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

Expression Transfer Dataset Cont.

Facial Reenactment Process

This image demonstrates that even when the sources look nothing alike, it is possible to transfer an expression from one person's face to another person's face using facial reenactment technology.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?

Facial Reenactment Process

This demonstration of the facial reenactment process shows the different components that go into creating a realistic facial expression transfer.

- 1 What do you notice about the manipulated image(s)?
- 2 How are the manipulated image(s) different from the original(s)?
- 3 What features look accurate in the manipulated image(s)?
- 4 What features don't look accurate in the manipulated image(s)?