Pictionary Lecture notes

Slide 1: Title Slide – Pictionary App: Communicating Pixels

- Welcome

Slide 2: Pictionary Apps

- Pictionary apps send pictures over the internet and we can guess what the picture is

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Slide 3: Images as 1s and 0s

- Computers don’t see pictures—they see data.
- Each pixel is either on (1) or off (0).
- We can represent simple images using grids of 1s and 0s.

Slide 4: Recreate a Drawing App Without Phones

- Let’s simulate a drawing app without devices.
- Use binary to send your drawing to the other team.

Slide 5: 5x5 Grid Example

- Here’s a small example: a 5x5 grid. (Like the 5 x 5 grid on the microbit)
- Draw a simple shape, like the letter T.
- Convert it into binary—1s for black squares, 0s for white.
- Decode it back to guess the image.

Slide 6: Bigger Grids = Bigger Problems

- What happens when we use a bigger grid?
- The binary string gets really long—225 characters for a bunny!
- Hard to manage and easy to mess up.

Slide 7: Compressing with Run Length Encoding

- We need it to be shorter - making things shorter is called “compression”
- Let’s compress the data using **Run Length Encoding**.
- Instead of writing every 0 and 1, we count how many in a row.
- Example: `000111111111000` becomes `031903`.

Slide 8: Another Compression Example

- Try this row: `001111111111100`.
- Count and compress: `0211102`.

Slide 9: Compression Problem

- Wait—`0211102` is confusing.
- Is it 1 group of 1s or 11 1s?
- We need a better way to represent numbers over 9.

Slide 10: The Problem

- We need a way to represent numbers bigger than 9 using just one character.
- Let’s fix this!

Slide 11: Solution – Use Letters

- Use letters to represent numbers above 9.
- A = 10, B = 11, C = 12, etc.
- So 11 1s becomes `B`.

Slide 12: Better Compression

- Now `001111111111100` becomes `021B02`.
- Much easier to read and decode!

Slide 13: Even Better Compression

- We don't even need to say 0s and 1s.
- Just write the counts: `2B2`.
- We'll agree to always start with white (0).

Slide 14–15: Encoding Examples

- A full white line of 15: just `F`.
- A full black line of 15: `0F`.
- Checkerboards are tricky—we'll avoid those where we can!

Slide 16: Encoding the Bunny

- Look how much shorter the encoded bunny is!
- Instead of 225 characters, we use compressed strings like `2B2`, `1D1`, etc.
- Run Length Encoding makes it manageable.

Slide 17: Game Rules

- Get a secret word from a tutor.
- Draw it on a grid (5x5, 10x10, or 15x15).
- Encode it into binary.
- If it's bigger than 5x5, use Run Length Encoding.
- Swap encoded messages with another team.
- Decode and guess the image.
- Tutors check your work and award points.

Slide 18: How to Win

- Points for encoding, decoding, and guessing correctly.
- Bigger grids = more points.
- Keep track of your score on your score sheet!

Slide 19–20: Posters & Instructions

- Posters around the room will help if you forget the steps.
- Follow the encoding and decoding instructions carefully.
- Use letters for numbers above 9.
- Always start with white when encoding.