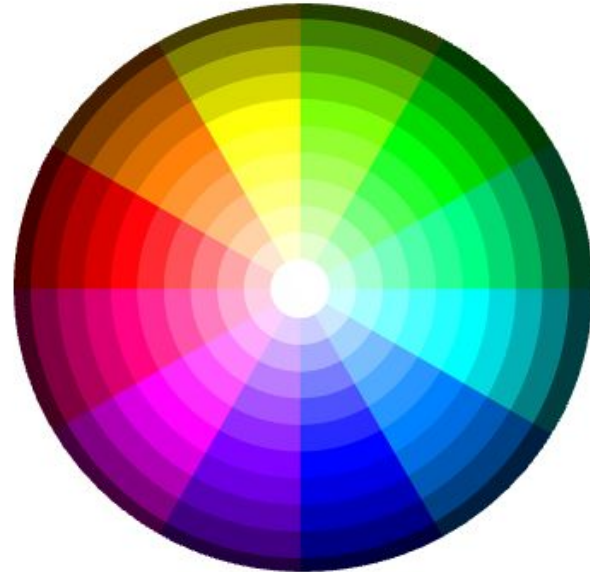




Q: Which colour best describes the one represented by the hexadecimal colour code: #FFD700?

- A. Shade of red
- B. Shade of blue
- C. Shade of green
- D. Shade of purple
- E. Shade of yellow





CPSC 100

Computational Thinking

Intro to Visualization

Instructor: Parsa Rajabi
Department of Computer Science
University of British Columbia



Agenda

- Course Admin
 - AI Disclosure Form *[Reminder]*
 - Course check-in survey *[Reminder]*
- Learning Goals
- Data Representation in Action *[Wrap up]*
- Introduction to Visualization

Course Admin



Course Admin

- **Project Milestone 2**
 - Due Wednesday, March 12, 11:59pm
 - **[New!]** *AI Disclosure Form*
- **PC Quiz 5**
 - Due Sunday, March 16, 11:59pm
- **Final Exam**
 - Tuesday, April 22, 7pm; Location TBA
 - This might be a good time to start your cheatsheet!*

Project AI Disclosure Form

CPSC 100 - AI Use Disclosure

Why this survey? This disclosure form aims to help us understand and reduce any potential risks related to the use of AI tools in this course.

Please be truthful in answering the survey. Using AI tools will not negatively affect your marks for the assignment.

Regardless of how your team member(s) have used AI tools, answer the questions based on your own use of AI tools for completing your part of the assignment.

What do we mean by AI tools in this survey? AI content generators refer to any tools that create any type of content, including:

- ChatGPT and all other large-scale language models;
- Stable Diffusion and other AI-based Image Generators; and
- Other tools that are capable of generating text, image, codes, or any other content for the course work.

BUT, Grammarly and other grammar checkers are NOT included.

Your 8-digit Student Number

First Name (as appears on Canvas)

Last Name (as appear on Canvas)

Link to Form

**Each student submits
their own disclosure**

**No submission? 10%
penalty applied**

***Also available via Canvas >
CPSC 100 >
Scroll down to project
section***

Course Check-in Survey



Course Check-in Survey

- Please fill out the anonymous survey below to provide your thoughts on the course thus far. Your feedback will be used to improve the course!
- https://ubc.ca1.qualtrics.com/jfe/form/SV_26a4t2Ppcw6mJ6u

CPSC 100 - Course Check-in Feedback

The purpose of this survey is to gather student feedback so the teaching team can make changes that can improve your learning experience for the remainder of the semester. Your answers will also help us make improvements for future years. All responses are *anonymous*.

Thank you for taking the time to complete this survey!

What lab are you in?

☐ L2A
☐ L2B
☐ L2C
☐ L2D
☐ L2E

Please indicate how strongly you agree or disagree with all the following statements.

Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
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Learning Goals



Learning Goals

After this **today's lecture**, you should be able to:

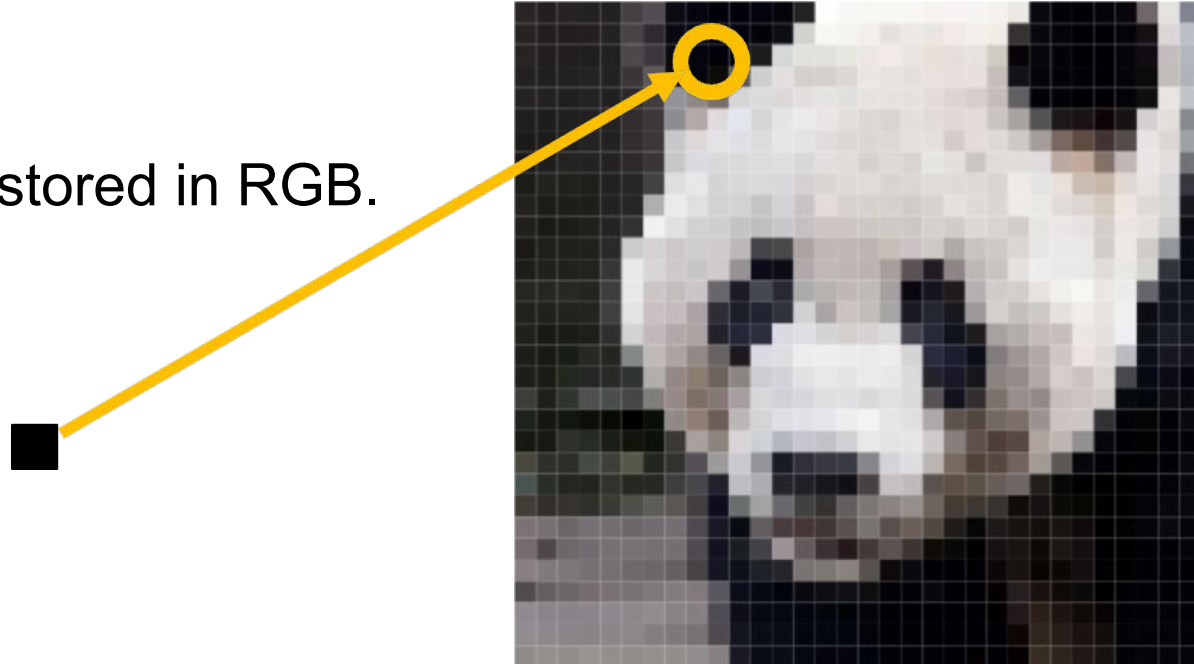
- Describe how images are stored in computers
- Explain the concept of bitmap images & how they are divided into pixels.
- Define visualization and explain its role in computational thinking.
 - Describe how visual data representation helps in understanding patterns, trends, and insights.
 - Differentiate between explanatory and exploratory visualization.
- Create different types of visual representations for a provided dataset.

Pixels & Computer



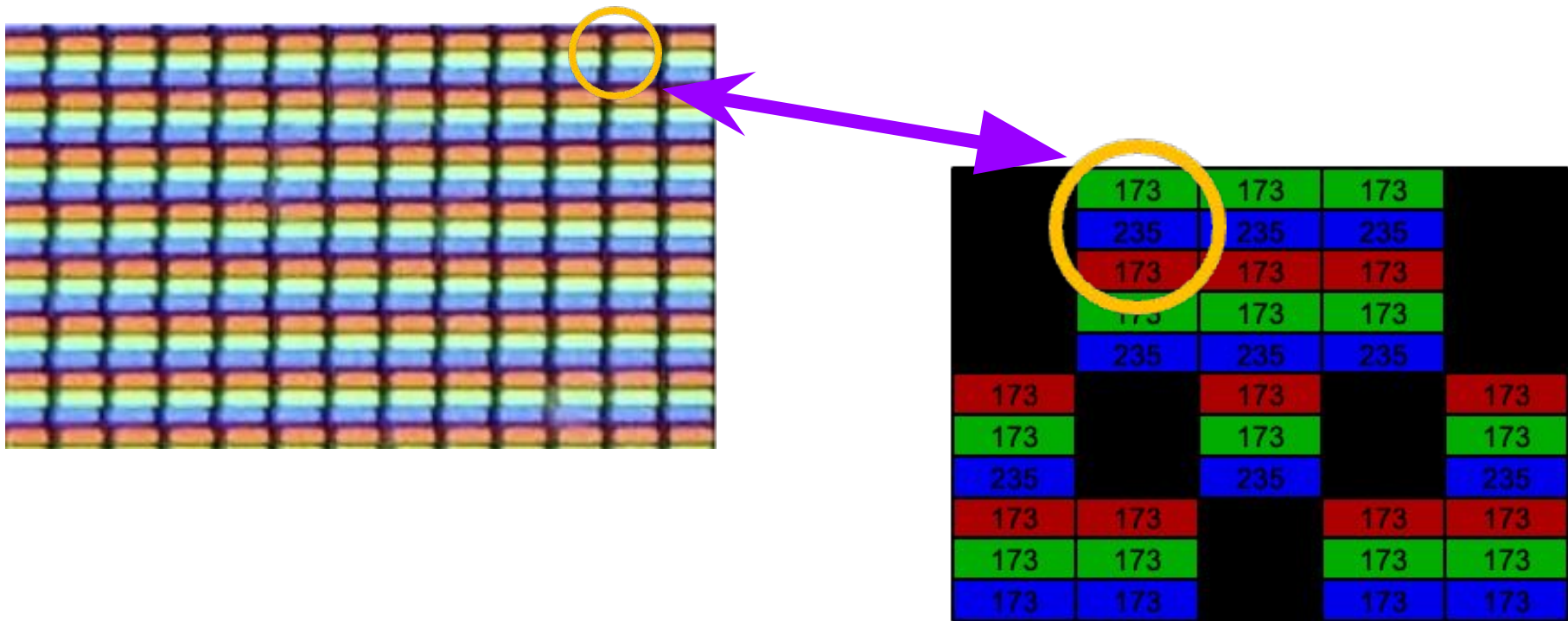
How are Images Stored?

- There are two ways that computers commonly store images. The most common is a **bitmap** – the picture is chopped up into small little squares called **pixels**.
- Each pixel's colour is stored in RGB.



Bitmap Pixels

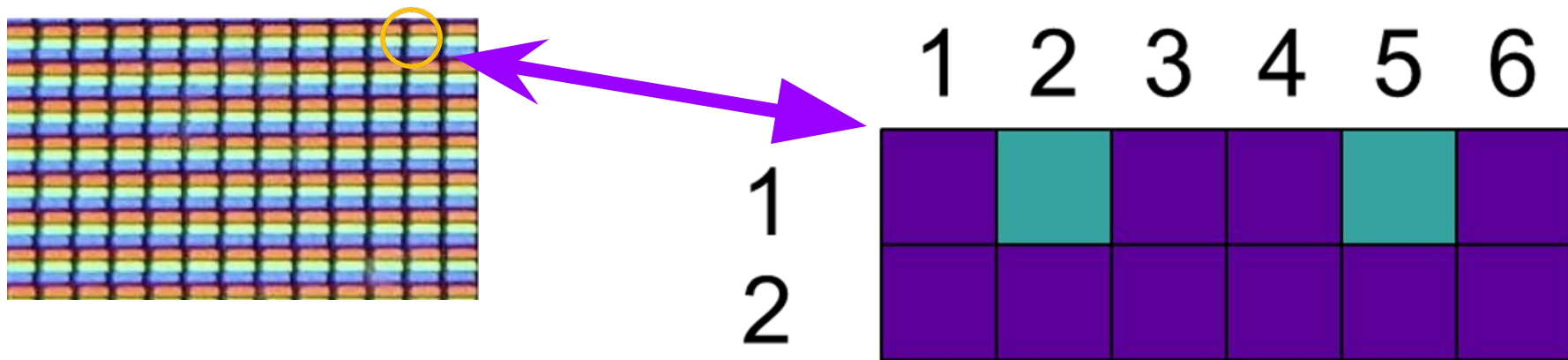
- The image is split into smaller **pixels**, each of which contain Red, Green and Blue





Bimap Pixels

- Bitmap image representation example



Note: the bitmap is

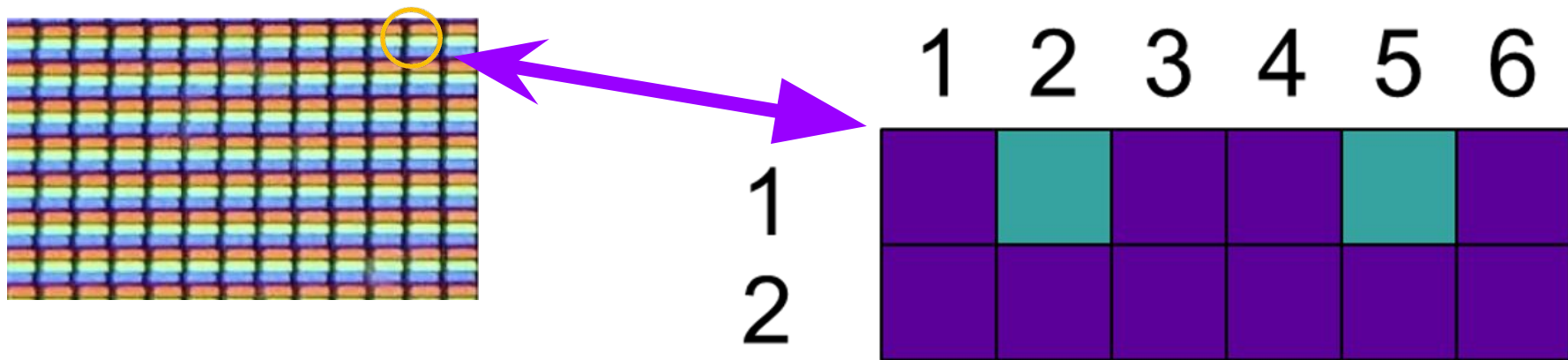
06 02

5C009A	35A4A0	5C009A	5C009A	35A4A0	5C009A
5C009A	5C009A	5C009A	5C009A	5C009A	5C009A



Bimap Pixels

- Bitmap image representation example



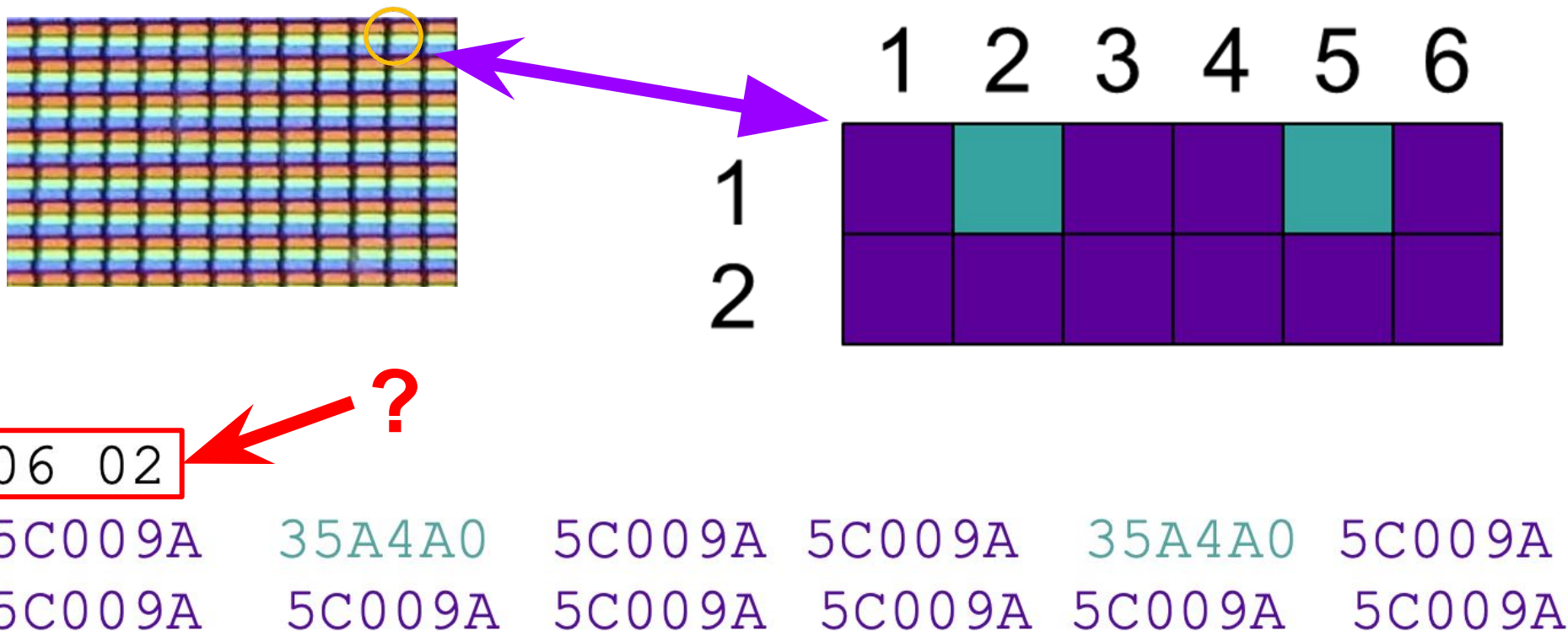
06 02

5C009A	35A4A0	5C009A	5C009A	35A4A0	5C009A
5C009A	5C009A	5C009A	5C009A	5C009A	5C009A



Bimap Pixels

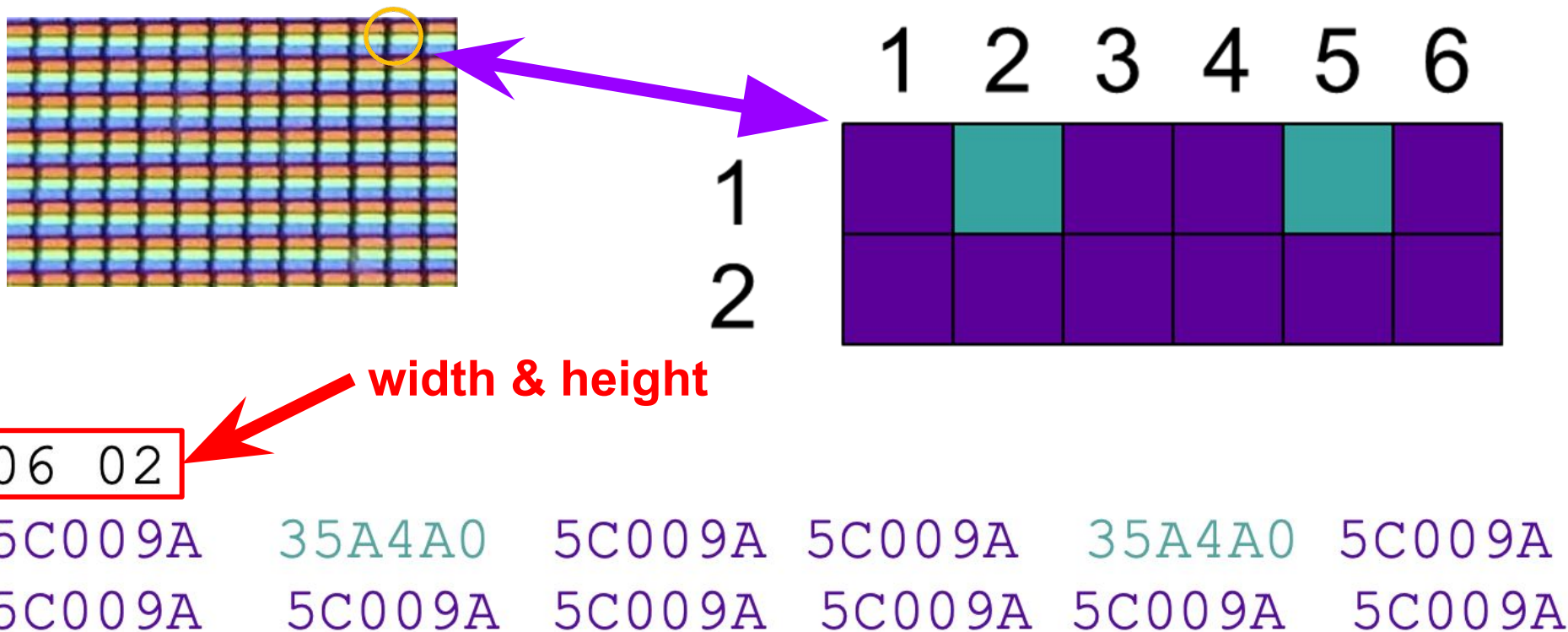
- Bitmap image representation example





Bimap Pixels

- Bitmap image representation example







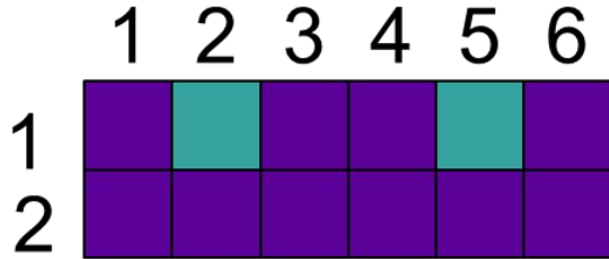
Q: Which image has the following bitmap?



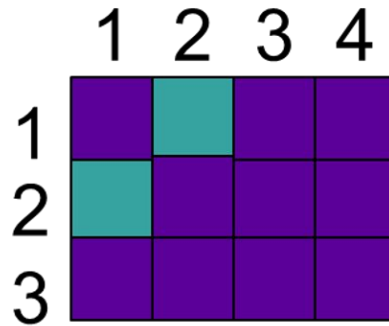
iClicker

04 03

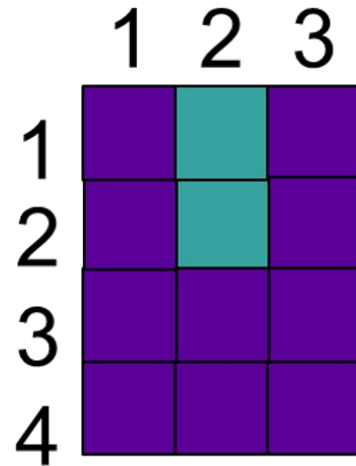
5C009A 35A4A0 5C009A 5C009A 35A4A0 5C009A
5C009A 5C009A 5C009A 5C009A 5C009A 5C009A



[A]



[B]



[C]

Visualization



What is Visualization?

- Also known as *visual data representation*
- The process of representing data graphically to make it easier to understand patterns, trends, and insights. Instead of raw numbers or complex tables, we use charts, graphs, and maps to communicate information effectively



What is Visualization?

- Also known as *visual data representation*
- The process of representing data graphically to make it easier to understand patterns, trends, and insights. Instead of raw numbers or complex tables, we use charts, graphs, and maps to communicate information effectively
- **Explanatory:** There is something in your data you would like to communicate to your audience
- **Exploratory:** You are trying to explore and understand patterns and trends within your data.

Why Visual Data Representation?



Why Visual Data Representation?

- Vision is our most dominant sense
- We are very good at recognizing visual patterns
- We need to see and understand in order to explain, reason, and make decisions:
 - Makes complex data easier to understand
 - Supports better decision-making
 - Improve communication



Why Visual Data Representation?

- Can you see any differences in the general trends of these four sets of numbers?

I		II		III		IV	
10	8.04	10	9.14	10	7.46	8	6.58
8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.1	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.1	4	5.39	19	12.5
12	10.84	12	9.13	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

Anscombe's Quartet

Four datasets that share the same descriptive statistics, including mean, variance, and correlation.

I

10	8.04
8	6.95
13	7.58
9	8.81
11	8.33
14	9.96
6	7.24
4	4.26
12	10.84
7	4.82
5	5.68

II

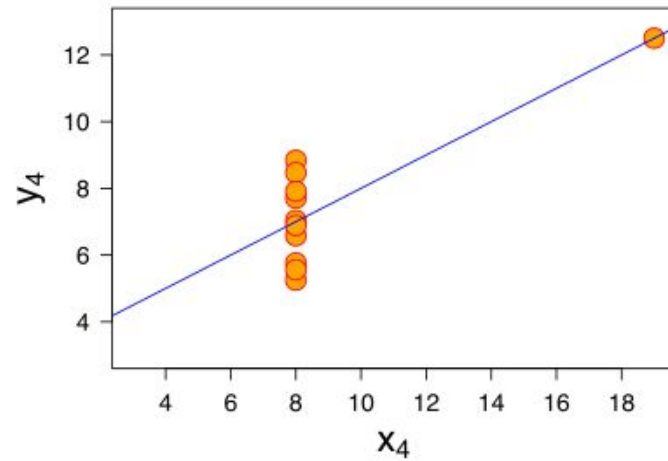
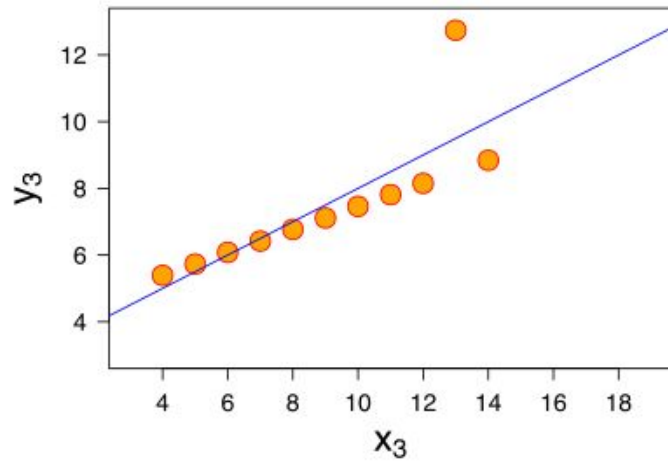
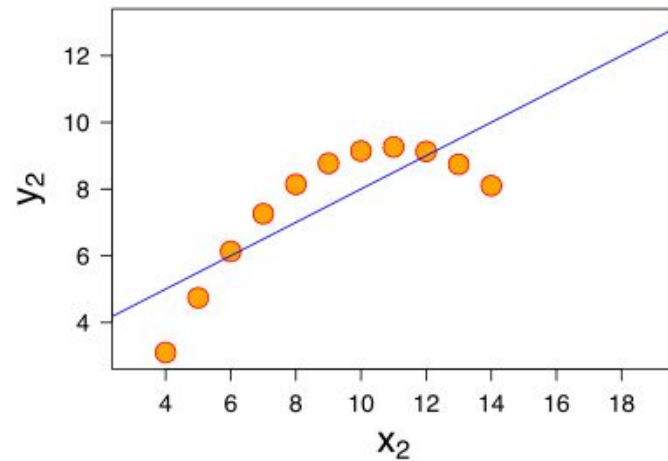
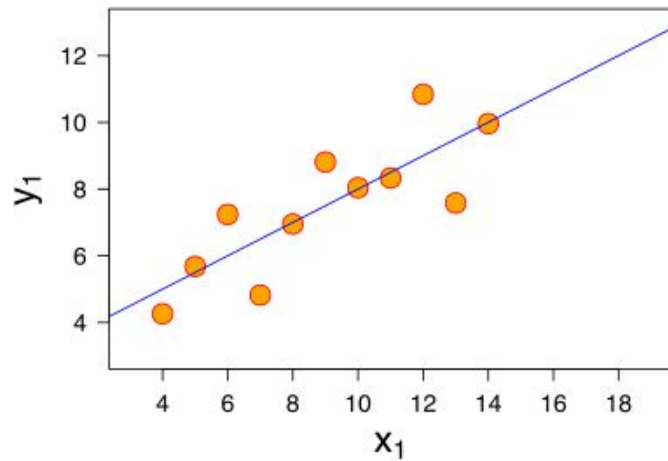
10	9.14
8	8.14
13	8.74
9	8.77
11	9.26
14	8.1
6	6.13
4	3.1
12	9.13
7	7.26
5	4.74

III

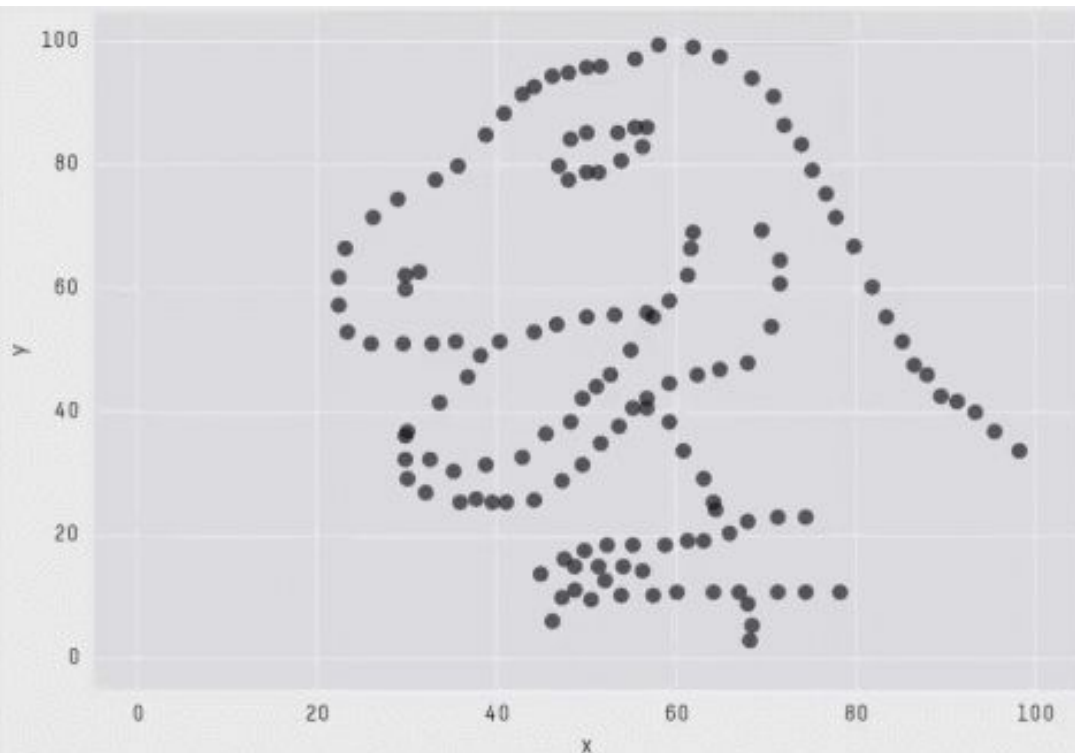
10	7.46
8	6.77
13	12.74
9	7.11
11	7.81
14	8.84
6	6.08
4	5.39
12	8.15
7	6.42
5	5.73

IV

8	6.58
8	5.76
8	7.71
8	8.84
8	8.47
8	7.04
8	5.25
19	12.5
8	5.56
8	7.91
8	6.89



Other Example: Datasaurus dataset [\[Link\]](#)



X Mean: 54.2659224
 Y Mean: 47.8313999
 X SD : 16.7649829
 Y SD : 26.9342120
 Corr. : -0.0642526

Activity



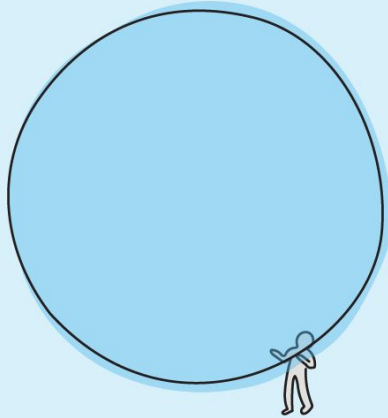
Activity

- Visualize the dataset below in at least 5 different ways.
- Sketch on paper
OR use a tool (e.g.Excel)

Ice Cream Flavour	Count
Chocolate	50
Vanilla	43
Mint	31
Strawberry	35
Matcha	12
Blueberry	43
Coffee	66



A REALLY HARD THING



HOW IT FEELS
RIGHT NOW



HOW IT WILL FEEL
IN A FEW MONTHS



HOW IT WILL FEEL
IN A FEW YEARS

LIZ FOSSLIE



What was your main takeaway from today's session?



Wrap up



Wrap Up

- **This week's Lab:** Project Milestone 2
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