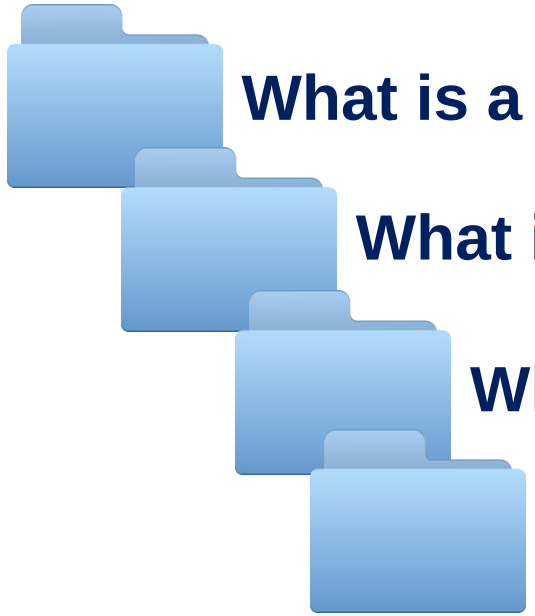
Pattern Recognition

Lesson Objectives

At the end of this lesson, you should be able to:

- Describe the concept of pattern recognition
- Apply pattern recognition to solve complex problems

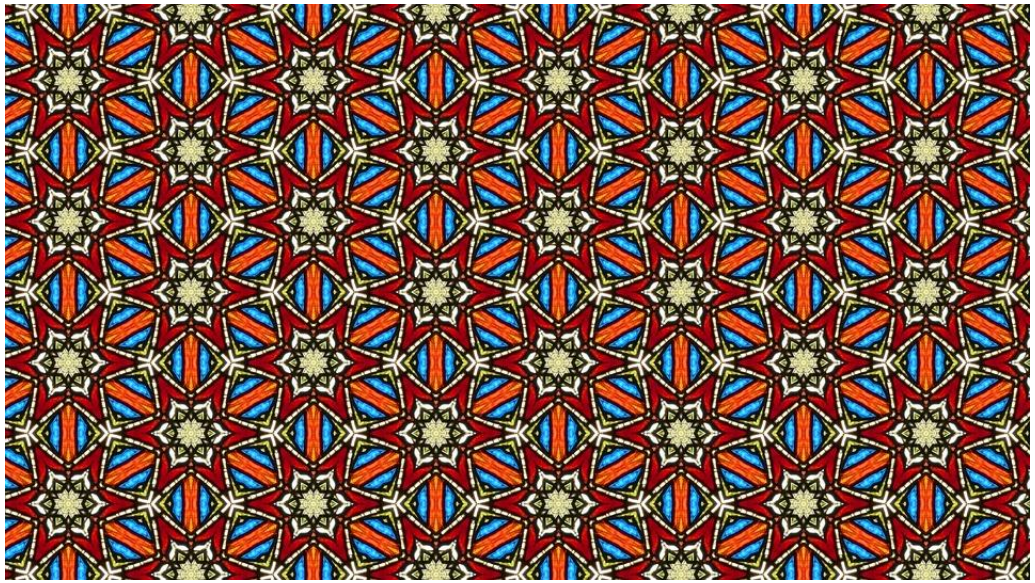
Topic Outline



- What is a Pattern?
- What is a Pattern Recognition?
- Why is Pattern Recognition Important?
- How to recognize Patterns?

What is a Pattern?

- A **pattern** is a discernible regularity.
  - The elements of a pattern repeat in a **predictable manner**.
- In computational thinking, a **pattern** is the spotted **similarities** and **common differences** between problems.



Example: 1, 4, 7, 10, 13, 16, 19, 22, 25, …

$$A_n = A_{n-1} + 3$$

What is Pattern Recognition

Pattern Recognition is one of the four cornerstones of Computational Thinking.

It involves finding the similarities or patterns among small, decomposed problems, which can help us solve complex problems more efficiently.

Why is Pattern Recognition Important?

- Patterns make problems simpler and easy to solve.
- Problems are easier to solve when they share patterns, we can use the same problem-solving solution wherever the pattern exists.
- The more patterns we can find, the easier and quicker our problem solving will be.

How to Recognize Patterns?

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Pattern recognition is a process involving the following steps:

1. Identifying common elements or features in problems.
2. Identifying and interpreting common differences between problems.
3. Identifying Individual elements within problems.
4. Describing patterns that have been identified.
5. Making predictions based on identified patterns.

Example 1

Suppose we already know that: 1 + 2 + 3+ 4 + … + 100 = 5050

How do we quickly calculate the result of 2 + 4 + 6 + 8 + … + 200?

Answer

2 + 4 + 6 + 8 + … + 200 = 2 * (1 + 2 + 3 + 4 + … + 100)

= 2 * 5050

Example 2

Suppose we already know that: 1 + 2 + 3+ 4 + … + 100 = 5050

How do we quickly calculate the result of

101 + 102 + 103 + 104 + … + 200?

Answer

101 + 102 + 103 + 104 + … + 200

= (100 + 1) + (100 + 2) + (100 + 3) + (100 + 4) + … + (100 + 100)

= (100 + 100 + 100 + 100 + … + 100) + (1 + 2 + 3 + 4 + … + 100)

100 times

= 100 * 100 + 5050

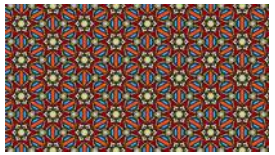
Summary

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

In this lesson, we have learned:

- What Pattern Recognition is
- Importance of Pattern Recognition
- Steps in Recognizing Patterns

References for Images

No.	Slide No.	Image	Reference
1	5		Survey icon [Online Image]. Retrieved April 18, 2018 from https://pixabay.com/en/survey-icon-survey-icon-2316468/.
2	5		Pattern [Online Image]. Retrieved July 2, 2018 from https://pixabay.com/en/pattern-stained-glass-church-2661920/.
3	6		Twinkle [Online Image]. Retrieved July 2, 2018 from https://www.deviantart.com/fleur555/art/Twinkle-71905382.
4	9, 10		Question problem [Online Image]. Retrieved April 18, 2018 from https://pixabay.com/en/question-problem-think-thinking-622164/.