FACULTY OF IT-HCMUS

Mathematical Method in Visual Data Analysis

Lecturer: Assoc Prof. Lý Quốc Ngọc

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Mathematical Method in Visual Data Analysis

Lecture 1: Introduction of Mathematical Method in VDA

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1. Introduction

1.1. Goal

1.2. Content

1. Introduction

1.1. Goal

- In the trend of the **industrial revolution 4.0**, building an **intelligent vision system** is increasingly urgent in life.

- Intelligent vision system includes **3 main layers**: **data** processing layer, **task** layer, **application** layer.

- To build these 3 layers, **the mathematical method** plays an **important core role**.

1. Introduction

1.1. Goal

- This subject is an urgent bridge to supplement **mathematics knowledge** in visual data science, improving knowledge of **visual data science**, building **intelligent vision systems**, suitable to **education method ver 4.0**.

1. Introduction

1.2. Content

Chapter 1. Introduction to Mathematical Method in Visual Data Analysis

1.1. The Goal of MM in VDA

1.2. Basic mathematical methods in VDA

1.3. Software tools to support VDA.

1. Introduction

1.2. Content

Chapter 2. Metric Space

2.1. The role of metric space in VDA

2.2. The basic concepts in metric space

2.3. Applications of metric space in VDA

1. Introduction

1.2. Content

Chapter 3. Vector space

3.1. The role of vector space in VDA

3.2. The basic concepts in vector space

3.3. Applications of vector space in VDA.

1. Introduction

1.2. Content

Chapter 4. Optimization Method

4.1. The role of optimization method in VDA

4.2. Unconstrained optimization method

4.3. Connstrained optimization method

4.4. Applications of optimization method in VDA.

1. Introduction

1.2. Content

Chapter 5. Method of solving a system of equations

5.1. The role of system of equations in VDA

5.2. Method of solving system of linear equations .

5.3. Method of solving system of non-linear equations .

5.4. Applications of system of equations in VDA.

1. Introduction

1.2. Content

Chapter 6. Method of solving Partial Differential Equation

6.1. The role of PDE in VDA

6.2. Method of solving PDE

6.3. Applications of PDE in VDA.

1. Introduction

1.2. Content

Chapter 7. Deep Learning

7.1. The role of DL in VDA

7.2. 2D and 3D Deep Convolution Neural Network

7.3. Deep Recurrent Neural Network

7.4. Applications of DL in VDA.