

**2022 东南大学计算机科学与工程学院**

**第二届国际暑期学校项目总结报告**

**Final Report of SEU CSE International Summer School Program**

**项目主题 Theme**

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**AI**

**Experiencing Frontier Technologies of Artificial Intelligence**

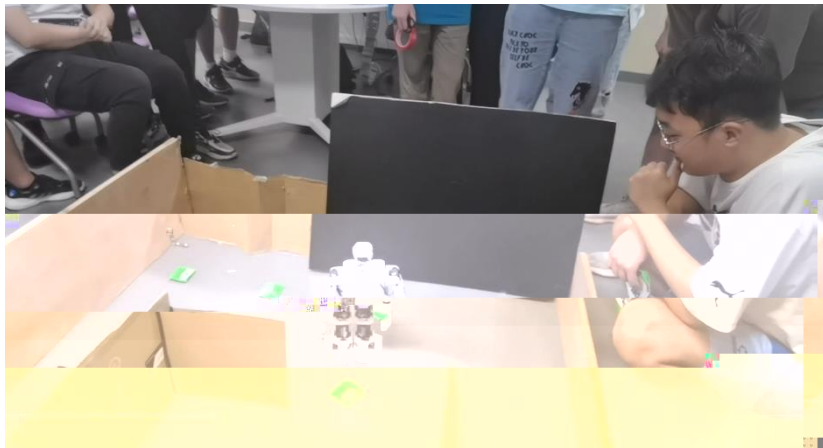
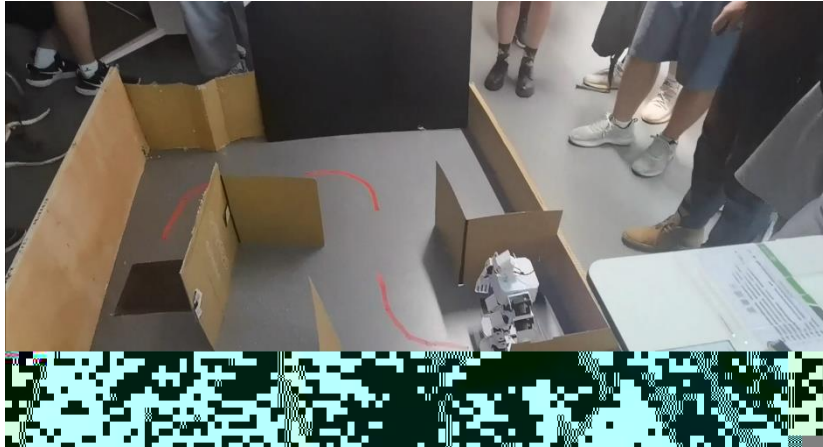
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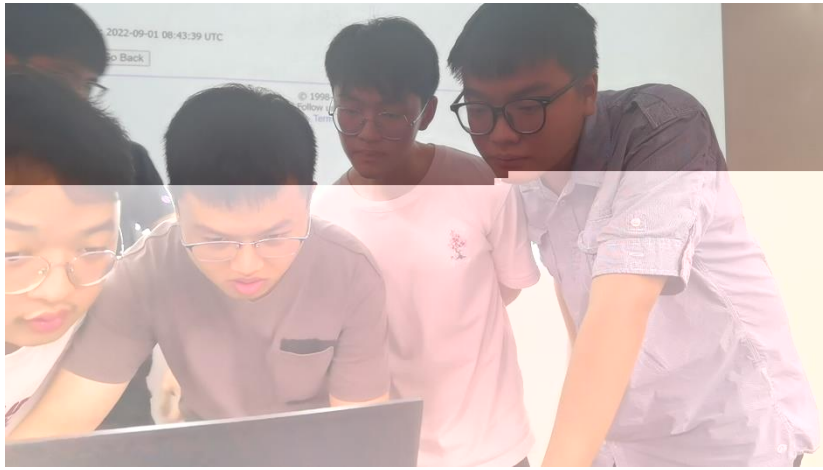
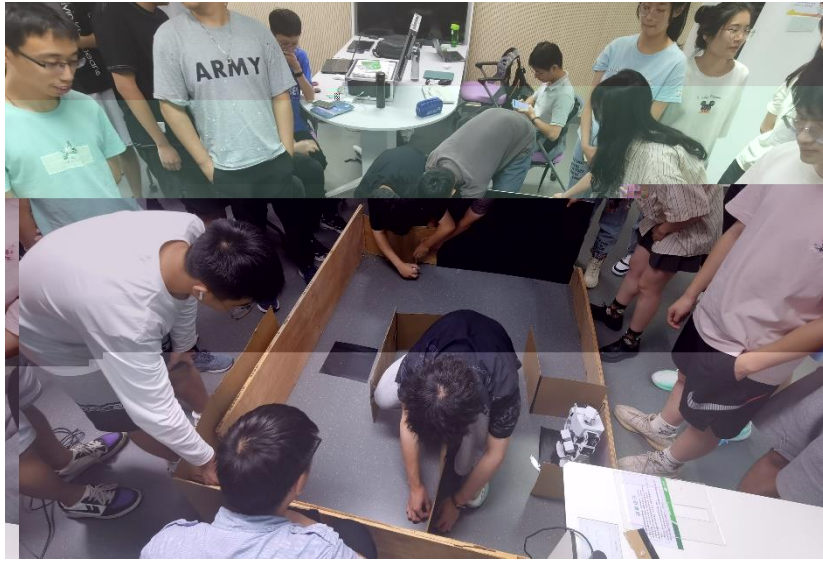
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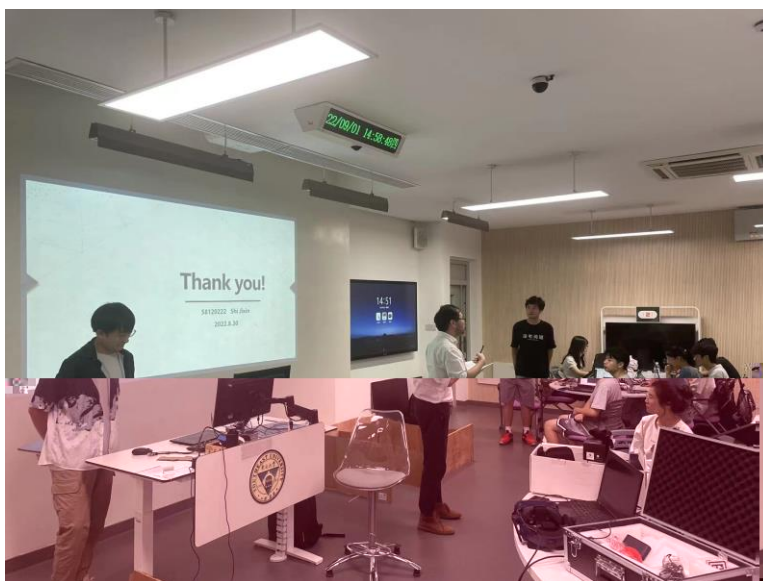
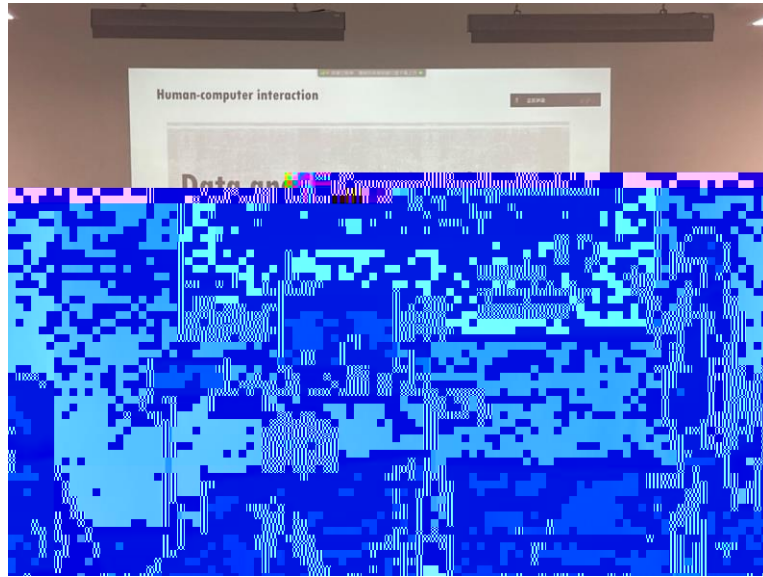
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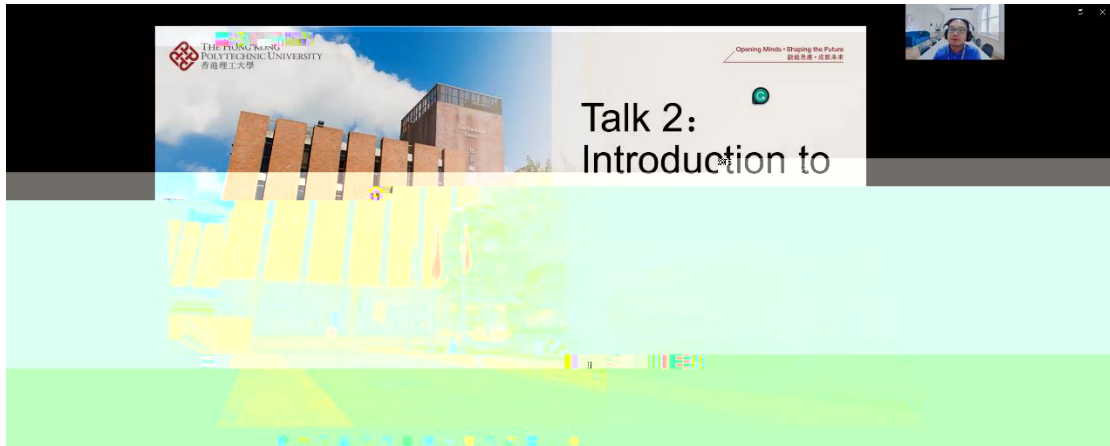
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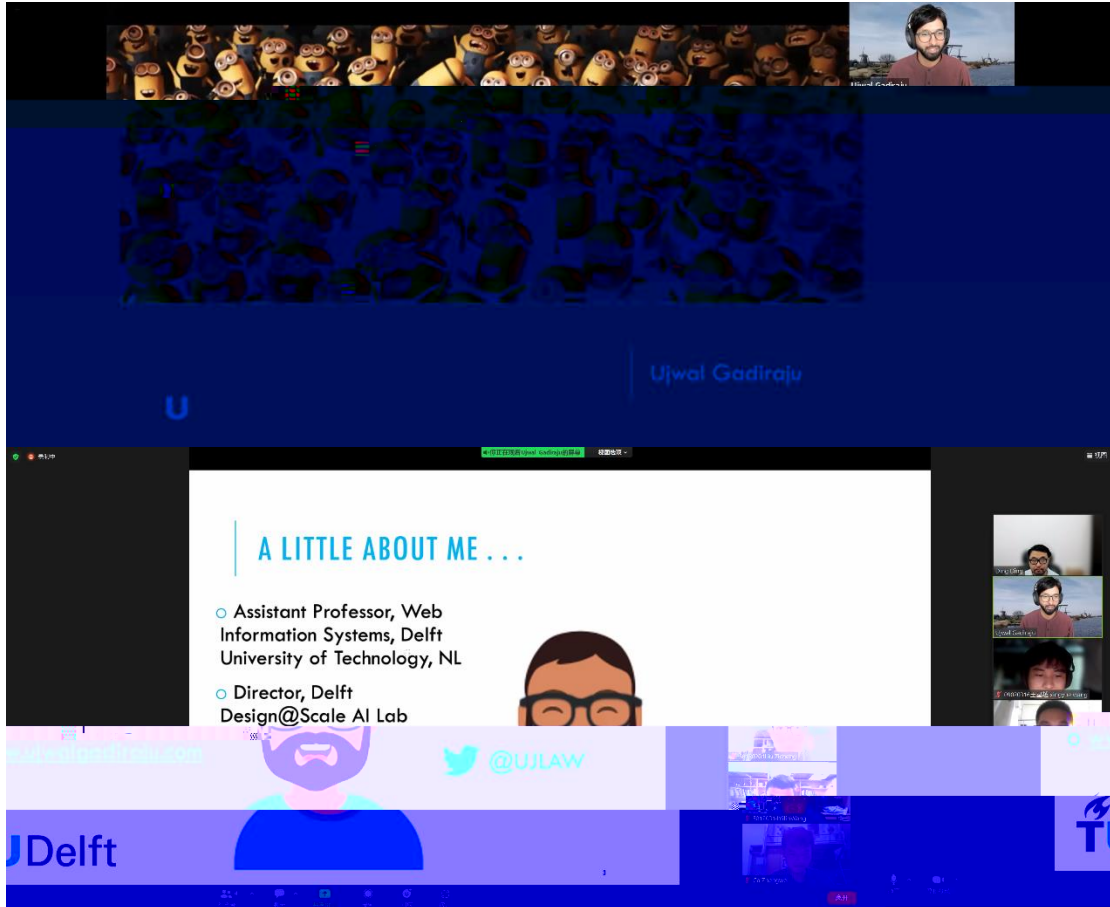




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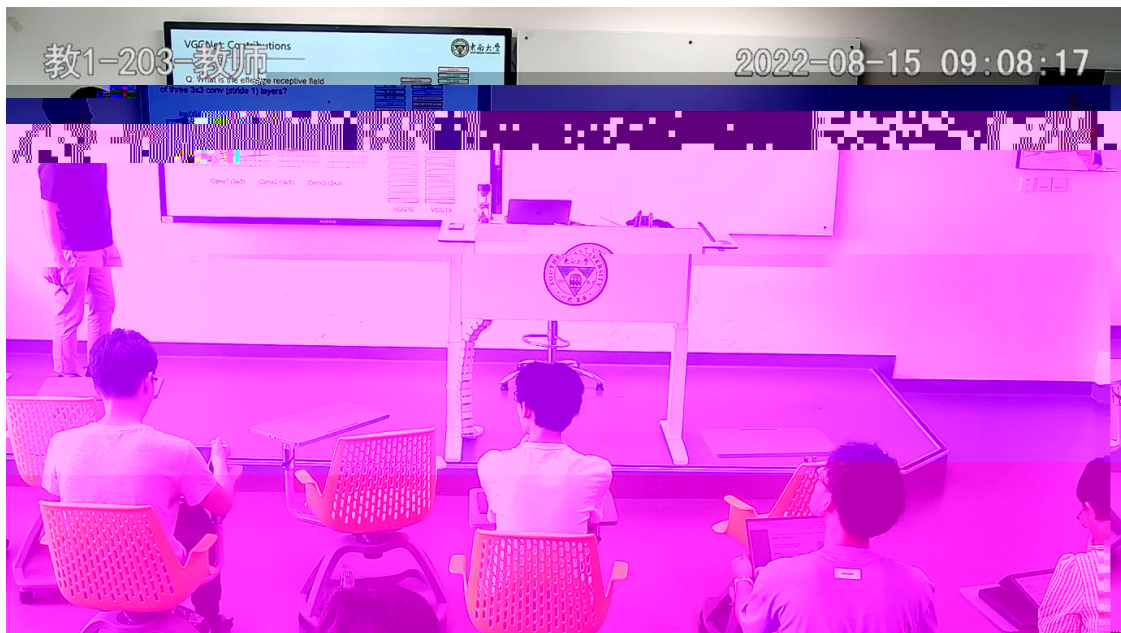
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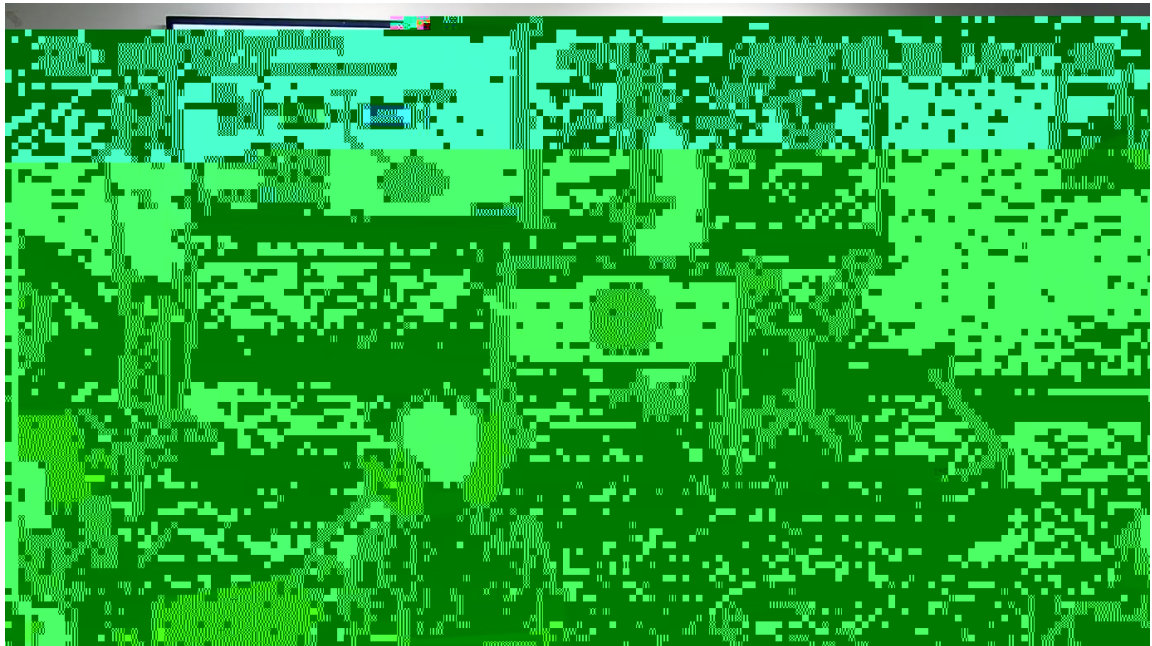
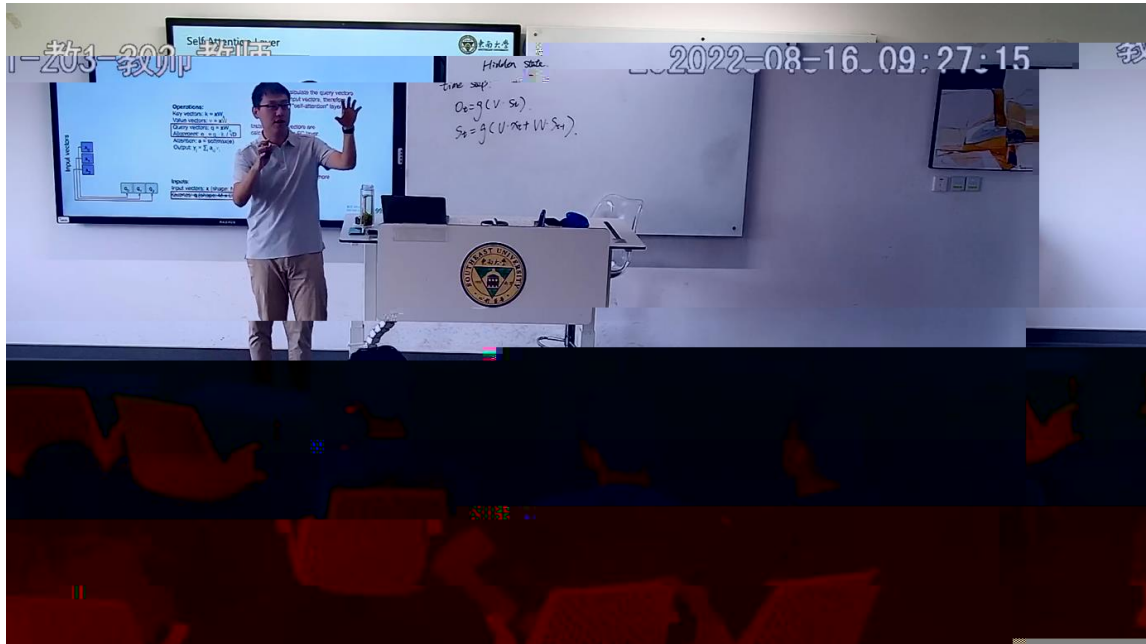
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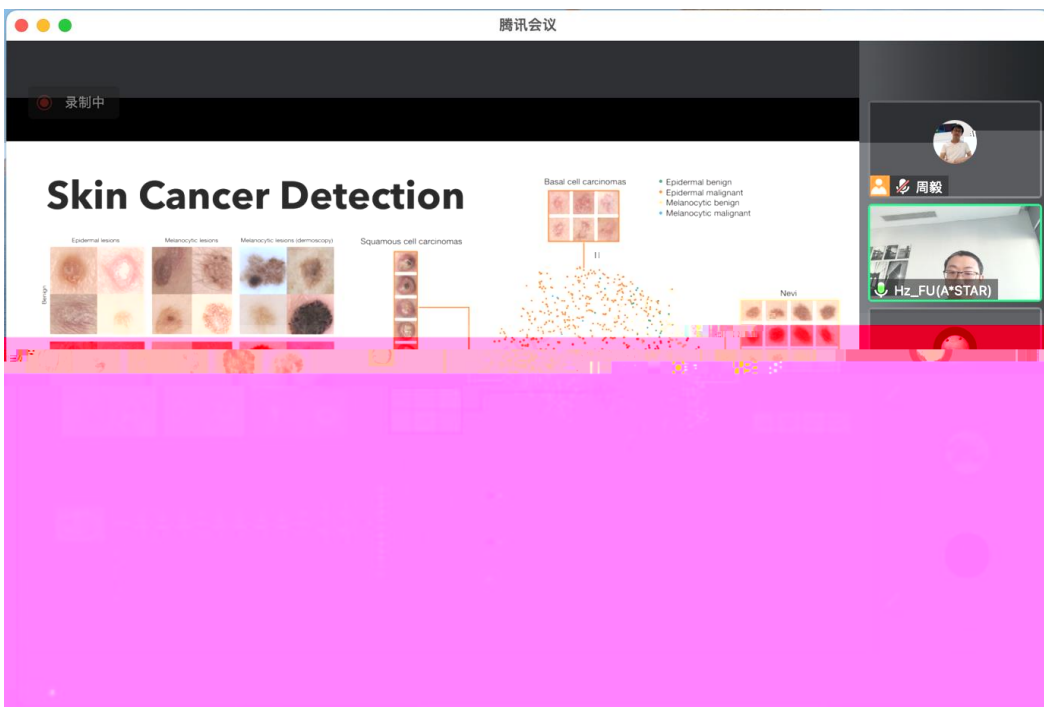
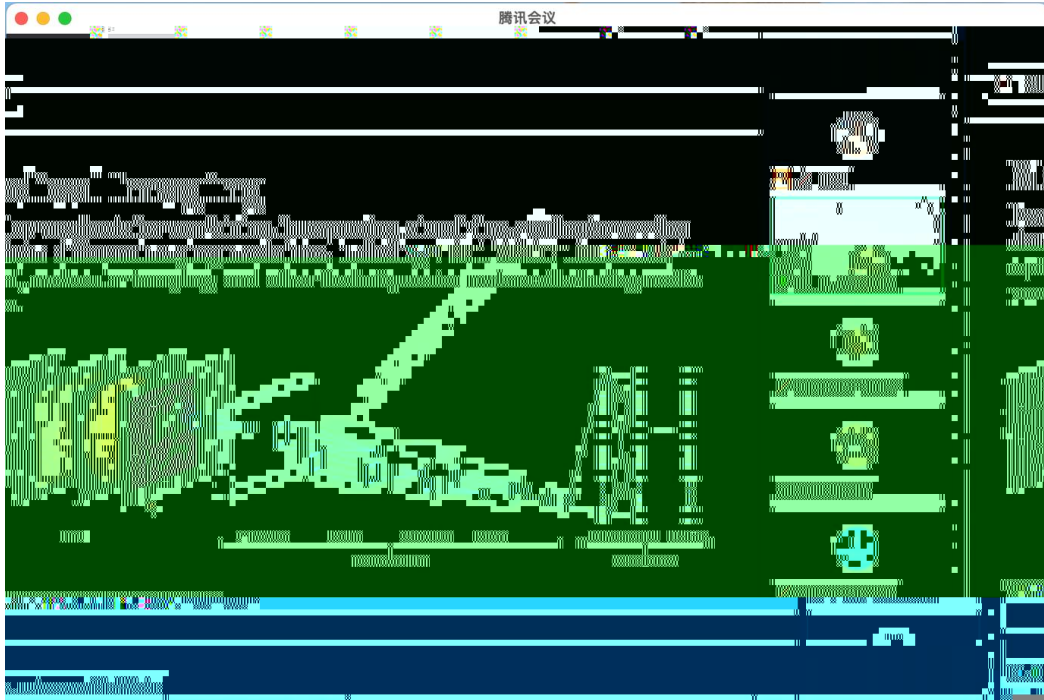


## Transformer





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## Unsupervised Retrieval

- Pseudo labelling
  - CIMON: Towards High-quality Hash Codes

(a) Generation of Semantic Information: An input image  $I$  is processed by a Pre-trained VAE (Z) to produce features. These features are used to generate a Global View and a Local View. The Local View is processed by a Confidence Matrix  $W$  to produce Semantic Information.

(b) Consistency Learning: The Semantic Information is used to generate Hash Codes. These are compared against a Hash Code Semantic Matrix. The process involves Consistency Learning, which includes Consistency Consistency and Pseudo Consistency, leading to Semantic Information  $W_1$  and  $S_1$ , and Semantic Information  $W_2$  and  $S_2$ .

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## MATRIX FACTORIZATION

Mean Squared Error

|  |  |     |   |     |     |     |
|--|--|-----|---|-----|-----|-----|
|  |  | 0.7 | 0 | 0   | 1.1 | 0   |
|  |  | 0   | 0 | 0.5 | 0   | 0.4 |
|  |  | 0.5 | 0 | 0   | 0.7 | 0   |

|        |        |        |        |        |        |     |
|--------|--------|--------|--------|--------|--------|-----|
|        |        | 0      | 0      | 0.6    | 0      | 0.5 |
| User 1 | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 |     |
|        | 1      | 0      | 0      | 1      | 0      |     |
| User 2 | 0      | 0      | 0      | 0      | 1      |     |
| User 3 | 0      | 0      | 0      | 1      | 0      |     |
| User 4 | 0      | 0      | 1      | 0      | 0      |     |

Utility Matrix

|  |  |      |     |
|--|--|------|-----|
|  |  | 0    | 1.3 |
|  |  | -0.6 | 0   |
|  |  | 0    | 0.9 |
|  |  | -0.8 | 0   |

User Matrix

Multiplication

|  |  |     |   |      |     |      |
|--|--|-----|---|------|-----|------|
|  |  | 0   | 0 | -0.8 | 0   | -0.6 |
|  |  | 0.5 | 0 | 0    | 0.8 | 0    |

Item Matrix

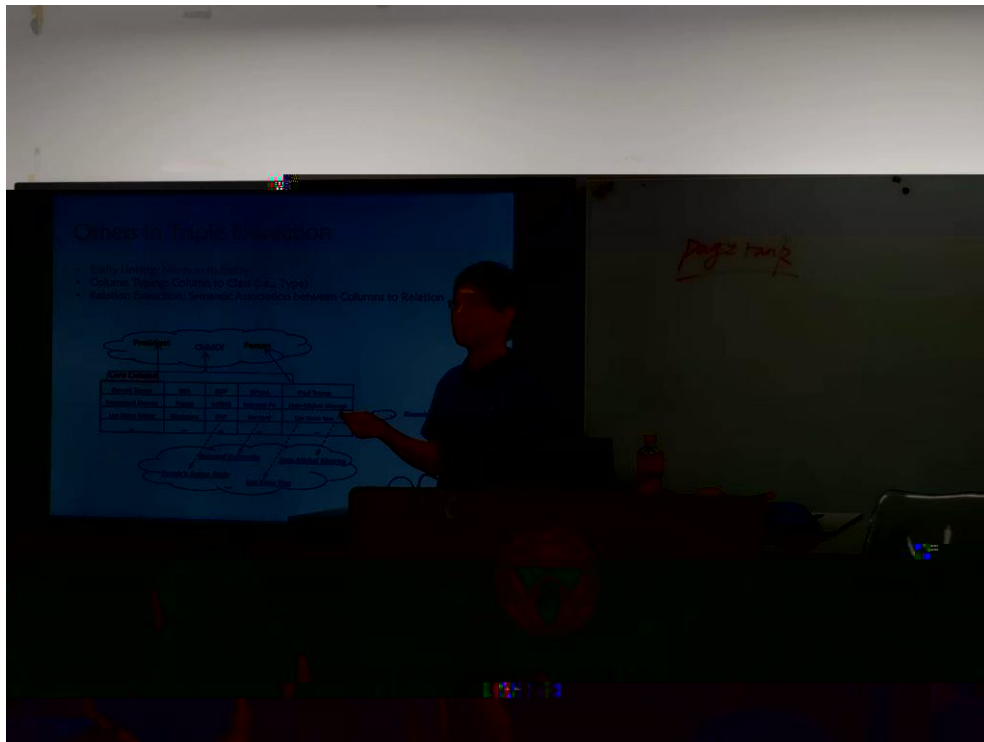
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3)

Guohui Xiao

Jiaoyan Chen





Guohui Xiao

SPARQL

SPARQL

### Example VALUES

```

ex:Book1    ex:title    "SPARQL Tutorial".
ex:Book2    ex:title    "C# in a Nutshell".
  
```

```

SELECT ?title WHERE {
  ?b ex:title ?title
  VALUES ?b { ex:Book1 }
}
  
```

Result

```

?title → "SPARQL Tutorial"
  
```

正在讲话: 肖国辉

肖国辉

SPARQL

Example

Data

dbpedia:Mount\_Bat

Guohui Xiao

Jiaoyan Chen

RDFS OWL

## Classes in RDFS

- Assume we have the following hierarchical classes (taxonomy) defined:  
E.g.,
 

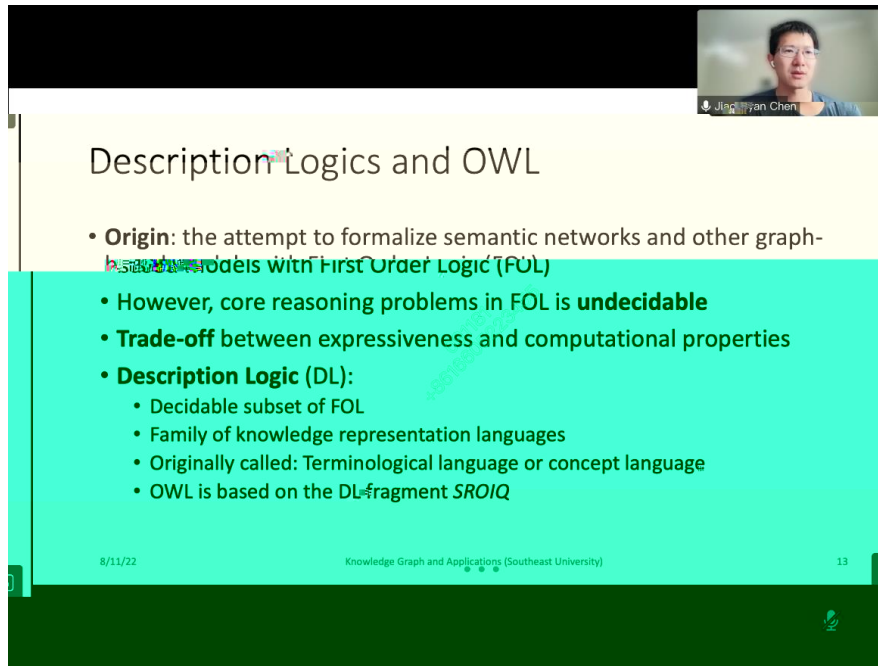
```

ex:Textbook rdfs:subClassOf ex:Book .
ex:Book    rdfs:subClassOf ex:PrintMedium .
ex:Journal rdfs:subClassOf ex:PrintMedium .

```
- RDFS semantics:
  - The `rdfs:subClassOf` property is **transitive**
  - E.g., it follows from the above that  
`ex:Textbook rdfs:subClassOf ex:PrintMedium .` Also known as **inheritance reasoning**

If `ex:Database rdfs:type ex:Textbook`, then `ex:Database rdfs:type ex:PrintMedium`

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## Description Logics and OWL

- **Origin:** the attempt to formalize semantic networks and other graph-based models with First Order Logic (FOL)
- However, core reasoning problems in FOL is **undecidable**
- **Trade-off** between expressiveness and computational properties
- **Description Logic (DL):**
  - Decidable subset of FOL
  - Family of knowledge representation languages
  - Originally called: Terminological language or concept language
  - OWL is based on the DL fragment *SROIQ*

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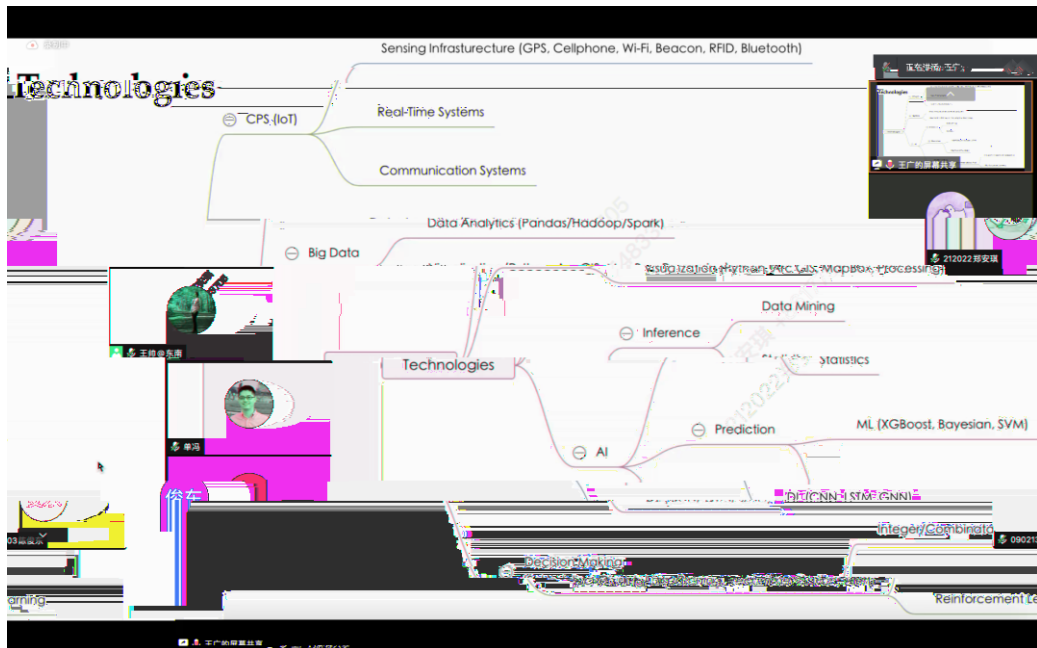
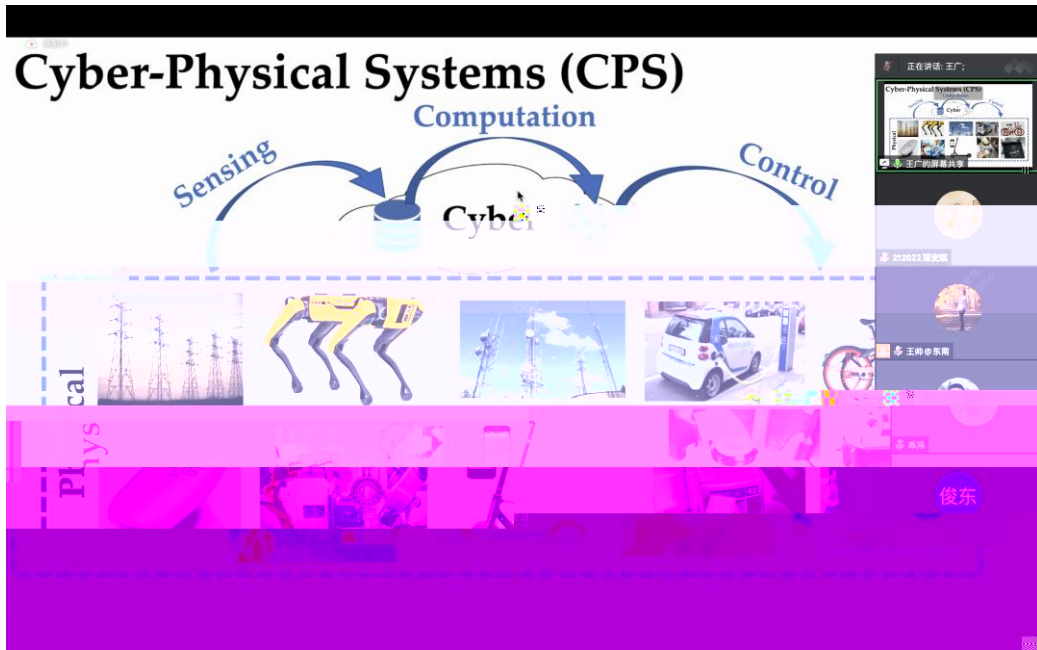
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PPT

GIT Latex









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