Titlepage Logos ISW + Fraunhofer   Footnote logos : ISW + Fraunhofer

Last page   Name, picture, e-mail

- **Metrics definition, purposes**
- **Why use mAP for overall performance?**

Warum ist die Forschung wichtig, nötig?

- Market Analysis
- Product competitors
- Chance of Development
  [Value]

Dataset: Imbalance dataset
Enlarge dataset
Sources of samples
Collection and segmentation
Methods: CNN vs. Transformer

- Problem statements
- Target of research (Goals)
- Contributions
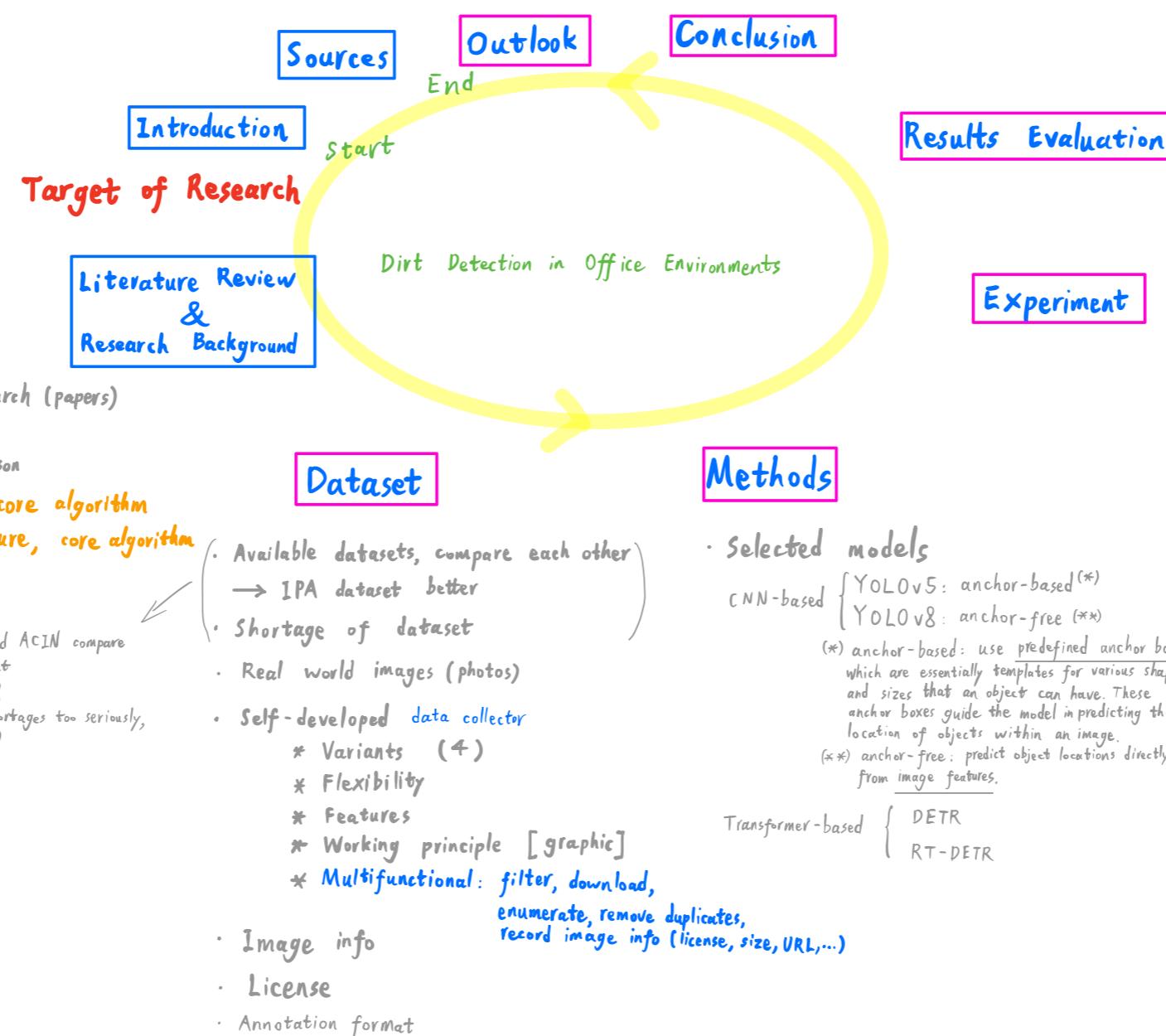
(v5 and v8)
YOLO, DETR, RT-DETR, ViT
Present information in a table

Multi-Headed Self-Attention
Masked Multi-Headed ∼
Multi ∼   Cross-Attention

- Compare different research (papers)
- Table for comparison
- Conclusion from comparison
- **CNN architecture, core algorithm**
- **Transformer architecture, core algorithm**
- Research background
  └→ • Previous paper : DirtNet
     • Dataset from IPA and ACIN compare
       and choose IPA dataset
     • Shortage of Dataset ?
       (Don't describe the shortages too seriously,
         it is useable dataset)

Sources   **Outlook**   **Conclusion**

End

Introduction   Start

Target of Research

Dirt Detection in Office Environments

Literature Review
&
Research Background

Dataset   **Methods**

- Compare different models based on results
- mAP@[.5:.95] definition: the average of the mAP computed over
  a range of Intersection over Union (IoU) thresholds, from 0.5 to 0.95 in increments of 0.05.

Results Evaluation

Experiment

- Tables for experiments parameters   ⎱ Hardware
                                       ⎱ Software
                                       ⎱ Model configuration
- Result figures : explain briefly each meaning
- Metrics definition, meaning

Optimizer: SGD, Adam, AdamW,
RMSProp

Difficulties in project

- Available datasets, compare each other
  → IPA dataset better
- Shortage of dataset
- Real world images (photos)
- Self-developed data collector
  * Variants (4)
  * Flexibility
  * Features
  * Working principle [graphic]
  * Multifunctional : filter, download,
    enumerate, remove duplicates,
    record image info (license, size, URL,...)
- Image info
- License
- Annotation format

- Selected models

CNN-based ⎱ YOLOv5: anchor-based (*)
          ⎱ YOLOv8: anchor-free (**)

(*) anchor-based: use predefined anchor boxes,
    which are essentially templates for various shapes
    and sizes that an object can have. These
    anchor boxes guide the model in predicting the
    location of objects within an image.
(**) anchor-free : predict object locations directly
     from image features.

Transformer-based ⎰ DETR
                  ⎱ RT-DETR

- Greetings, self introduction, supervisor and examiner.   (0.5 min.)
- Structure (first (why important, relevant studies and paper), then (dataset and methods used in this study), in the end (exp. results, compare, get conclusion))   [1 M 4 S]
- Statistical data about "employment growth by industries" from Statistisches Bundesamt.
  Light blue: Total imployment growth, after 2010 more stable, except around 2020 due to Covid.
  Pink: Service industries, growth almost always positive. → Strong and expanding market.
  Automation technology, such as robots, can provide workforce and maintain stability during crises.
  → **Commerically profitable market**
- Left: Household cleaning robot, small, light, not suitable for large area.
  Right: Industrial   ~   , efficient, high power, large and noisy, not suitable for offices.
  → Medium size, high efficiency, minimal interference cleaning robot is necessary.
  → Visual ability saves power, increase working efficiency
  → This study is necessary and important.
- Goals : ① Increase dataset diversity
          ② Implement Transformer-based models
          ③ Compare performances between different models
- Problem statement: dataset, method 2 parts

Presentation

- Logic, structure, order of speaking.

- Speed moderate, easy to understand and follow, clear speaking.

- Self confidence, know and understand what to talk about.

- Eye contact with audience.

- Presentation simulation, imagine at the place and do everything as in real situation.

- What language to use is not important, it's important to demonstrate the knowledge in research, so use the language that can fully fullfil this purpose.

- 事在人为