Fine-tuning a foundation segmentation model for an object counting task

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Abstract

- A lack of a precise **general object counting application** that's applied to inventory viable for the industry.
- prompted us to created a system, designed for this **general counting** task.
- Trying, using two Computer Vision **Foundation Models** and a prompting method.
- To attack a fairy complex and weary problem.

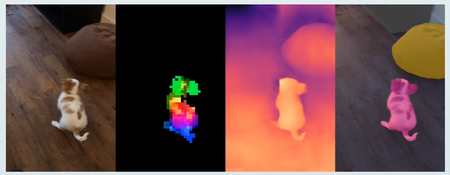
Introduction

- Given the industry's transition into an **Industry 4.0** standard.
- The inclusion of **AI** is a must in in the industry.
- Still a general counting system that's suited to the industry is hard to obtain.
- However **Computer Vision Foundation Models** are versatile and have potential for this downstream task.

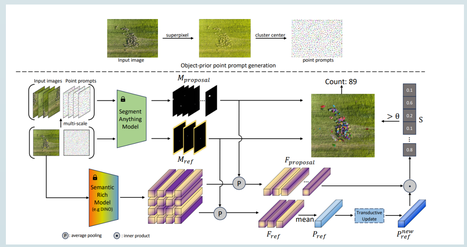
Methodology

- **Segment Anything Model (SAM):**
  - Capable of segmenting and classifying complex and object dense images.

- **Self DIstillation with NO labels (DINOv2):**
  - Capable of semantic segmentation, depth estimation, Dense and sparse matching.

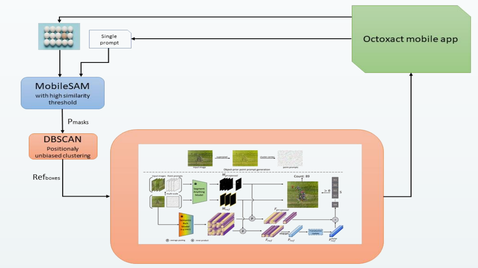


- **Architecture:**
  - Dino's feature extractor combined with SAM's segmentation.



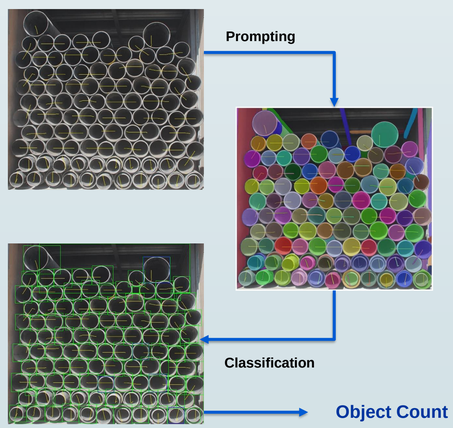
Results

- **System architecture:**



- **Prompting:**
  - A Prompting method is included in the system to generate more prompts from a single user entry.

- **System Demo:**



Model/Method	MAE	MAPE	RMSE	Counting Accuracy (%)
Base SAM Model	42.48	36.14%	137.50	4.92%
Count-anything	27.97	131.24%	82	8.71%
SAM+DINOv2 + SIFT	12.56	8.97%	58.33	21.21%

Table 7.2: Performance Metrics for Different Models

Conclusion

- **Significance of the work:**
  - Introducing a general object counting based on a foundation segmentation model is on the verge of publicly available scientific research.
- **Limitations:**
  - Accurate counting remains a very challenging task, however both community research and our own are still developing and improving at this task.

Acknowledgements

- I would like to express my sincere gratitude to **Dr .Emna Ghorbel** for their guidance and support throughout my academic journey.
- I also extend my thanks to **Octomiro** for providing resources and facilities and environment that were crucial for this work.