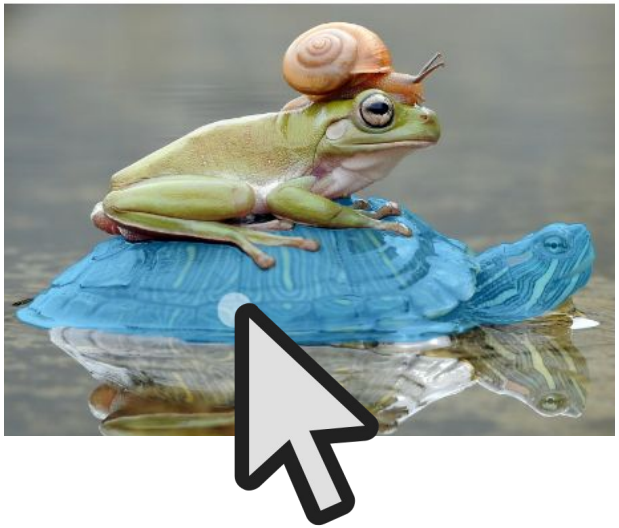
Segmentation interactive d'image avec SAM

par Ana Bernal

mentor: Samir Tanfous

Avril 2023



Dépôt github pour ce projet:

https://github.com/ana-bernal/P7_preuve-concept

Programme

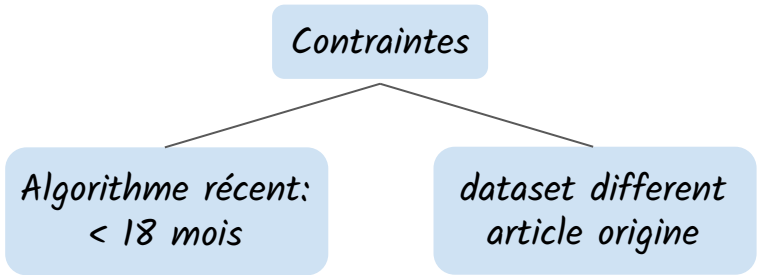
1. Rappel consignes
2. La tâche de segmentation d'image
3. SAM: Segment Anything Model
4. Notre expérience
5. Conclusions

1

Rappel consignes

Rappel consignes

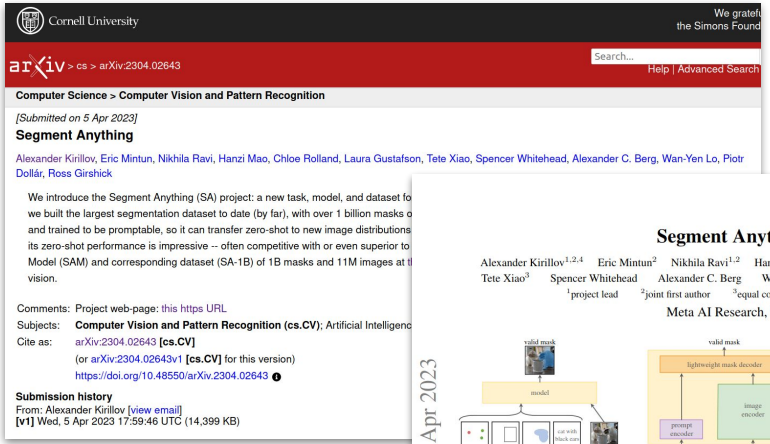
- Tour d'horizon + état de l'art ➜ article récent SAM par Meta
- Approfondir + choisir références ➜ plan de travail
- Implémentation algorithme + baseline



Rappel consignes

Début avril

Meta



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arXiv > cs > arXiv:2304.02643

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Computer Science > Computer Vision and Pattern Recognition

[Submitted on 5 Apr 2023]

Segment Anything

Alexander Kirillov, Eric Mintun, Nikhila Ravi, Hanzi Mao, Chloe Rolland, Laura Gustafson, Tete Xiao, Spencer Whitehead, Alexander C. Berg, Wan-Yen Lo, Piotr Dollár, Ross Girshick

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its zero-shot performance is impressive -- often competitive with or even superior to
Model (SAM) and corresponding dataset (SA-1B) of 1B masks and 11M images at t
vision.

Comments: Project web-page: this https URL

Subjects: **Computer Vision and Pattern Recognition (cs.CV)**; Artificial Intelligenc

Cite as: arXiv:2304.02643 **[cs.CV]**

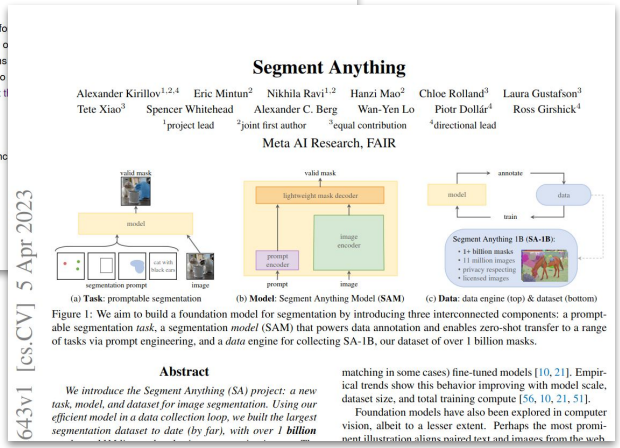
(or arXiv:2304.02643v1 **[cs.CV]** for this version)

https://doi.org/10.48550/arXiv.2304.02643

Submission history

From: Alexander Kirillov [view email]

[v1] Wed, 5 Apr 2023 17:59:46 UTC (14,399 KB)



643v1 [cs.CV] 5 Apr 2023

Segment Anything

Alexander Kirillov[1,2,4] Eric Mintun[2] Nikhila Ravi[1,2] Hanzi Mao[2] Chloe Rolland[3] Laura Gustafson[3]
Tete Xiao[3] Spencer Whitehead Alexander C. Berg Wan-Yen Lo Piotr Dollár[4] Ross Girshick[4]

[1]project lead [2]joint first author [3]equal contribution [4]directional lead

Meta AI Research, FAIR

(a) **Task**: promptable segmentation (b) **Model**: Segment Anything Model (**SAM**) (c) **Data**: data engine (top) & dataset (bottom)

Figure 1: We aim to build a foundation model for segmentation by introducing three interconnected components: a prompt-able segmentation *task*, a segmentation *model* (SAM) that powers data annotation and enables zero-shot transfer to a range of tasks via prompt engineering, and a *data* engine for collecting SA-1B, our dataset of over 1 billion masks.

Abstract

We introduce the Segment Anything (SA) project: a new task, model, and dataset for image segmentation. Using our efficient model in a data collection loop, we built the largest segmentation dataset to date (by far), with over 1 ***billion***

matching in some cases) fine-tuned models [10, 21]. Empirical trends show this behavior improving with model scale, dataset size, and total training compute [56, 10, 21, 51].

Foundation models have also been explored in computer vision, albeit to a lesser extent. Perhaps the most promi-
nent illustration aligns paired text and images from the web

Rappel consignes

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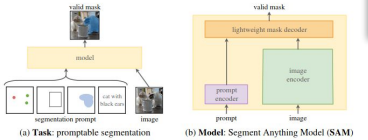
Meta AI Research, FAIR



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Meta's New Segment Anything Model for Identification Is a Big Deal, Experts Say

SAM can recognize objects it hasn't seen before

By Sascha Brodsky · Published on April 17, 2023 09:40AM EDT · Fact checked by Jerri Ledford

SMART & CONNECTED LIFE

> AI & Everyday Life News

Key Takeaways

- Meta's new AI image segmentation tool could lead to advances like better tagging of photos on social media.
- The SAM model was trained on a vast database of images.
- There's a race to find better ways for computers to detect and recognize objects.

Rappel consignes

Début avril Meta

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Tete Xiao[3] Spencer Whitehead Alex
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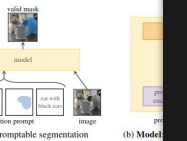

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HACKADAY

HOME BLOG HACKADAY.IO TINDIE HACKADAY PRIZE SUBMIT ABOUT April 26, 2023

NEED TO PICK OBJECTS OUT OF IMAGES? SEGMENT ANYTHING DOES EXACTLY THAT

by: Donald Papp 7 Comments

April 14, 2023

Rappel consignes

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arXiv > cs > arXiv:2304.02643

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News · Artificial Intelligence

unches AI at Can Separate Pictures

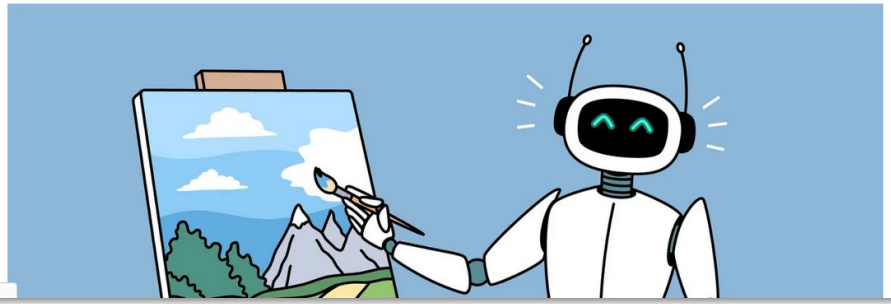
Meta Launches AI Tool That Can Identify, Separate Items in Pictures

Meta unveils "Segment Anything" AI image identification tool, but the scale of the dataset used by the social giant raises privacy concerns.

By Jason Nelson

Apr 7, 2023

4 min read

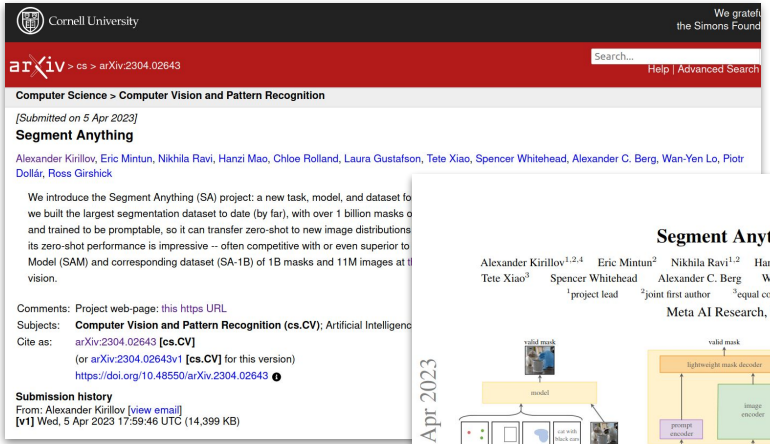


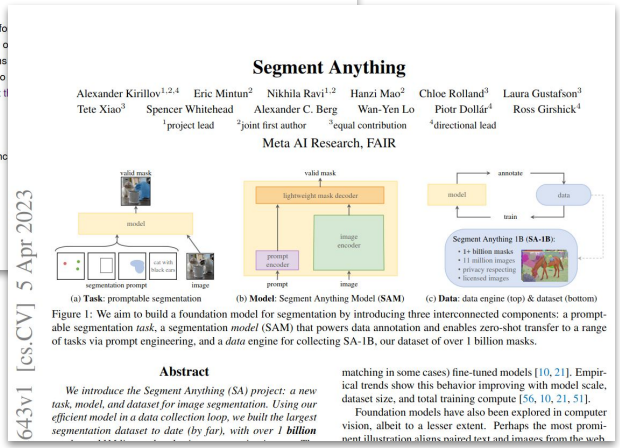
April 26, 2023

Rappel consignes

Début avril

Meta





Choix d'article principal

2

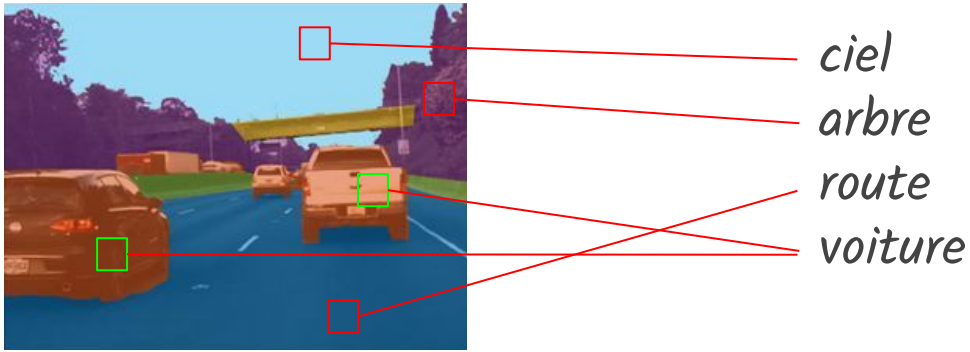
La segmentation d'image

La segmentation d'image

- Partitionner une image digitale dans plusieurs segments/régions
- **But:** simplifier/mieux comprendre
- **Applications:** Recherche d'image par le contenu, imagerie médicale (localiser tumeurs, mesurer volume de tissus, etc), détection de piétons, détections de feu sur la route (conduite autonome), etc...

La segmentation d'image

Concrètement : **classification** des pixels

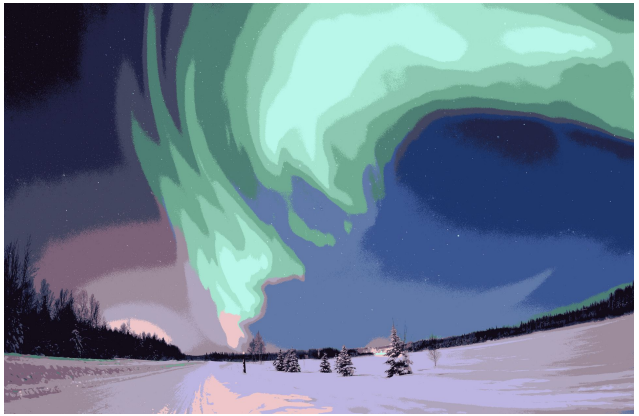


La segmentation d'image:
méthodes classiques

Thresholding (seuillage d'image)

La segmentation d'image:
méthodes classiques

K-means



La segmentation d'image:

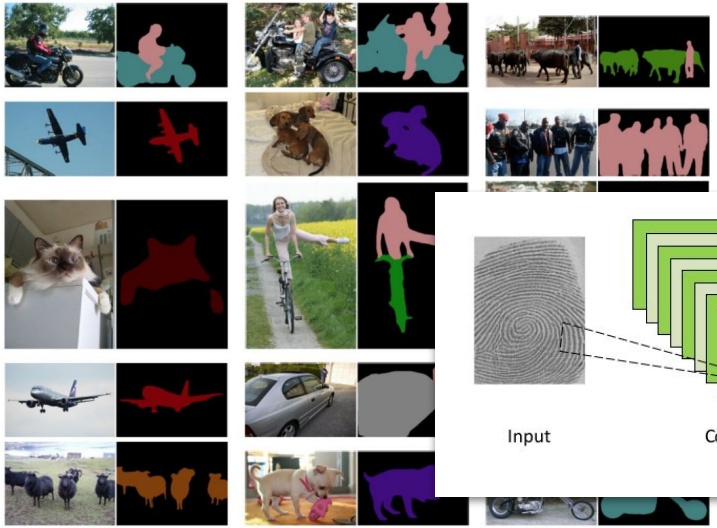
méthodes classiques

Détection de bords

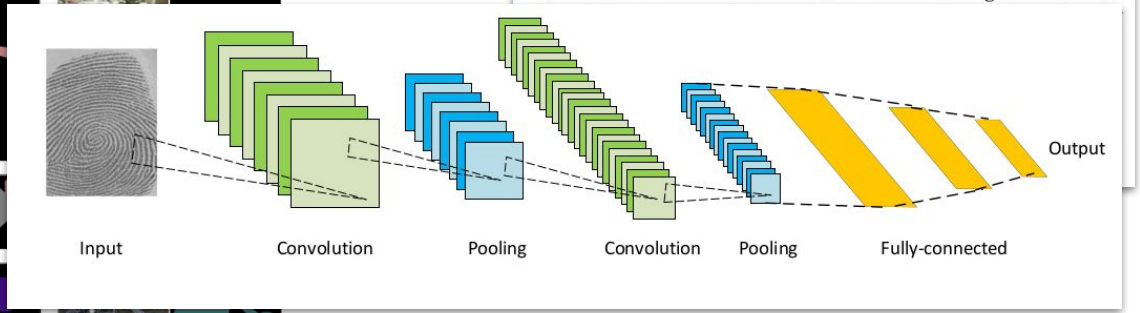
La segmentation d'image:

Réseaux des neurones

Extraction automatique des features (bords, volumes ...) ➜ facilitent la tâche



1) Fully convolutional networks
2) Convolutional models with graphical models
3) Encoder-decoder based models
4) Multi-scale and pyramid network based models
5) R-CNN based models (for instance segmentation)

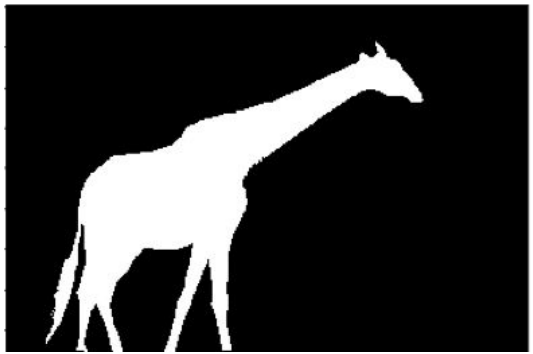


La segmentation d'image

Nous: cartes de segmentation (masque, **mask**) binaire

Image original

Masque

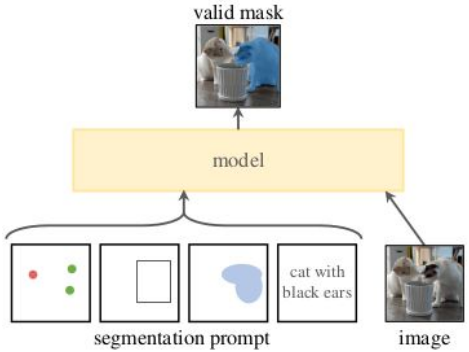


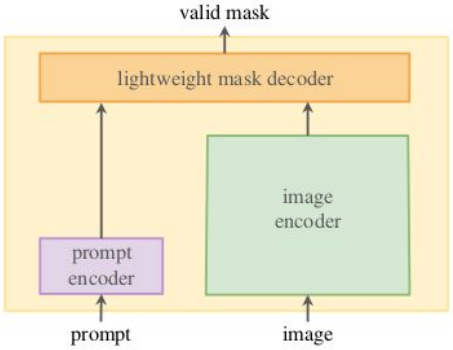
3

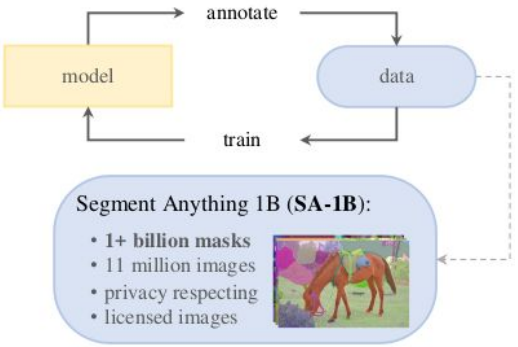
SAM
Segment Anything Model

SAM

Tâche + modèle de fondation + dataset





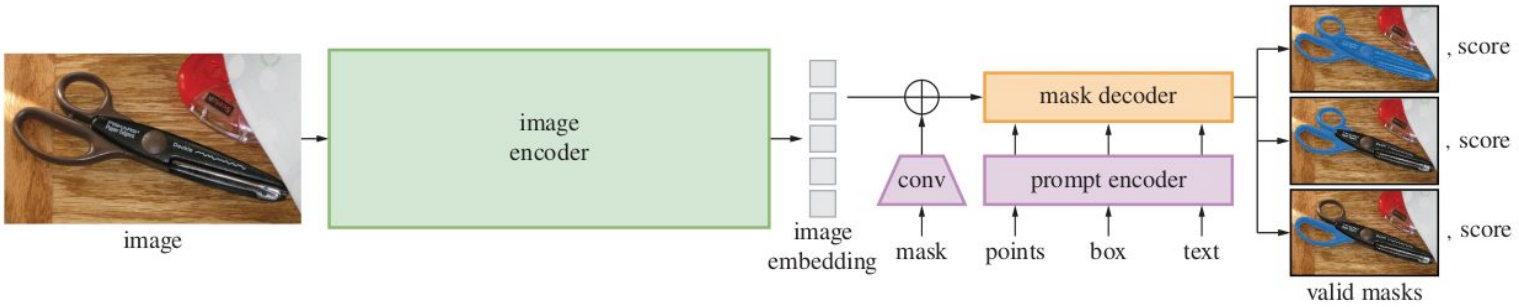


SAM

Dataset **SA-1B**

SAM

Architecture du modèle



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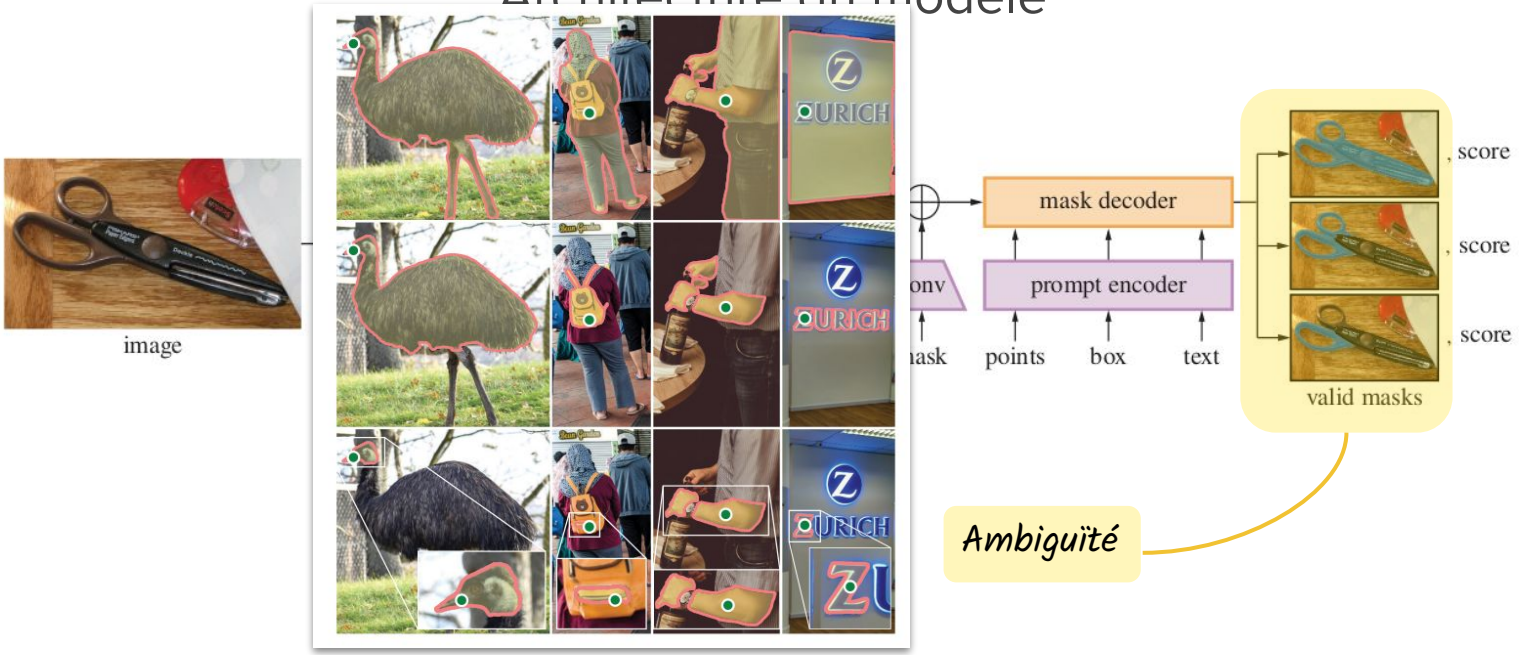

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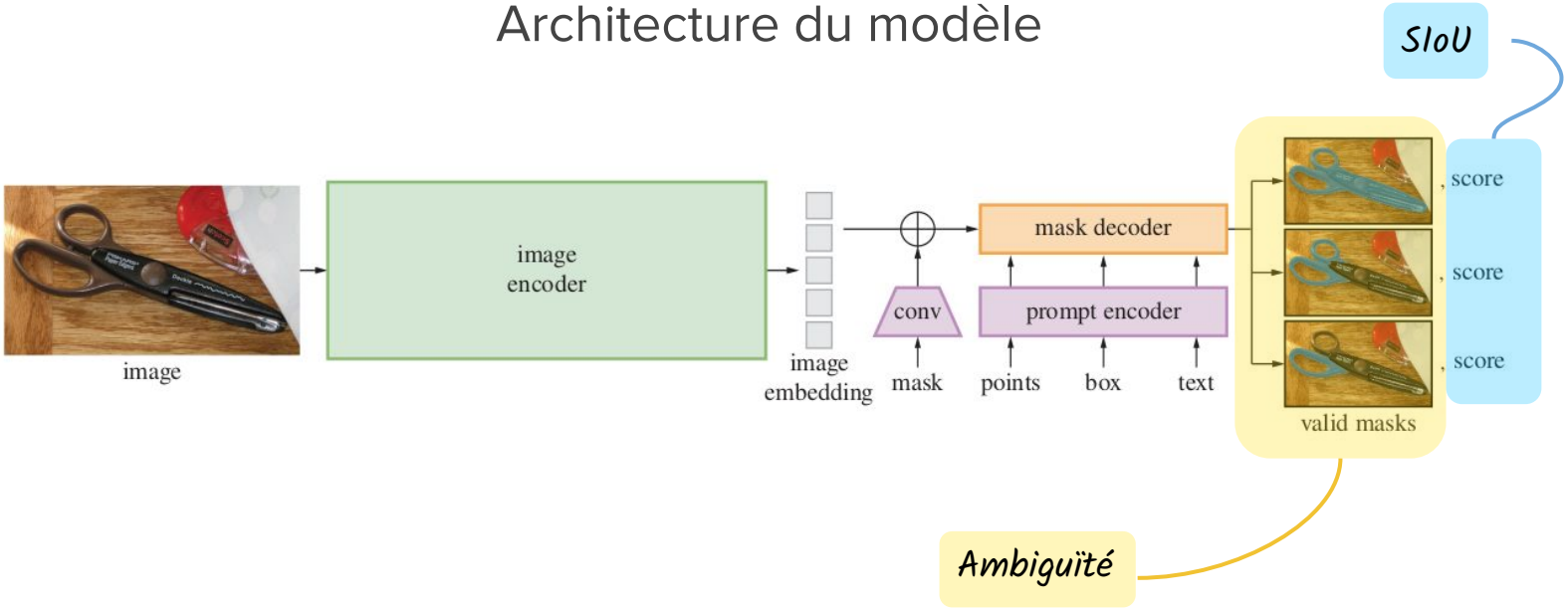
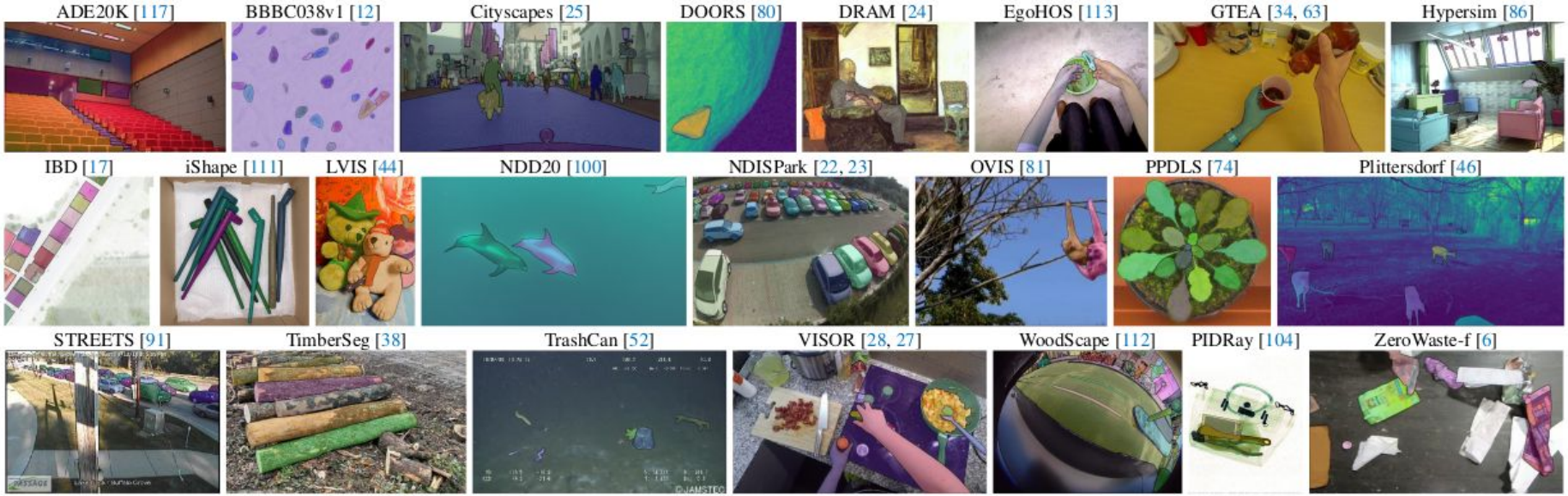


SAM

Évaluation du modèle
23 datasets différents ➜ différents domaines



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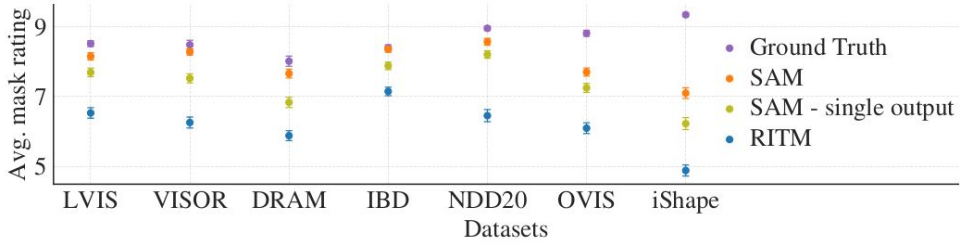
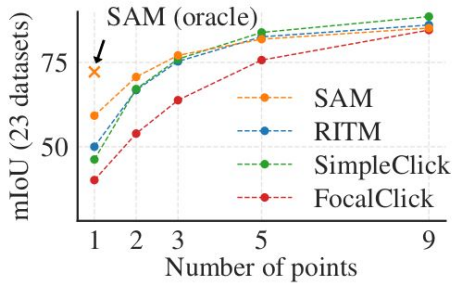
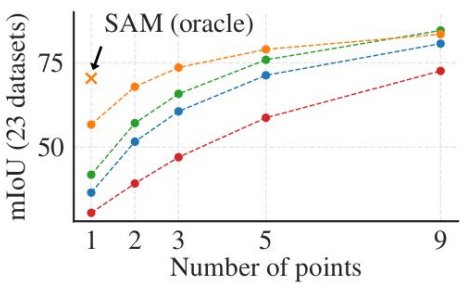


(b) Mask quality ratings by human annotators



(c) Center points (default)



(d) Random points

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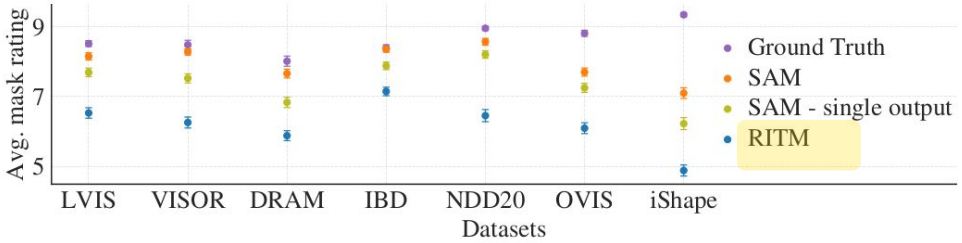
23 datasets différents ➜ différents domaines



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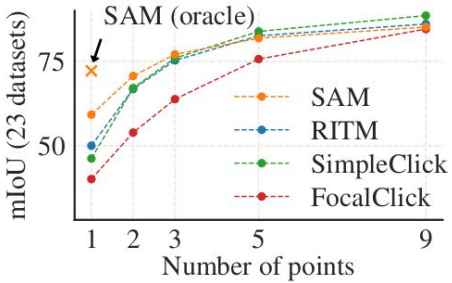

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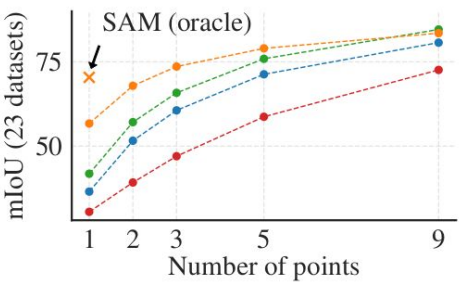

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4

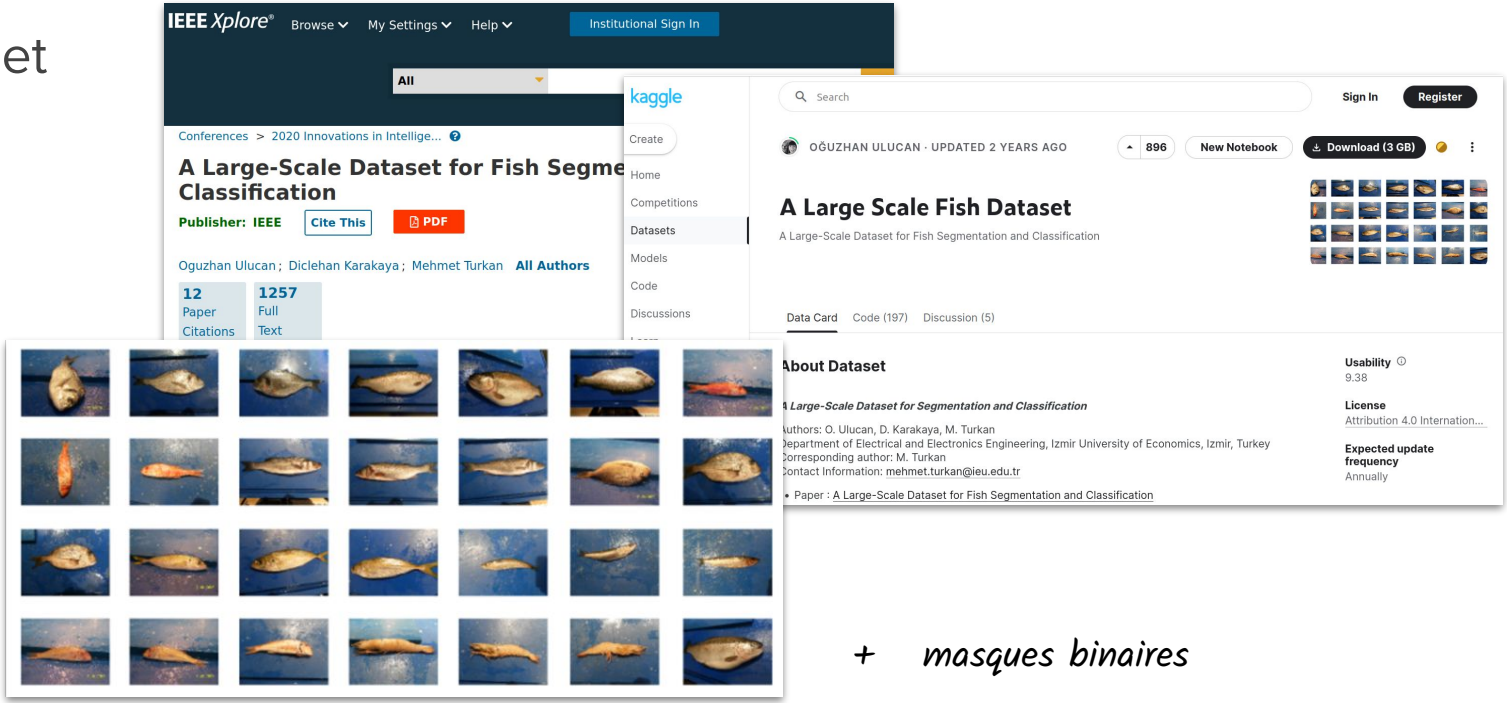
Notre expérience

Expérience

- Dataset
- Baseline
- Prédictions + évaluation

Expérience

Dataset



\+ *masques binaires*

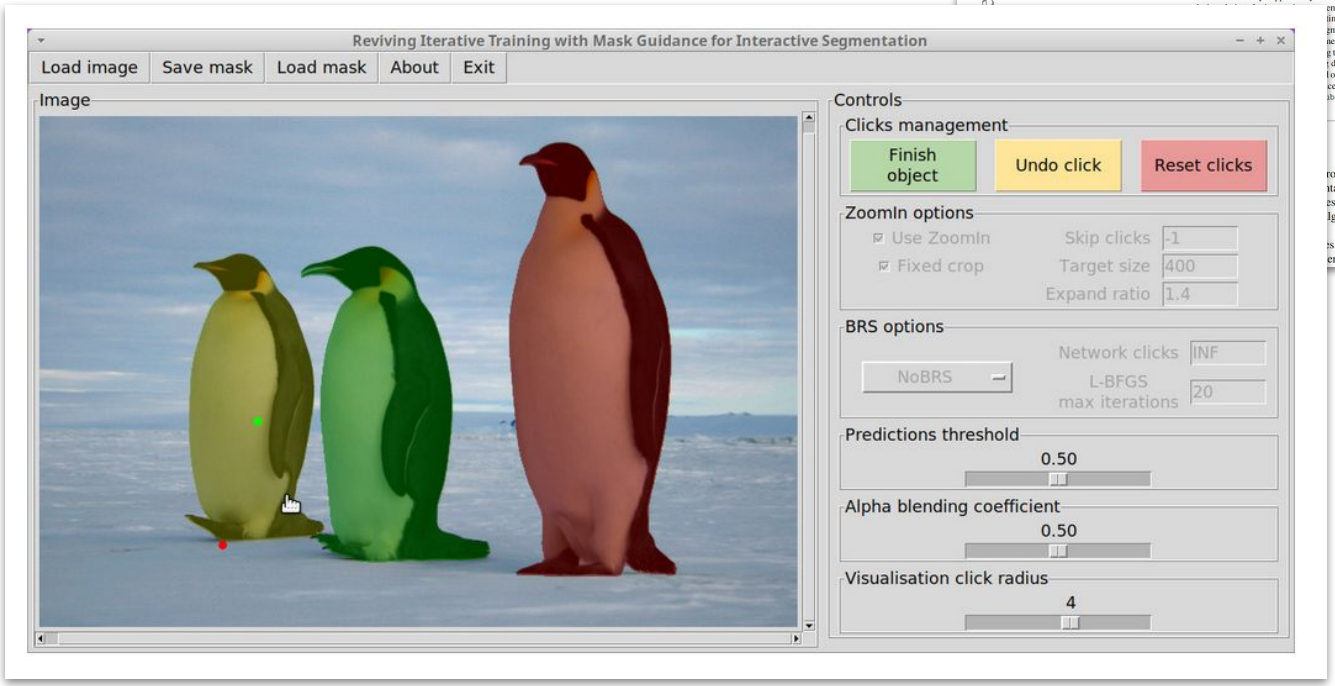
Expérience

Dataset

Espèce (nom original)	Espèce (nom en français)	Nombre d'images
Hourse Mackerel	Maquereau	50
Black Sea Sprat	*Clupeonella cultriventris*	50
Striped Red Mullet	Rouget de roche	50
Gilt-Head Bream	Dorade royale	50
Red Mullet	Rouget	50
Sea Bass	Bar commun	50
Shrimp	Crevette	50
Trout	Truite	50
Red Sea Bream	Dorade japonaise	50
		Total: 450

Expérience

Baseline: **RITM**



Reviving Iterative Training with Mask Guidance for Interactive Segmentation

Konstantin Sofiiuk, Ilia A. Petrov* and Anton Konushin**

Visual Understanding lab., AI Center Moscow, Samsung Electronics Co., Lesnaya 5C, Moscow, Russia

ARTICLE INFO

Keywords:
interactive segmentation
segmentation
mask refinement

ABSTRACT

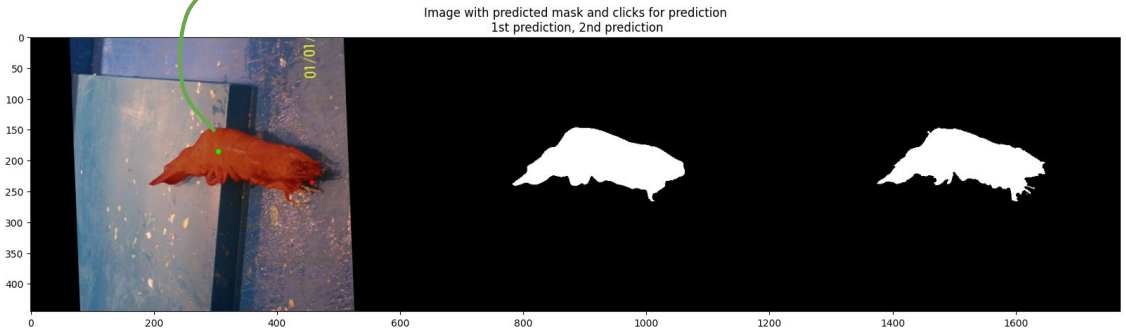
Recent works on click-based interactive segmentation have demonstrated state-of-the-art results by using various inference-time optimization schemes. These methods are considerably more computationally expensive compared to feedforward approaches, as they require performing backward passes through a network during inference and are hard to deploy on mobile frameworks that usually support only forward passes. In this paper, we extensively evaluate various

Expérience

Prédictions: **RITM**

entrée pour **SAM**

clic !



Expérience

Prédictions: **SAM**

Expérience

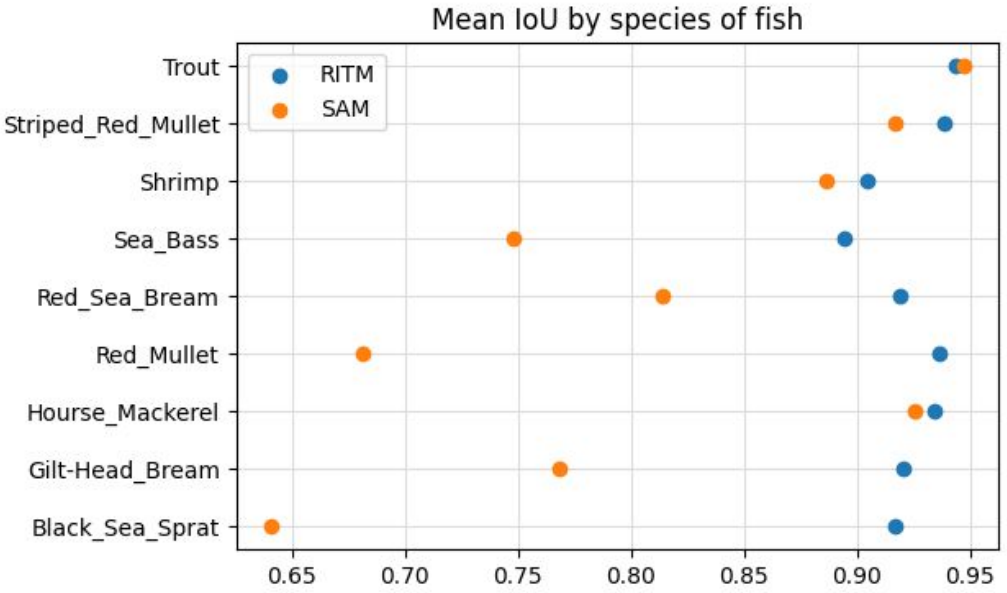
Évaluation: comparaison des IoU

	iou_RITM	iou_SAM
count	450.000000	450.000000
mean	0.922935	0.814156
std	0.043442	0.259960
min	0.526922	0.023829
25%	0.910158	0.823418
50%	0.925036	0.920395
75%	0.943318	0.958745
max	0.992594	0.987818

species	iou_RITM	iou_SAM
Black_Sea_Sprat	0.916618	0.640691
Gilt-Head_Bream	0.920119	0.768064
Hourse_Mackerel	0.934028	0.925069
Red_Mullet	0.936137	0.681345
Red_Sea_Bream	0.918904	0.813904
Sea_Bass	0.894340	0.748280
Shrimp	0.904728	0.886251
Striped_Red_Mullet	0.938162	0.916985
Trout	0.943377	0.946816

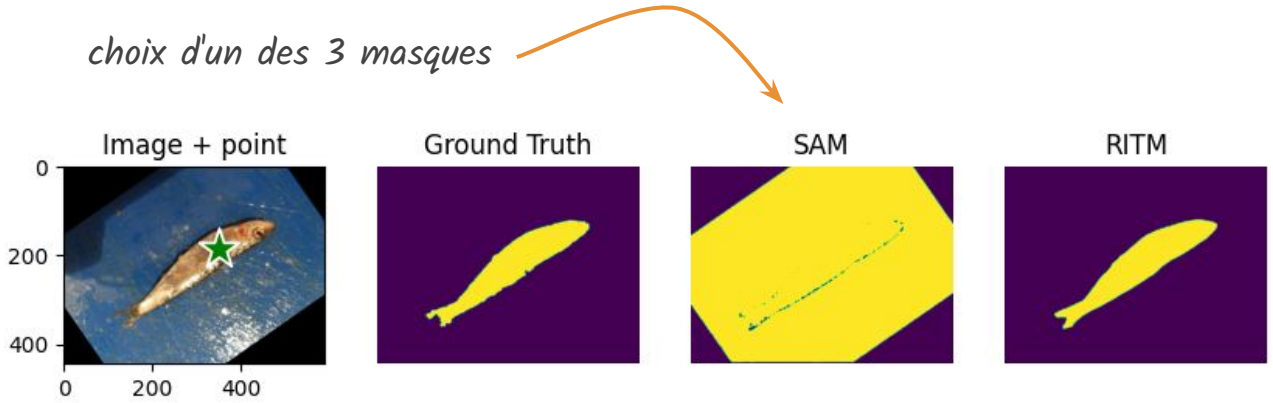
Expérience

Évaluation: comparaison des IoU



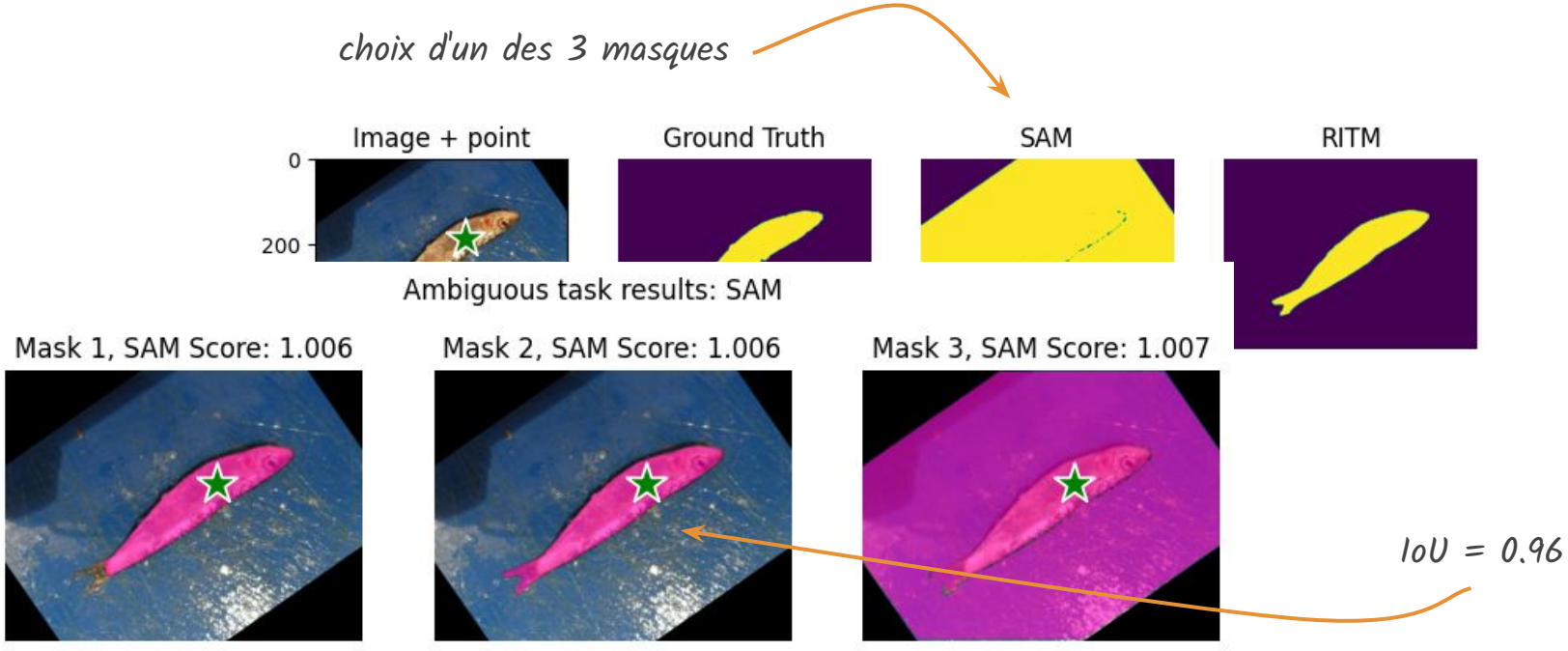
Expérience

Possibles explications du résultat inattendu



Expérience

Possibles explications du résultat inattendu



5

Conclusions

Conclusions

Contrairement aux attentes, dans cette expérience, nous obtenons de meilleurs résultats avec RITM (le modèle de base) qu'avec SAM (le modèle principal). De mon point de vue de non-expert, je pense que les raisons en sont les suivantes :

- Possible manque de qualité des étiquettes de l'ensemble de données : Certains masques de vérité au sol sont de très mauvaise qualité par rapport à l'image originale. Nous ne savons pas comment ces masques ont été générés et malheureusement l'accès à l'article source de ce jeu de données n'est pas disponible gratuitement.

- Comme SAM est entraîné à effectuer des tâches ambiguës, nous n'avons choisi qu'un seul des masques prédits pour notre évaluation. Parfois, avec notre unique clic choisi, le masque choisi a sélectionné un "objet" correspondant à la quasi-totalité de l'image (voir les exemples ci-dessus).

Merci