



Introduction

Distractor Selection for Photo Cleaning



Image + User click



Dense Segmentation





EntitySeg [2] Mask2Former [1] X Cannot select out-of-domain objects (class-specific segmentation) **X**Requires click for each instance (class-agnostic segmentation)



Interactive Segmentation





RiTM [4]

XRequires multiple clicks for each object **X**Requires at least one click for each instance

> **SimpSON: Select object with single-click** and find similar objects automatically



SimpSON





1C-DSN

IDS+PVM

SimpSON: Simplifying Photo Cleanup with Single-Click Distracting Object Segmentation Network

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SimpSON

SimpSON includes three stages with three modules:



1. Bowen Cheng et al., Masked-attention mask transformer for universal image segmentation, CVPR 2022 2. Lu Qi et al., Open-world entity segmentation, TPAMI 2022

3. Xi Chen et al., Towards practical interactive image segmentation, CVPR 2022

Masks from clicks Exemplar ---- SwinL-baseline ---- SwinL-baseline — SwinL-click masks MiTB3-baseline ---- MiTB3-baseline — MiTB3-click MiTB3-click R101-baseline R101-baseline Iterative R101-click R101-click Distractor Heatmap New masks Selection 0.2 LVIS DistractorReal **Proposal Verification** (IDS) 0.4 0.6 0.8 0.2 Module (**PVM**) **1C-DSN module outperforms EntitySeg** CPN PVM Extractor Medium (DistractorReal) Small (DistractorReal) Click Proposa **1C-DSN outperforms Interactive Segmentation** Embedding Extraction for Target Mas IDS PVM AP **Embedding Extraction for Source Mask** $\rightarrow Z_{s}$ √ 33. 34. Normal Known Obie Background Living Things √ 42. se aesthetics of the scene ole-shaped Things -----Shadows freq cate 63 💻 **AP/AR of IDS + PVM in finding similar distractors** req cate 62 💳 freq cate 61 freq cate 59 💳 freq cate 58 freq cate 57 freq cate 56 freq cate 55 # 2000 freq cate 53 freq cate 53 freq cate 52 freq cate 52 freq cate 51 freq cate 50 freq cate 49 1000 #image freq cate 48 freq cate 47 freq cate 47 #instance freq cate 45 freq cate 44 freq cate 43 freq cate 44 freq cate 44 freq cate 44 freq cate 44 freq cate 39 freq cate 39 freq cate 37 freq cate 36 freq cate 35 freq cate 34 freq cate 33 freq cate 32 freq cate 32 freq cate 29 freq cate 29 freq cate 29 freq cate 27 freq cate 27 freq cate 27 freq cate 27 freq cate 24 freq cate 25 freq cate 24 freq cate 24 freq cate 25 freq cate 24 freq cate 27 freq cate 24 freq cate 25 freq cate 24 freq cate 27 freq cate 24 freq cate 25 freq cate 24 freq cate 10 freq cate 11 freq cate 10 freq cate 10 freq cate 3 freq cate 2 freq cate 3 3500 3000 <u>م</u> 2500 2000 1500 10 15 #category/image #image #instance #instances 0.2 Mask area / Image siz **Our real Distractor20K dataset**

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. Konstantin Sofiiuk et al., *Reviving iterative training with mask guidance for interactive segmentation*, ICIP 2022 5. D Goldman et al., *Content Aware Fill*, Photoshop feature 2010

Results of SimpSON in selecting distractors



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Experiments





| | AP_s | AP_m | AP_l | AR | AR_s | AR_m | AR_l |
|---|--------|--------|--------|-------------|--------|--------|--------|
| 1 | 21.0 | 35.2 | 39.4 | 41.0 | 31.1 | 41.1 | 50.9 |
| 7 | 21.9 | 34.6 | 39.5 | 39.0 | 30.6 | 39.2 | 47.2 |
| 4 | 18.7 | 35.8 | 42.5 | 47.0 | 36.3 | 47.2 | 57.4 |
| 4 | 35.6 | 43.4 | 44.2 | 49.7 | 44.5 | 50.5 | 54.2 |
| | | | | | | | |





Similarity map from one click



Iteratively select distractors