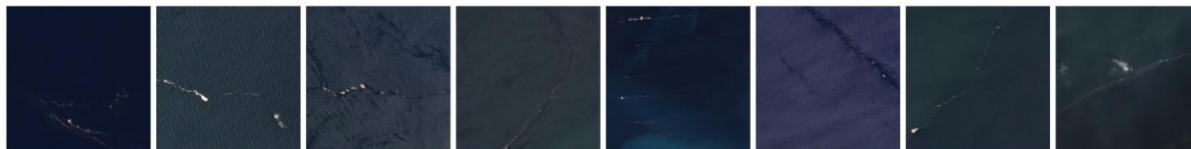


A Novel Model for Marine Pollution Detection Using Edge-Guide Mamba

Shuaiyu Chen

Background

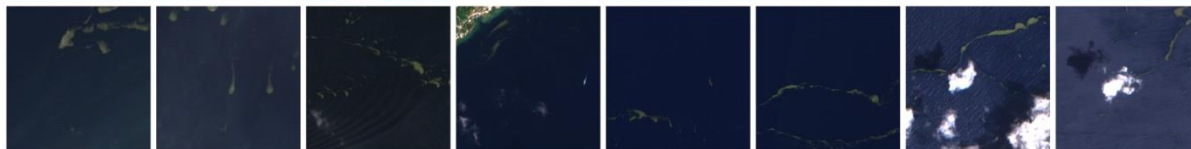
Marine Debris



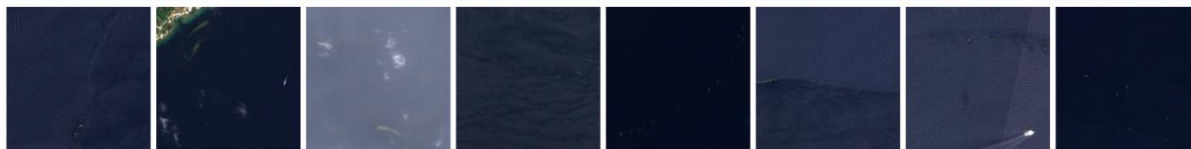
Oil Spill



Dense Sargassum



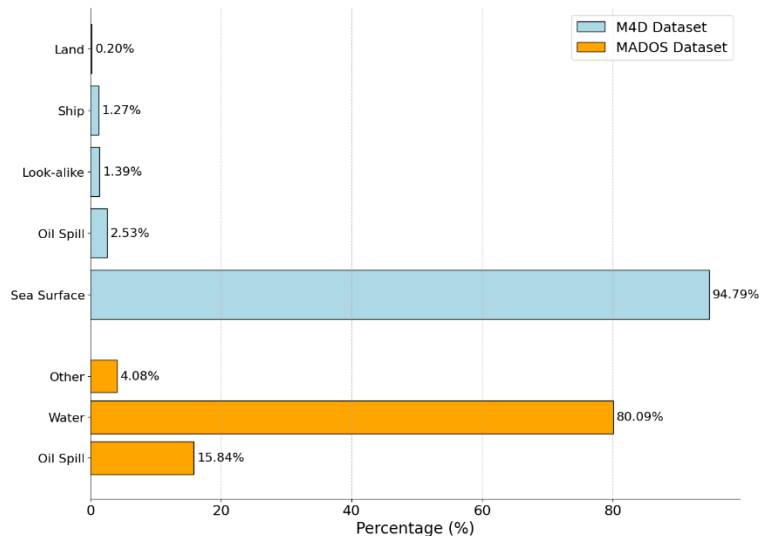
Sparse Floating Algae



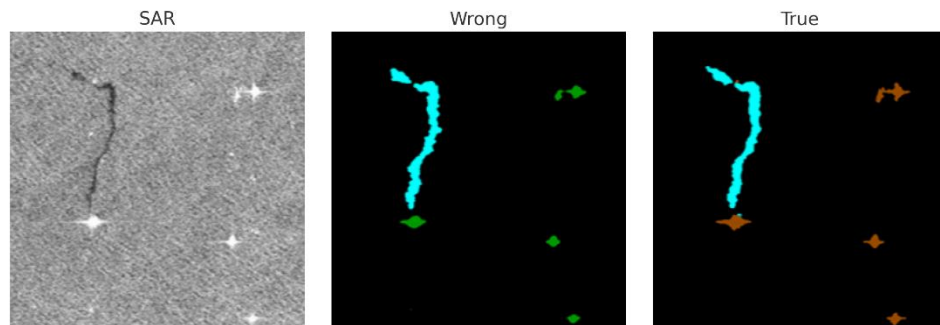
Natural Organic Material



Background



Data distribution

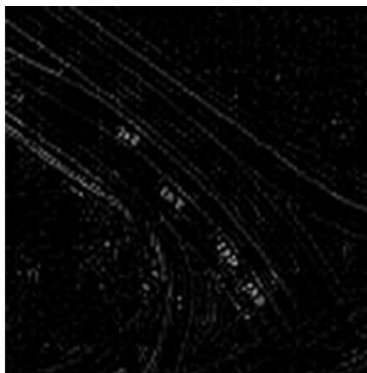


Misclassification on M4D Dataset

Background



Origin Image

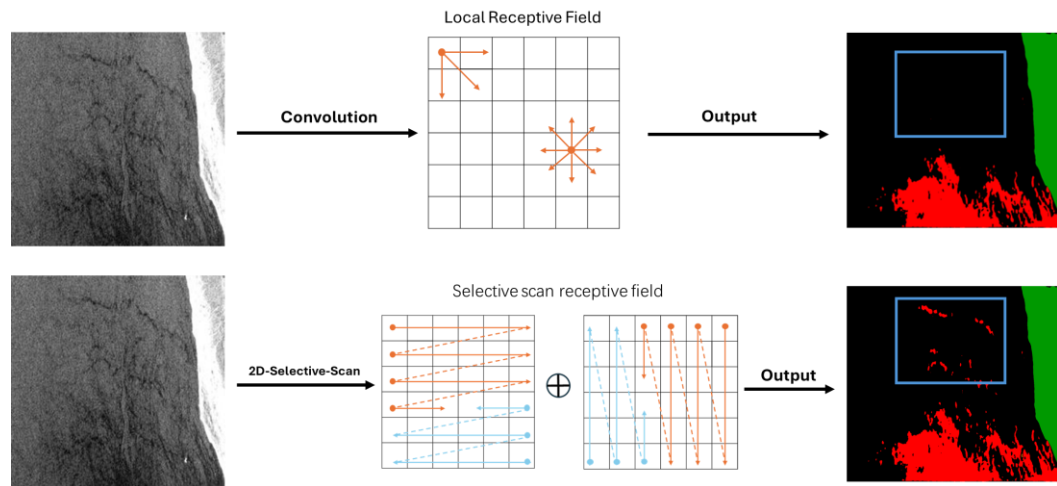


One convolution



Two convolutions

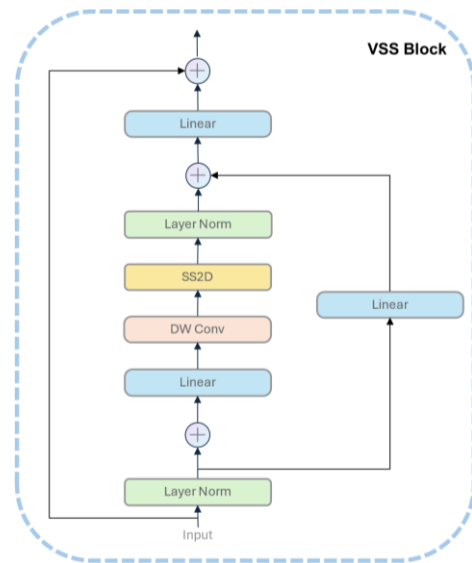
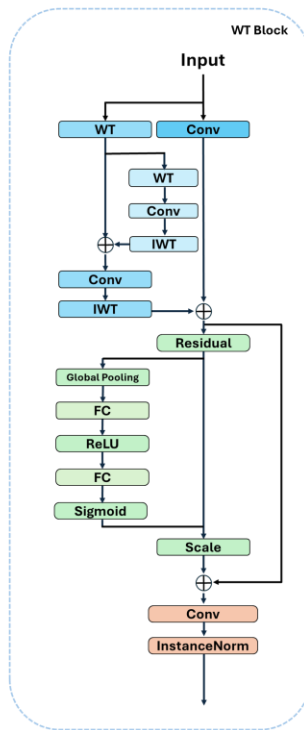
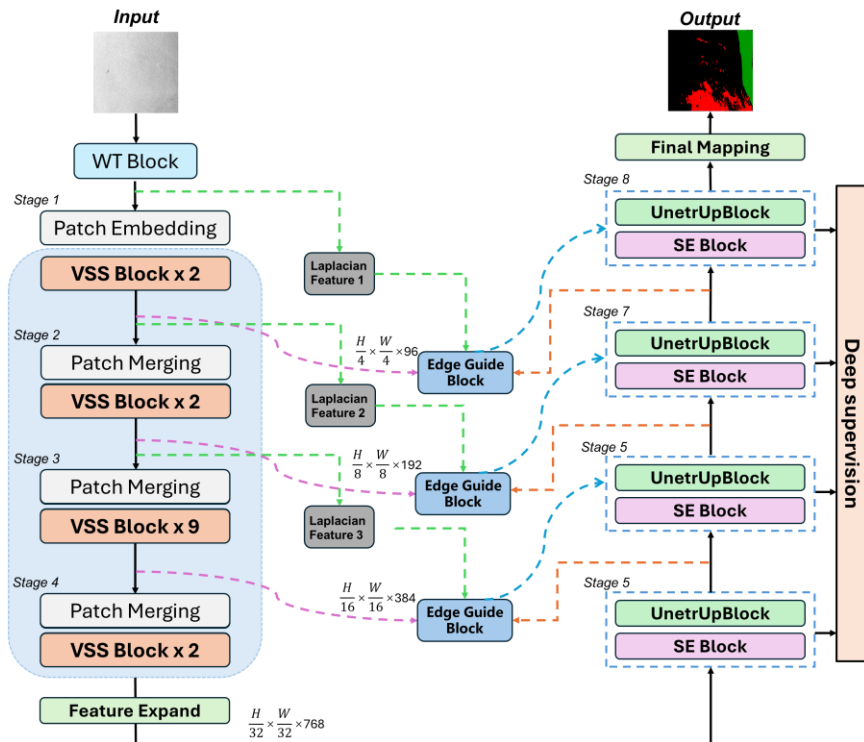
Background



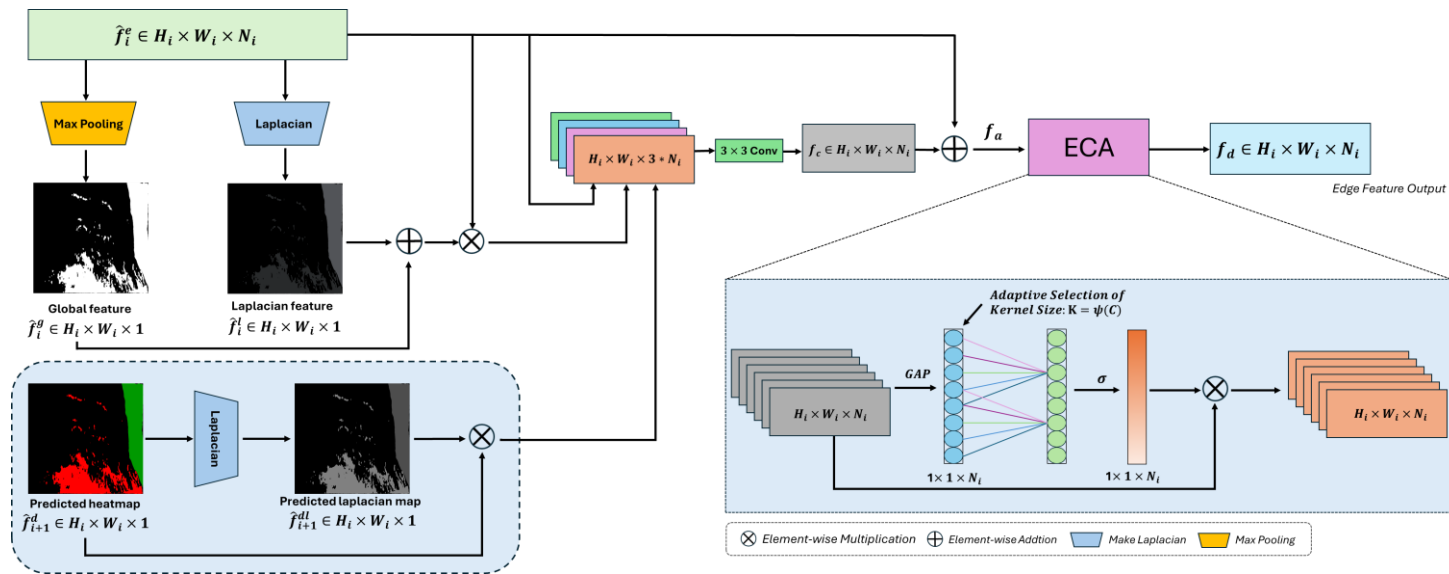
EGMamba Structure



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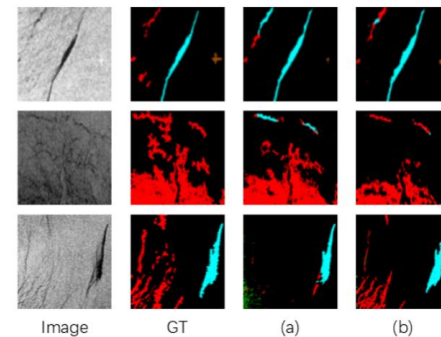
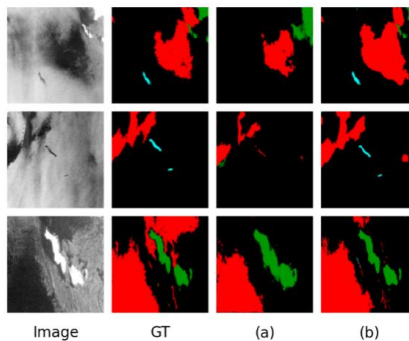
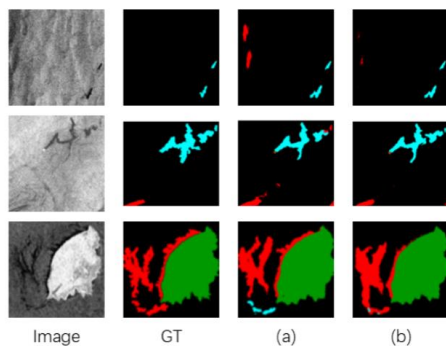
Edge-Guided Block



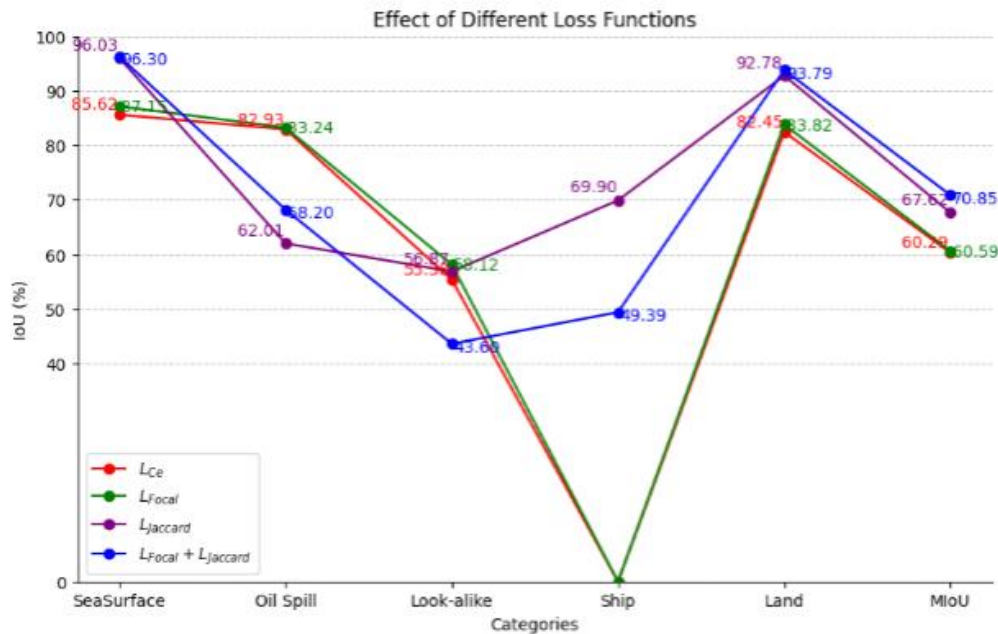
Experiment Result

TABLE I
ABLATION EXPERIMENT OF THE PROPOSED MODULES ON THE M4D DATASET

Model Name	WTM	SER	EGB	SeaSurface(%, $\uparrow$)	Oil Spill(%, $\uparrow$)	Look-alike(%, $\uparrow$)	Ship(%, $\uparrow$)	Land(%, $\uparrow$)	MIoU (%, $\uparrow$)	Acc (%, $\uparrow$)
MambaUnet (baseline)				93.90	53.90	39.55	44.93	92.68	64.97	96.02
MambaUnet + WTM	✓			95.43	66.97	46.09	37.58	91.82	67.58	96.15
MambaUnet + SER		✓		95.58	66.70	45.51	37.55	93.26	67.72	96.24
MambaUnet + EGB			✓	96.40	65.46	46.70	38.36	94.59	68.30	97.00
MambaUnet + WTM + SER	✓	✓		96.29	65.38	47.62	43.29	94.14	69.34	96.93
MambaUnet + SER + EGB		✓	✓	95.73	67.36	47.38	41.88	93.18	69.11	96.49
MambaUnet + WTM + EGB	✓		✓	96.27	64.97	45.16	45.43	95.57	69.48	95.39
EGMambaNet (ours)	✓	✓	✓	96.30	68.20	43.60	49.39	93.79	70.85	97.21



Experiment Result



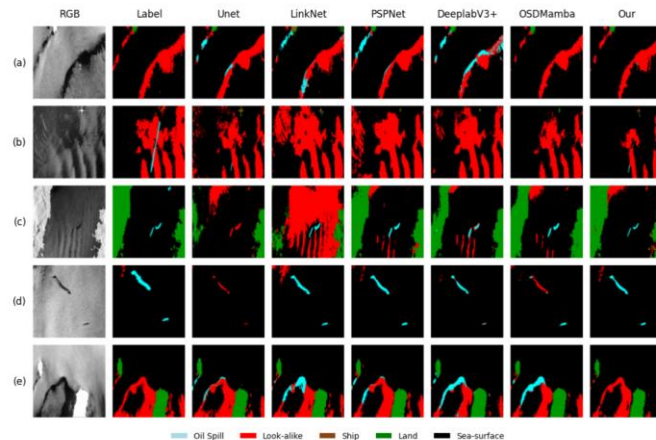
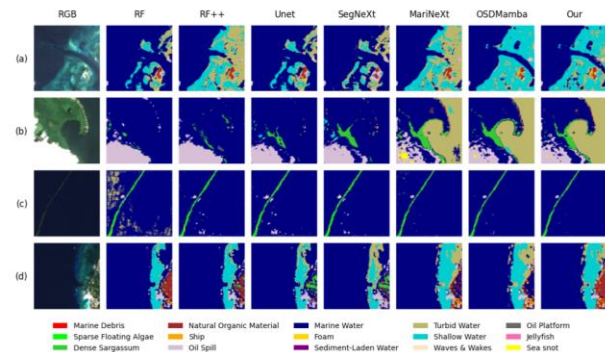
Experiment Result

TABLE II
COMPARISON OF SEGMENTATION RESULTS ON THE M4D DATASET

Model Name	SeaSurface(%, $\uparrow$)	Oil Spill(%, $\uparrow$)	Look-alike(%, $\uparrow$)	Ship(%, $\uparrow$)	Land(%, $\uparrow$)	MIoU (%, $\uparrow$)
Unet [48]	93.90	53.79	39.55	44.93	92.68	64.97
LinkNet [49]	94.99	51.53	43.24	40.23	93.97	64.79
PSPNet [50]	92.78	40.10	33.79	24.42	86.90	55.60
Deeplabv2 [51]	94.09	25.57	40.30	11.41	74.99	49.27
Deeplabv2(msc) [51]	95.39	49.28	31.26	88.65	93.97	62.83
Deeplabv3+ [52]	96.43	53.38	55.40	27.63	92.44	65.06
YOLOv8-SAM [53]	94.34	41.84	48.15	52.48	87.65	64.89
SAM-OIL [53]	96.05	51.60	55.60	52.55	91.81	69.52
EGMambaNet(ours)	96.30	68.20	43.60	49.39	93.79	70.85

TABLE III
PERFORMANCE OF OSDMAMBA ON THE MADOS DATASET

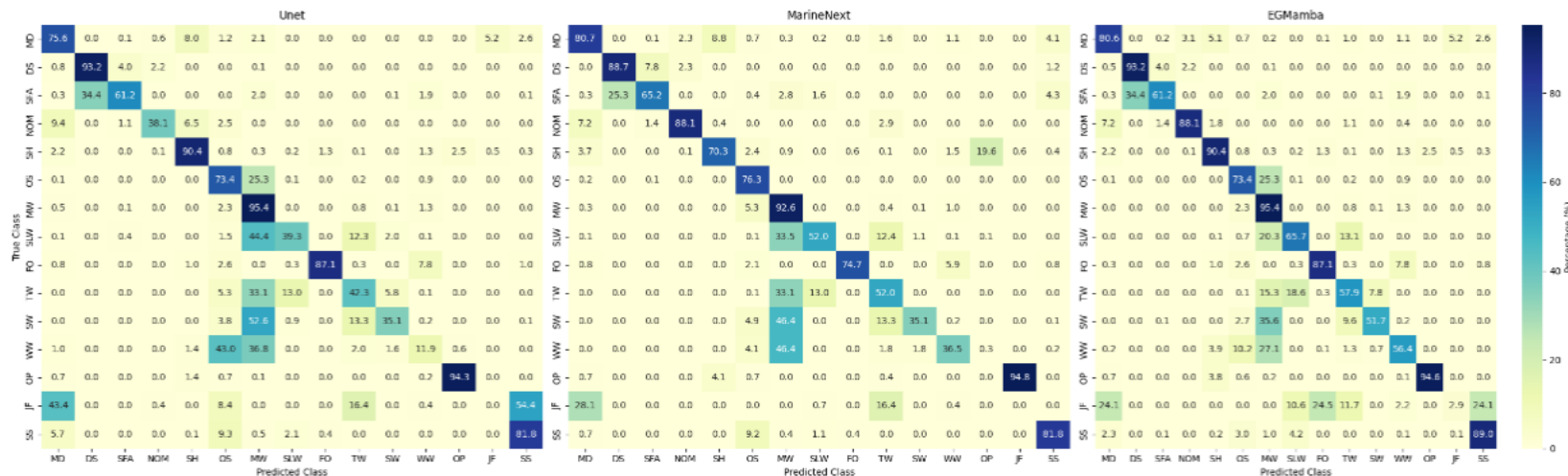
model	F1(%, $\uparrow$)	mIoU(%, $\uparrow$)	Overall OA(%, $\uparrow$)
RF [54]	56.6	43.9	67.1
RF++ [55]	64.4	52.4	83.8
U-Net [56]	63.8	51.0	82.9
SegNext [57]	60.6	49.2	86.6
MariNeXt(reproduce) [58]	70.6	59.2	81.6
EGMamba(ours)	74.8	69.3	83.1



Experiment Result



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MD: Marine Debris
DS: Dense Sargassum

SFA: Sparse Floating Algae
NOM: Natural Organic Material

SH: Ship
OS: Oil Spill

MW: Marine Water
SLW: Sediment-Laden Water

FO: Foam
TW: Turbid Water

SW: Shallow Water
WW: Waves & Wakes

OP: Oil Platform
JF: Jellyfish

SS: Sea snot



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Thank you for listening