Supplementary Materials

Improving in situ real-time classification of long-tail marine plankton images for ecosystem studies

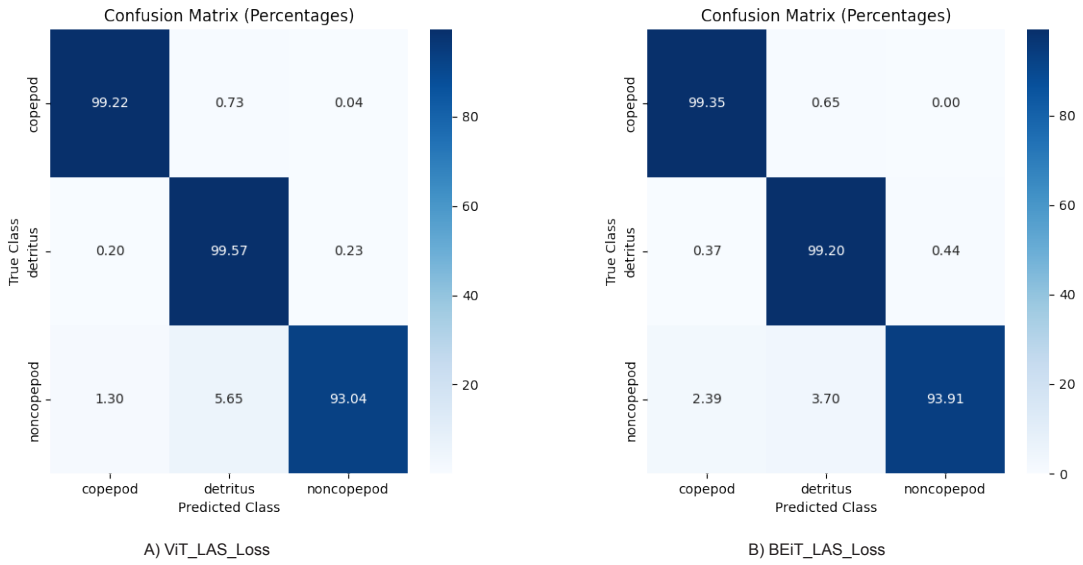

Figure 1: The confusion matrices compare the classification performance of LAS-based loss functions. Each matrix is normalized, presenting the percentage of true class predictions versus predicted outcomes across three categories: copepod, detritus, and non-copepod. (A) ViT_LAS_Loss: Demonstrates high accuracy in classifying copepods (99.22%) and detritus (99.57%) but shows slightly lower accuracy for non-copepods (93.04%). (B) BEiT_LAS_Loss: Exhibits similar results, with strong accuracy for copepods (99.35%) and detritus (99.20%) classifications, but some misclassification in the non-copepod category (93.91%).

Table 1: Overview of Copepod and Non-Copepod Species with Corresponding Image Counts: This Table Lists Various Species of Copepods and Non-Copepods, Detailing the Number of Images Collected for Each (NOI: number of images).

Copepod Species	**NoI**	**Non-copepod Species**	**NoI**
copepod bits	8	amphipoda caprellidae	1
copepod calanoida	1588	cladocera	2
copepod calanoida acartia_spp	109	cnidaria	567
copepod calanoida calanus_spp	7	cnidaria hydrozoa	2
copepod calanoida centropages_spp	262	cnidaria hydrozoa polyp	21
copepod calanoida temora_spp	74	decapoda	3
copepod cyclopoida	479	decapoda larvae brachyura	5
copepod cyclopoida oithona_spp	1326	echinodermata juvenille	1
copepod cyclopoida oncaea_spp	47	echniodermata larvae	2
copepod harpacticoida	3	euphausiid nauplii	3
copepod harpacticoida euterpina	16	fish larvae	1
copepod_harpacticoida_microstella	4	fish-larvae clupeidae	2
copepod_nauplii	2189	gastropoda	7
copepod unknown	6142	invertebrate eggs	3
-	-	mysidacea	1
-	-	nt-phyto	14
-	-	nt-phyto chains	37
-	-	nt-bubbles	8
-	-	nt-phyto ceratium_spp	589
-	-	nt-phyto rhizosolenia_spp	27
-	-	radiolaria	3
-	-	tintinnida	906