Supplementary Material

NegZoom: Negative-Constraint Coarse-to-Fine Retrieval in Whole Slide Images

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Supplementary Section 1. Dataset and Split Details

All experiments used fixed data partitions. BRACS used its official WSI-level train/validation/test split. TCGA-NSCLC was split at the patient level (60/20/20), ensuring that all WSIs from the same patient remained in one partition. H99 used a grade-stratified patient-level split with one WSI per patient. The private H99 source cohort comprised 686 WSIs with accompanying pathology reports; 627 LUAD cases with a pathologist-assigned grade of 1–3 were included. Supplementary Table S1 summarizes the cohort composition and partition sizes, and Supplementary Table S2 reports the class-wise counts for BRACS and H99.

Supplementary Table S1: Cohort composition and fixed partition sizes. TCGA-NSCLC WSI counts can exceed patient counts because a patient may contribute more than one diagnostic slide.

Cohort	Task	Counted unit	Split rule	Total	Train	Val.	Test
BRACS	Seven-class breast pathology	WSI	Official WSI-level split	547	395	65	87
TCGA-NSCLC	LUAD vs. LUSC	Patient	Patient-level 60/20/20	956	573	191	192
		WSI	Inherited patient assignment	1,073	645	203	225
H99	Three-grade LUAD	Patient/WSI	Grade-stratified patient split	627	377	124	126

Supplementary Table S2: Class-wise sample counts for BRACS, TCGA-NSCLC, and H99. TCGA-NSCLC counts are reported per WSI, with split assignment performed at the patient level.

Cohort	Class	Train	Val.	Test	Total
BRACS	N (normal)	27	10	7	44
	BP (pathological benign)	120	11	16	147
	UDH (usual ductal hyperplasia)	56	9	9	74
	FEA (flat epithelial atypia)	24	6	11	41
	ADH (atypical ductal hyperplasia)	28	8	12	48
	DCIS (ductal carcinoma in situ)	40	9	12	61
	IC (invasive carcinoma)	100	12	20	132
TCGA-NSCLC	LUAD	327	97	137	561
	LUSC	318	106	88	512
H99	G1: well differentiated	242	80	81	403
	G2: moderately differentiated	43	14	14	71
	G3: poorly differentiated	92	30	31	153

Supplementary Section 2. Complete Prompt Specifications

Supplementary Tables S3–S5 present the complete prompt sets used in the experiments. At the coarse stage, the positive and negative prompt sets are used as listed. At the fine stage, prompts for the target class form the positive set, whereas prompts from all other fine-stage groups, including the normal/background group, form the negative set.

Supplementary Table S3: Complete BRACS prompt configuration.

Stage	Group	Exact prompt strings
Coarse	Positive	*an H&E image of benign breast tumor* *an H&E image of atypical breast tumor* *an H&E image of malignant breast tumor*
Coarse	Negative	*an H&E image of ordinary breast tissue* *an H&E image of normal breast parenchyma* *an H&E image of unremarkable breast tissue* *an H&E image of empty glass slide background with no tissue* *an H&E image of slide background*
Fine	N	*An H&E image of high-magnification microscopic features of normal breast tissue.*
Fine	BP	*An H&E image of high-magnification microscopic features of pathological benign breast tumor.*
Fine	UDH	*An H&E image of high-magnification microscopic features of usual ductal hyperplasia.*
Fine	FEA	*An H&E image of high-magnification microscopic features of flat Epithelial Atypia.*
Fine	ADH	*An H&E image of high-magnification microscopic features of atypical ductal hyperplasia.*
Fine	DCIS	*An H&E image of high-magnification microscopic features of ductal carcinoma in situ.*
Fine	IC	*An H&E image of high-magnification microscopic features of invasive carcinoma.*
Fine	Normal/background	*an H&E image of high-magnification microscopic ordinary breast tissue* *an H&E image of high-magnification microscopic normal breast parenchyma* *an H&E image of high-magnification microscopic unremarkable breast tissue* *an H&E image of high-magnification microscopic empty glass slide background with no tissue* *an H&E image of high-magnification microscopic slide background*

Supplementary Table S4: Complete TCGA-NSCLC prompt configuration.

Stage	Group	Exact prompt strings
Coarse	Positive	*an H&E image of lung adenocarcinoma* *an H&E image of lung squamous cell carcinoma*
Coarse	Negative	*an H&E image of ordinary lung tissue* *an H&E image of ordinary pulmonary tissue* *an H&E image of ordinary pulmonary parenchyma* *an H&E image of empty glass slide background with no tissue* *an H&E image of slide background* *an H&E image of interlobular* *an H&E image of bronchiole*
Fine	LUAD	*An H&E image of high-magnification microscopic features of lung adenocarcinoma.*
Fine	LUSC	*An H&E image of high-magnification microscopic features of lung squamous cell carcinoma.*
Fine	Normal/background	*An H&E image of high-magnification microscopic features of ordinary lung tissue.* *An H&E image of high-magnification microscopic features of pleura.* *An H&E image of high-magnification microscopic features of interlobular.* *An H&E image of high-magnification microscopic features of bronchiole.* *An H&E image of high-magnification microscopic features of ordinary lung cells.* *An H&E image of high-magnification microscopic features of healthy lung tissue.* *An H&E image of high-magnification microscopic features of blood vessels.* *An H&E image of high-magnification microscopic features of lymphatic vessels.* *An H&E image of high-magnification microscopic features of empty glass slide background with no tissue.*

Supplementary Table S5: Complete H99 prompt configuration.

Stage	Group	Exact prompt strings
Coarse	Positive	*an H&E image of grade 1 lung adenocarcinoma* *an H&E image of grade 2 lung adenocarcinoma* *an H&E image of grade 3 lung adenocarcinoma*
Coarse	Negative	*an H&E image of ordinary lung tissue* *an H&E image of ordinary pulmonary tissue* *an H&E image of ordinary pulmonary parenchyma* *an H&E image of empty glass slide background with no tissue* *an H&E image of slide background* *an H&E image of interlobular* *an H&E image of bronchiole*
Fine	G1: Well differentiated	*An H&E image of high-magnification microscopic features of grade 1 lung adenocarcinoma.*
Fine	G2: Moderately differentiated	*An H&E image of high-magnification microscopic features of grade 2 lung adenocarcinoma.*
Fine	G3: Poorly differentiated	*An H&E image of high-magnification microscopic features of grade 3 lung adenocarcinoma.*
Fine	Normal/background	*An H&E image of high-magnification microscopic features of ordinary lung tissue.* *An H&E image of high-magnification microscopic features of pleura.* *An H&E image of high-magnification microscopic features of interlobular.* *An H&E image of high-magnification microscopic features of bronchiole.* *An H&E image of high-magnification microscopic features of ordinary lung cells.* *An H&E image of high-magnification microscopic features of healthy lung tissue.* *An H&E image of high-magnification microscopic features of empty glass slide background with no tissue.*