

# HistGen: Histopathology Report Generation via Local-Global Feature Encoding and Cross-modal Context Interaction

## Supplementary Materials

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<b>Prompt for TCGA Diagnostic Report Cleaning using GPT-4</b>
For report data preprocessing with GPT-4, this prompt is used: Help me check the formatting and spelling of the supplied pathology report, including incorrect use of punctuation like misusing of 'x' and 'X', and capitalization as well as deletion of some words of unclear meaning. It checks formatting and spelling while preserving the report's meaning, ensuring clinical correctness in the final report.

Fig. 1: Prompt for Report Data Preprocessing using GPT-4. This prompt checks formatting and spelling while preserving the report's diagnostic meaning, ensuring clinical correctness in the final report.

Table 1: Composition of the curated WSI-Report dataset. The dataset structure is detailed as follows, with each subset corresponding to a distinct disease type. Raw reports and more information on different subsets could be sourced from the TCGA platform. Notably, to guarantee each WSI corresponds to the report description, cases where one report matches multiple WSIs are excluded.

Cancer Type	BRCA	UCEC	KIRC	THCA	LGG	LUAD	HNSC	LUSC
# of Case	999	503	501	486	444	444	442	442
Cancer Type	COAD	PRAD	BLCA	STAD	LIHC	KIRP	CESC	GBM
# of Case	412	368	353	337	329	265	251	245
Cancer Type	SARC	PAAD	PCPG	READ	ESCA	THYM	KICH	SKCM
# of Case	243	174	171	156	117	113	108	97
Cancer Type	TGCT	MESO	UVM	OV	UCS	ACC	DLBC	CHOL
# of Case	87	67	65	62	56	54	43	37



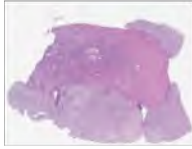
Whole Slide Image	HistGen Generated Results	Ground Truth
	a. renal cell carcinoma conventional clear cell type <u>fuhrman nuclear grade 3 of 4</u> . b. the neoplasm is confined within the renal capsule c. no invasion of the renal vein is identified . d. no evidence of angiolymphatic invasion is identified. e. all surgical margins are free of the neoplasm. f. non-neoplastic kidney with no evidence of malignancy . g. the adrenal gland is not involved. no evidence of malignancy	a. renal cell carcinoma conventional clear cell type. b. <u>fuhrman nuclear grade is 2 of 4</u> . c. <u>the greatest diameter of the neoplasm is 45 cm</u> . d. the neoplasm is confined within the renal capsule. e. no angiolymphatic invasion is identified. f. all final assessed surgical resection margins are free of neoplasm. g. pathologic tm stage pt1b nx mx
	Specimen type gastrectomy, with tumor site stomach. Tumor features ulcerated histologic type adenocarcinoma histologic grade poorly differentiated tumor extent adjacent structures specify - <u>lesser omentum</u> . lymph nodes positive for metastasis intraabdominal. lymphatic invasion not specified. venous invasion not specified. perineural invasion not specified. margins uninvolved. evidence of neo-adjuvant treatment not specified. additional pathologic findings not specified	Specimen type gastrectomy. Tumor site stomach. tumor features ulcerated. histologic type adenocarcinoma. histologic grade poorly differentiated. tumor extent adjacent structures specify - <u>lesser and greater omentum</u> . lymph nodes positive for metastasis intraabdominal. lymphatic invasion not specified . venous invasion not specified . perineural invasion not specified . margins not specified. evidence of neoadjuvant treatment not specified. additional pathologic findings not specified .
	diagnosis a left kidney renal cell carcinoma conventional clear cell type fuhrman nuclear grade 4. tumor confined to the kidney. vascular ureteral and soft tissue margins of resection free of tumor. adrenal gland no tumor present. gross description a left kidney and adrenal gland - a nephrectomy specimen including the renal sinus adipose tissue. the renal vein is present. tumor invading blood vessel in renal hilum.	diagnosis a left kidney renal cell carcinoma conventional clear cell type fuhrman nuclear grade 4. tumor extending focally into perirenal adipose tissue. tumor invading blood vessel in renal hilum. vascular ureteral and soft tissue margins of resection free of tumor. adrenal gland no tumor present. comment grossly no renal vein invasion was identified in one of the sections from the tumor in relation to the renal hilar region parts a7 and a8. there is tumor invading the lumen and partially the wall of a thick-walled vessel.

Fig. 2: Qualitative analysis of the proposed HistGen model: Words in bold green indicate alignment between our model’s generated results and the ground truth. Words underlined in orange represent diagnostic details our model misses. The first two examples demonstrate the model’s superior captioning capability, accurately diagnosing provided WSIs with minor, non-critical differences from the ground truths. In the third example, the model correctly predicts the diagnosis despite lacking detailed context present in the ground truth.

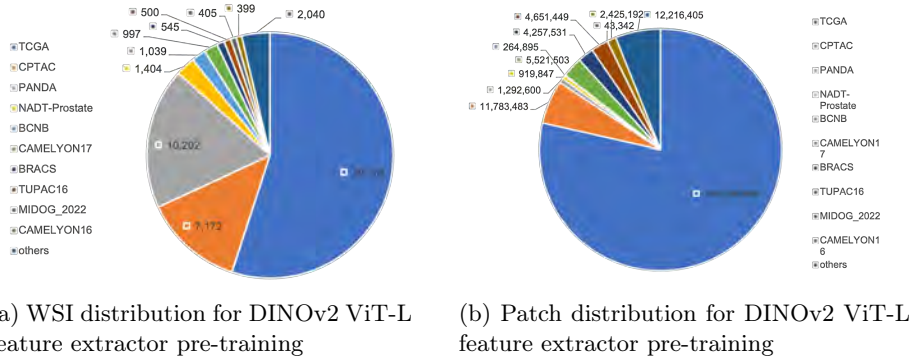


Fig. 3: Data distribution for DINOv2 ViT-L feature extractor pre-training. We have collected over 30 different pathology datasets containing over 60 primary sites. Patches are extracted from whole slide images at level 0, with dimensions of  $512 \times 512$ . These patches are subsequently resized to  $224 \times 224$  for pre-training the feature extractor. Subfigure (a) shows the details of our collected WSIs and subfigure (b) denotes the details of patches (tiled from the above WSIs) used for pre-training.