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PanVasc: A Shape-Aware Framework for Peripancreatic Vascular Invasion Assessment in Pancreatic Ductal Adenocarcinoma

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Supplementary Information

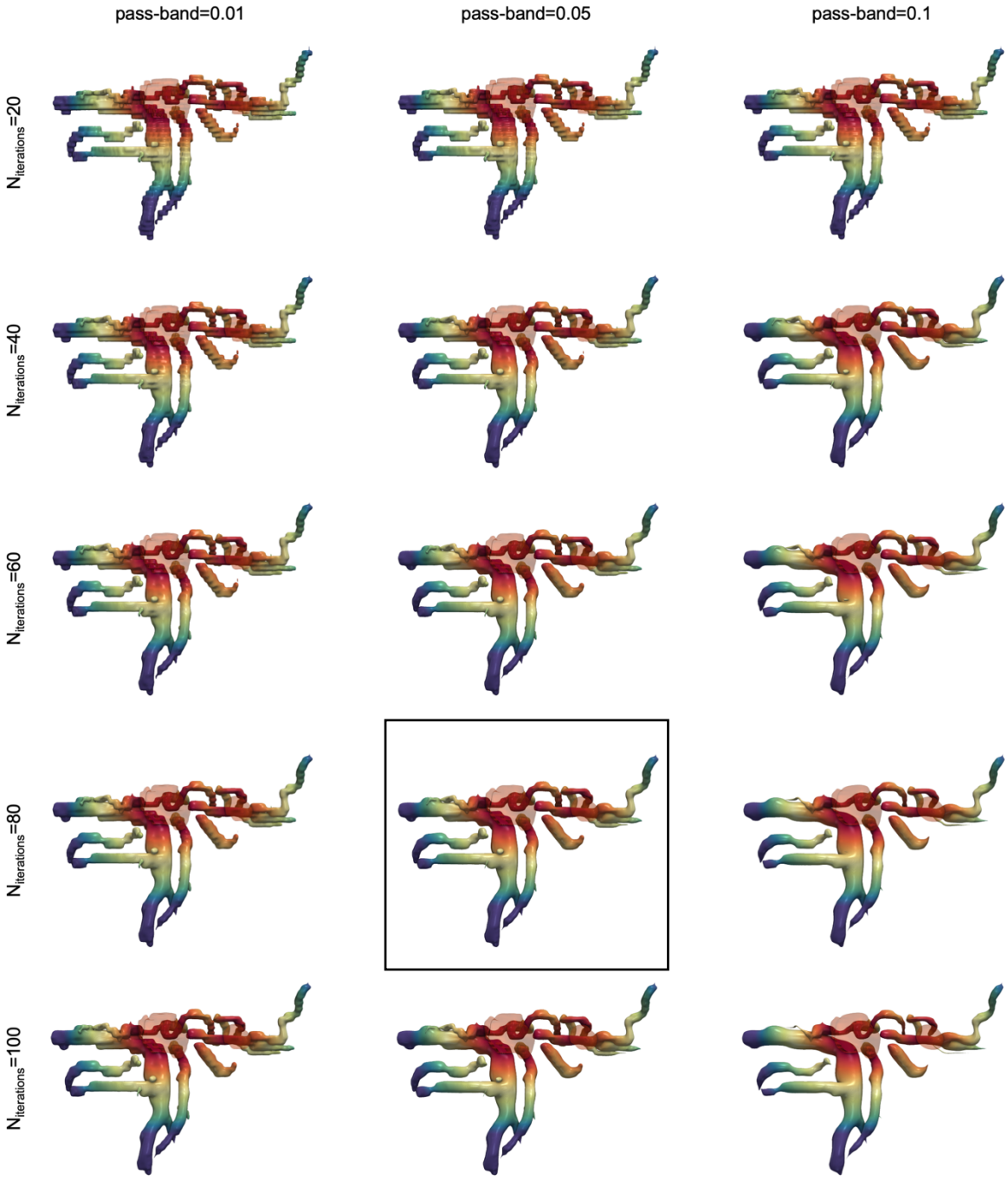
Supplementary Figure 1: *Sensitivity of the tumor-proximity map to Taubin smoothing parameters……1*

Supplementary Figure 2: *Sensitivity of the tumor-proximity map to the distance cut-off……...2*

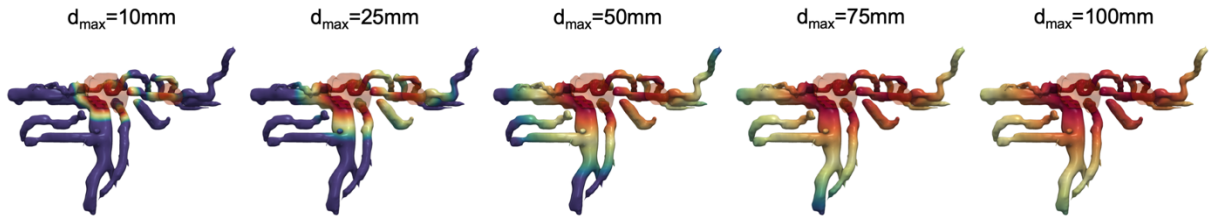
Supplementary Table 1: E_{max} *by preoperative resectability class……..3*

Supplementary Table 2: *AUEC by preoperative resectability class……...4*

Supplementary Figure 1: Sensitivity of the tumor-proximity map to Taubin smoothing parameters. Rows represent the number of iterations $N_{\text{iterations}} \in \{20, 40, 60, 80, 100\}$; columns vary the *pass-band* $\in \{0.01, 0.05, 0.1\}$. The *pass-band* sets the surface-frequency cutoff below which geometry is preserved; the iteration count controls how sharply that cutoff is approached. Colors encode distance to the nearest tumor-surface point, clamped at $d_{\max} = 50$mm. The configuration used throughout the paper ($N_{\text{iterations}} = 80$, *pass-band* $= 0.05$) is outlined.



Supplementary Figure 2: Sensitivity of the tumor-proximity map to the distance cut-off $d_{\max} \in \{10, 25, 50, 75, 100\}$mm, at fixed Taubin smoothing ($N_{\text{iteration}} = 80$, *pass-band* $= 0.05$). $d_{\max}$affects the visualization only. The parameter sets the upper end of the color map.



Supplementary Table 1: $E_{\max}$ (degrees, mean $\pm$SD) by preoperative resectability class. Values are given for the SMA, CA and branching arteries, and regional veins across the resectable, borderline resectable, and locally advanced groups, at contact thresholds of 1, 2, and 3 mm. Spearman rank correlation ρ between $E_{\max}$ and resectability class (ordered: resectable, borderline-resectable, locally advanced); bold indicates $p < 0.05$.

Vessel	Contact threshold	Resectable	Borderline resectable	Locally advanced	Spearman ρ
Superior mesenteric artery	1mm	1.0 ± 9.2	3.0 ± 17.5	19.2 ± 48.9	**+0.17**
	2mm	4.8 ± 28.6	12.9 ± 48.9	84.9 ± 131.6	**+0.24**
	3mm	9.0 ± 41.6	25.4 ± 75.6	98.9 ± 136.4	**+0.26**
Celiac axis, common hepatic artery, and splenic artery	1mm	0.1 ± 1.3	0.0 ± 0.0	2.9 ± 10.5	+0.08
	2mm	11.9 ± 50.0	17.8 ± 67.8	87.1 ± 134.0	**+0.12**
	3mm	29.1 ± 84.5	27.5 ± 82.4	130.9 ± 158.6	**+0.12**
Regional veins (superior mesenteric vein, portal vein, and splenic vein)	1mm	13.0 ± 50.9	47.3 ± 98.6	14.7 ± 18.6	**+0.23**
	2mm	45.7 ± 86.6	121.1 ± 143.2	91.1 ± 123.3	**+0.25**
	3mm	91.4 ± 120.5	170.4 ± 153.8	142.1 ± 141.8	**+0.21**

Supplementary Table 2: *AUEC* (degrees-mm, mean $\pm$ SD) by preoperative resectability class. Values are given for the SMA, CA and branching arteries, and regional veins across the resectable, borderline resectable, and locally advanced groups, at contact thresholds of 1, 2, and 3 mm. Spearman rank correlation ρ between *AUEC* and resectability class (ordered: resectable, borderline resectable, locally advanced); bold indicates $p < 0.05$.

Vessel	Contact threshold	Resectable	Borderline resectable	Locally advanced	Spearman ρ
Superior mesenteric artery	1mm	1.3 ± 13.6	27.5 ± 210.6	80.1 ± 268.5	**+0.17**
	2mm	24.0 ± 159.4	200.6 ± 1332.7	625.3 ± 1123.5	**+0.24**
	3mm	81.1 ± 413.2	351.4 ± 1808.4	1216.7 ± 1988.7	**+0.26**
Celiac axis, common hepatic artery, and splenic artery	1mm	0.0 ± 0.6	0.0 ± 0.0	2.6 ± 7.9	+0.08
	2mm	23.6 ± 104.1	35.7 ± 159.3	378.0 ± 705.7	**+0.12**
	3mm	107.3 ± 413.7	91.1 ± 373.4	821.3 ± 1311.4	**+0.12**
Regional veins (superior mesenteric vein, portal vein, and splenic vein)	1mm	27.4 ± 113.3	86.7 ± 186.1	21.9 ± 37.3	**+0.22**
	2mm	193.0 ± 452.0	447.8 ± 720.8	316.0 ± 441.8	**+0.22**
	3mm	438.8 ± 760.8	919.8 ± 1105.7	746.1 ± 839.2	**+0.22**