Student Assistant (SHK/HiWi)

Cell Segmentation and Biomarker Expression

original multiplex images

segmented multiplex images

single cell expressions

Cell	X-coord	Y-coord	Marker 1	Marker 2	...	Marker N
1	47	103	0.0	254.7	...	3.0
2	55	520	362.0	122.2	...	122.3
3	80	433	545.3	9.0	...	10.2
4	92	294	12.9	20.1	...	583.4
5	107	578	847.7	894.2	...	0.0
6	138	212	173.9	42.5	...	107.8
...	...	...	...	...	...	...
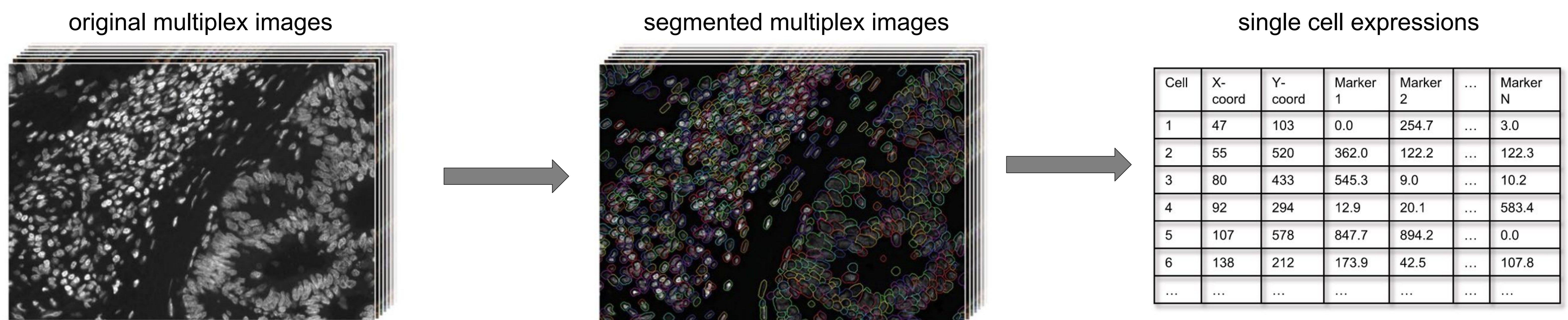
Setting

The "Translational Surgical Oncology" division of the National Center for Tumor Diseases (NCT) Dresden is conducting research at the intersection of medicine, computer science and technology to provide computer- and robot-assisted solutions for surgery. One of the research streams at the lab aims in assisting surgical planning and patient care by pre-operatively predicting potential surgical complications.

Task

Cellular morphology is an indicator of a physiological state of the cell, and a well-segmented image can capture biologically relevant morphological information. Given our dataset 7plex pancreatic ductal adenocarcinoma (PDAC) tumor microenvironment images, we aim to segment cell nuclei, estimate the cell shape and merge biomarker expressions. The difficulty of achieving accurate, automated cell segmentation is due in large part to the differences in cell shape, size and density across tissues. Thus machine learning methods are developed to fulfill this goal. Both supervised and unsupervised methods shall be explored.

Requirements

We are looking for motivated students, interested in offering innovative solutions to surgical problems. We offer the chance to work with an interdisciplinary team of computer scientists and surgeons and gather experience with Linux, Python, Git, etc.

Time: 20 to 40h per month (individually adaptable)

Eligibility criteria:
· Very good programming knowledge
· Experience with deep learning
· Can work independently and communicate clearly
· Basic knowledge of biology
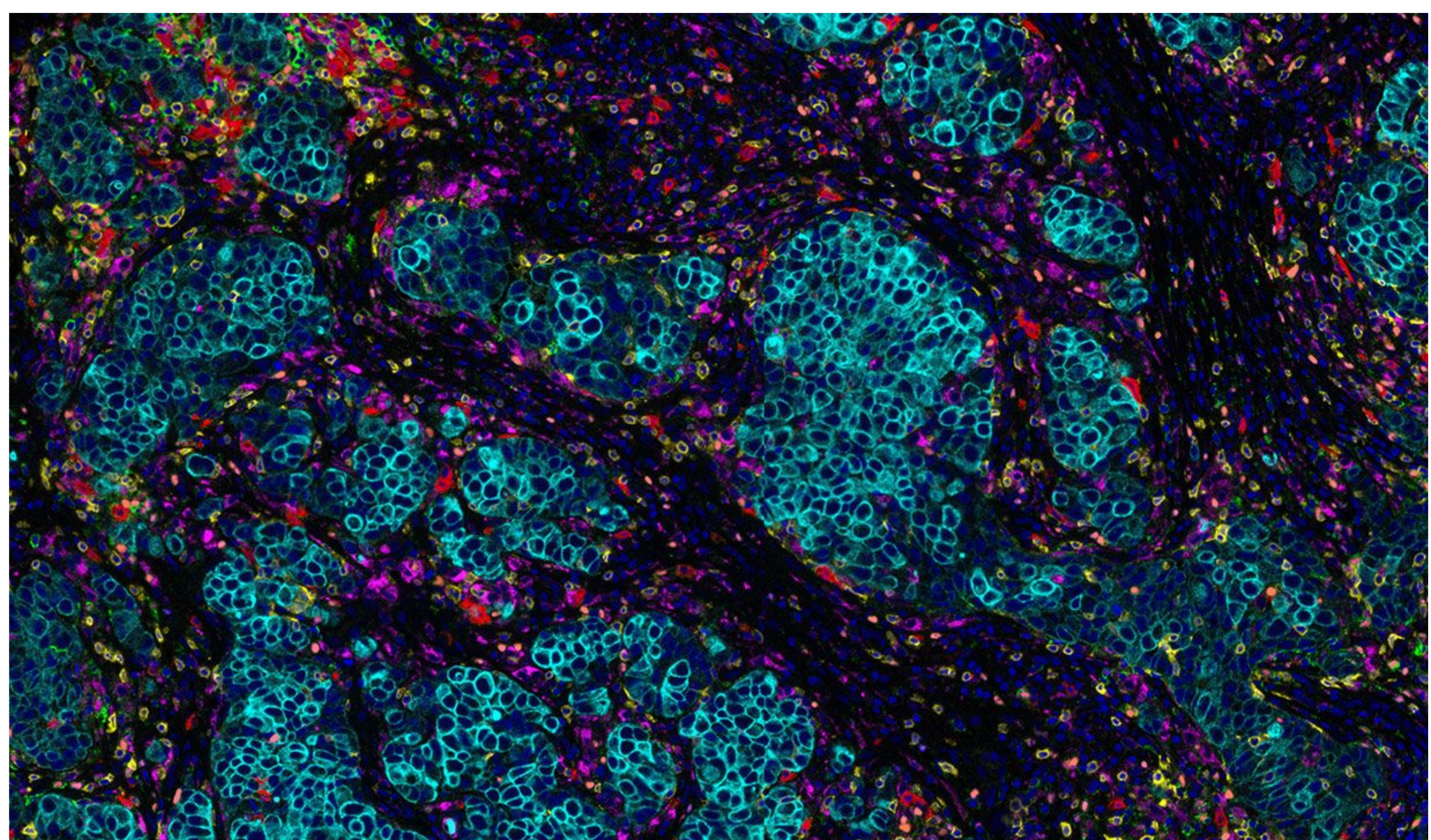
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