

Supplementary information

A guide to artificial intelligence for cancer researchers

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Supplementary Material

Supplementary Table 1: How to get started: commonly used tools for automated medical image processing. To optimize productivity, image-based toolkits can be used to automate medical image analysis tasks, such as microscopy-based quantification of structures or even automatic sorting of photographs taken in the laboratory. Alternatively, with no-code or low-code applications, researchers even without programming knowledge can train their own custom models for basic tasks. Region of Interest (ROI); Computed Tomography (CT); Magnetic Resonance Imaging (MRI); Positron Emission Tomography (PET).

Image modality	Digital pathology, microscopy images
Task	Software
Automatic and manual cell count	Fiji ¹ /ImageJ ² CellProfiler ³ QuPath ⁴ BioImageXD ⁵
Monitor cell growth, death and migration	Fiji ¹ /ImageJ ² CellProfiler ³ Napari ⁶
Differentiate morphological patterns	Fiji ¹ /ImageJ ² CellProfiler ³ BioImageXD ⁵
Assess protein expression	Fiji ¹ /ImageJ ²
Cell segmentation	Fiji ¹ /ImageJ ²
Nucleus segmentation	Fiji ¹ /ImageJ ²
Create 3D models	Fiji ¹ /ImageJ ² Napari ⁶
Image modality	Fluorescent Images, Multiple Depth Images
Task	Software
Viewing multi-channel images	Fiji ¹ /ImageJ ² CellProfiler ³ QuPath ⁴
Viewing multi-dimensional images	Fiji ¹ /ImageJ ² CellProfiler ³ QuPath ⁴
Cell segmentation	Fiji ¹ /ImageJ ²
Nucleus segmentation	Fiji ¹ /ImageJ ²
Image modality	CT, MRI and PET images
Task	Software

View radiology images	3DSlicer ⁷ OsiriX ⁸ Horos ⁹
ROI segmentation	3DSlicer ⁷ OsiriX ⁸ ITK-SNAP ⁷⁴ Horos ⁹
Image reconstruction Create 3D models	3DSlicer ⁷ OsiriX ⁸ ITK-SNAP ⁷⁴ Horos ⁹
Voxel density or intensity quantification	3DSlicer ⁷ OsiriX ⁸ ITK-SNAP ⁷⁴ Horos ⁹ Horos ⁹ LIFEx ¹⁰
Automatic segmentation of anatomical structures and organs	TotalSegmentator ^{11,12}
Computations of hand-crafted radiomics	PyRadiomics ¹³
Signal intensity quantification; MRI-based biomarker computation	ANTs ¹⁴ FSL ¹⁵ Freesurfer ¹⁶ MITK ¹⁷ DIPY ¹⁸ MRtrix3 ¹⁹

Supplementary Table 2: Hyperlinks to some of the most commonly used resources for the applications of AI in cancer research.

Resource	Link
Fiji	https://fiji.sc/
ImageJ	https://imagej.net/ij/index.html
CellProfiler	https://cellprofiler.org/
QuPath	https://qupath.github.io/
ilastik	https://www.ilastik.org/
Napari	https://napari.org/stable/
BioImageXD	https://www.bioimagexd.net/
3DSlicer	https://www.slicer.org/
OsiriX	https://www.osirix-viewer.com/
ITK Snap	http://www.itksnap.org/pmwiki/pmwiki.php
TotalSegmentator	https://github.com/wasserth/TotalSegmentator
PyRadiomics	https://pyradiomics.readthedocs.io/en/latest/
ANTx	https://github.com/ANTsX/ANTs
chatGPT-4	https://openai.com/gpt-4
Google Bing	https://www.bing.com/
TensorFlow	https://www.tensorflow.org/
PyTorch	https://pytorch.org/
Keras	https://keras.io/
Fastai	https://github.com/fastai/fastai
OpenCV	https://opencv.org/
BioPython	https://biopython.org/
Hadoop	https://hadoop.apache.org/
R	https://www.r-project.org/
scikit-survival	https://scikit-survival.readthedocs.io/en/stable/
Beautiful Soup	https://www.crummy.com/software/BeautifulSoup/bs4/doc/
Scrapy	https://scrapy.org/

References for Supplements only

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