Elif Bilge

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ABOUT ME

I am a Computer Vision Research Engineer with a focus on medical image analysis. I possess expertise in working both independently and in teams, and I have a track record of creating algorithms that are seamlessly incorporated into user-friendly applications designed for pathologists and radiologists. My approach involves close collaboration with healthcare experts and consultants, resulting in the creation of long-lasting solutions. I also enjoy designing intuitive user interfaces and brochures to present my projects, as well as, meticulously preparing my reports. I am open to engaging in open-source projects and collaborating with like-minded individuals to advance the field of healthcare technology and make positive contributions to the community.

EDUCATION

Bilkent University September 2015 - February 2020
B.S. in Electrical and Electronics Engineering *Ankara, Turkey*

EMPLOYMENT HISTORY

Disun Software March 2022 - Present
Computer Vision Research Engineer *Izmir, Turkey*

Developed decision support system for detection of cytomegalovirus (CMV) in immunohistochemical stained images and detection of tumor buddings to assist pathologists. Developed automatic HER2 scoring algorithm for optimal cancer treatment strategy selection. Designed algorithms for automatic mapping between hematoxylin-eosin (HE) images to DAPI images, and automatic analysis/visualization of fluorescence in situ hybridization (FISH) images. Built systems for automatic spectral spectral karyotype analysis and automatic detection of antinuclear antibody on immunofluorescence images. *The projects have been successfully reported, presented, and integrated into the interface.*

National Magnetic Resonance Research Center February 2021 - December 2022
Research Engineer *Ankara, Turkey*

To eliminate vendor dependency, worked on the design of MRI spectrometer and MRI pulse sequences crafting, collaborated with ASELSAN. Moreover, led the FPGA-based MRI spectrometer project to establish communication between sequences and scanner for flexible transmission of waveforms.

Papilon Defense July 2020 - November 2020
Computer Vision Research Engineer *Ankara, Turkey*

Designed algorithms to detect license plates in video streams and perform optical character recognition for automated registration and authentication processes of smart parking systems.

ASELSAN January 2018 - April 2018
Summer Intern *Ankara, Turkey*

Offer service through Windows Communication Foundations (WCF) framework in Model-View-Controller (MVC) pattern to create a platform of user login page.

KIWI July 2017 - August 2017
Summer Intern *Ankara, Turkey*

Worked on drone motor communication via FPGA.

SELECTED PROJECTS

FISH Analyze *(PyTorch, OpenCV, Tkinter)*
Developed a specialized automated algorithm for *fluorescence in situ hybridization* (FISH) analysis. A UNet-based model was trained to segment cells within FISH images, followed by the detection of signals via image processing techniques. Designed an intuitive GUI that conveniently displays the results of analyses and offers visualization based on the chosen channel option. This enhances the visibility of signals and cell nucleus boundaries, making it easier for pathologists to accurately assess the presented solution.

Tumor Budding Segmentation *(TensorFlow, Scikit-Image)*
Segmenting tumor budding is an intricate task due to its subjective nature for pathologists. To address this challenge, a neural network has been trained specifically for tumor budding segmentation in H&E images, prioritizing the requirements of pathologists. This network is meticulously designed to integrate the information from multiple resolutions of Regions of Interest (ROI). To mitigate false positives, a pretrained model is employed to identify potential tumor budding candidates, followed by the trained model's application in these candidate regions. The developed solution is integrated into a UI to allow pathologists to try this solution.

HER2 Scoring *(TensorFlow, Tkinter)*
A convolutional neural network is trained to conduct a probabilistic multiclass classification of Human Epidermal Growth Factor Receptor 2 (HER2) images. Additionally, an intuitive GUI has been designed to conveniently present the HER2 characteristics for the user's selected region on an Immunohistochemistry (IHC) image.

HE-2-DAPI Matching *(Scikit-Image, Scipy)*
Matching is carried out between regions in the H&E stained image and the corresponding regions in the 4',6-diamidino-2-phenylindole (DAPI) stained image, using keypoint matching as the foundation. This matching offers the complementary information provided by both imaging methods helps to accurately identify cell types, visualize tissue structures more clearly, and ultimately aid in the better diagnosis of diseases and identification of abnormalities in tissue samples. Additionally, a GUI has been created for testing this module.

CMV Detection *(Scikit-Image, Scikit-Learn, Scipy, Pandas)*
Designed a decision support algorithm for the detection of Cytomegalovirus (CMV) in immunohistochemical stained images based on the extracted features. This solution is now ready to be used by pathologists as it is integrated into a UI.

Detection and 2D-Mapping of Chemicals using MWIR Laser *(MATLAB, LabVIEW)*
Design and implementation of laboratory chemical scanner prototype utilizing middle wavelength infrared (MWIR) laser, as part of a senior project course, collaborated with METEKSAN Defense.

Reconstruction of Head Phantom Image in Defined k-Space *(MATLAB)*
Simulated the reconstruction of raw MRI data through the projection-reconstruction method using the Shepp-Logan Head Phantom function based on the Central Slice Theorem.

SKILLS

Programming Languages	Python, MATLAB
Frameworks	PyTorch, TensorFlow, OpenCV, Scikit-Learn, Scipy, Pandas
Tools	Linux, Docker, Git, Shell, MySQL
Languages	English (C1), German (B1), Turkish (Native)

Last updated December 16, 2023