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Autonomous, high accuracy classification of cancer in tissue samples

A machine learning-based algorithm for cancer detection and classification.

IP Status: US Patent Issued; **Application #:** 15/829,562

Applications

- Computer aided diagnosis - cancer detection and classification
- Software as a service (SaaS) for detection, grading of cancer

Key Benefits & Differentiators

- Algorithm is built using computer vision techniques; does not rely on rule-based learning.
- Can successfully distinguish morphologic variants that can mislead pathologists
- Classifier produces a multidimensional graph to clearly distinguish covariants
- Provides insight into disease morphology through interpretable explanation of computer models
- Removes subjectivity from diagnosis process; does not rely on experience of pathologist
- Autonomous classification and annotation reduces time and cost significantly
- User-friendly GUI

Overview

Researchers at the University of Minnesota have developed a machine learning-based computer aided-diagnosis (CAD) software for identification and classification of cancer in tissue samples. This software uses an imaging processing algorithm built on computer vision techniques to quickly and reliably detect, diagnose and classify cancer in histopathological samples with minimal oversight from surgical pathologists. The software can effectively classify benign vs. cancerous tissue, as well as distinguish between the different types of smooth muscle tumors. Researchers have noted the accuracy of distinguishing conventional leiomyomas and leiomyoma variants from leiomyosarcomas to be 96.00% and 97.19%, respectively.

Currently available CAD softwares to detect and classify cancer from stained tissue samples rely on segmentation and feature extraction methods based on color, texture, size, and borders. Relatively modern algorithms have used machine learning approach to find a combination of such features that best fit the learning model. While these algorithms seem promising to detect cancer, they fail to distinguish between morphologic variants of the diseases. These variants often mislead even a trained pathologist, thereby resulting in misdiagnosis. The novel algorithm presented here does not rely on rule-based learning; instead, it is built on computer vision techniques, resulting in highly accurate CAD that can distinguish seemingly difficult and ambiguous tissue samples.

Phase of Development

Pilot scale demonstration in endometrioid, adenocarcinoma, breast cancer.

Researchers

Technology ID
20140318

Category
Life Sciences/Diagnostics & Imaging
Software & IT/Health IT
Software & IT/Image & Signal Processing

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- **Nikolaos Papanikolopoulos, PhD,** Professor, Electrical and Computer Engineering

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