



Real Time Imaging of Tumor Margin

ABSTRACT

CytoVeris Inc. is an emerging company formed with the vision to change the paradigm in cancer surgery through the introduction of optical-based “guided surgical tools”

Our technology will assist cancer surgeons to discern between cancer tissue and healthy tissue in real-time during surgery and as a result, will increase the probability of successful cancer surgery and outcomes.

We use a multi-modal approach, including Raman Spectroscopy, to provide an optical “fingerprint” of the tissue to the molecular level.

The CytoVeris Team



Gary Root



Michael Sapack



Pat Curry



David Fournier



Rishikesh Pandey



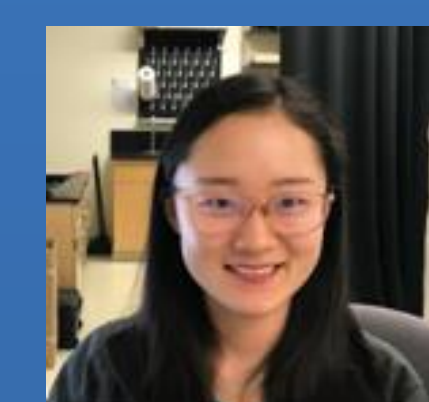
Noel Daigneault



Noemi Olivo



Machele Ricio



Yang Li



Tyler Peterson



Alan Kersey

CONTACT

Yang Li
University of Connecticut
Computer Science and Engineering
Email: yang.5.li@uconn.edu
Phone: (860)634-0412
Website: www.linkedin.com/in/yanglilith

Deep learning for Raman spectroscopic data analysis

Yang Li¹, Gary Root²

¹ Computer Science and Engineering Department, University of Connecticut

² CytoVeris Inc., 400 Farmington Ave Farmington Connecticut

INTRODUCTION

CytoVeris has been founded with the vision to develop new optical-based ‘guided surgical’ tools to aid surgeons in determining tumor margin in real-time during surgical procedures.

Our new **OncoVeris™** technology platform will assist surgeons in assessing tissue type during surgery, using an optical technique known as Raman spectroscopy. This technique provides high molecular specificity – the measurement of the Raman spectra can be considered to give the optical fingerprint of a biomolecule.

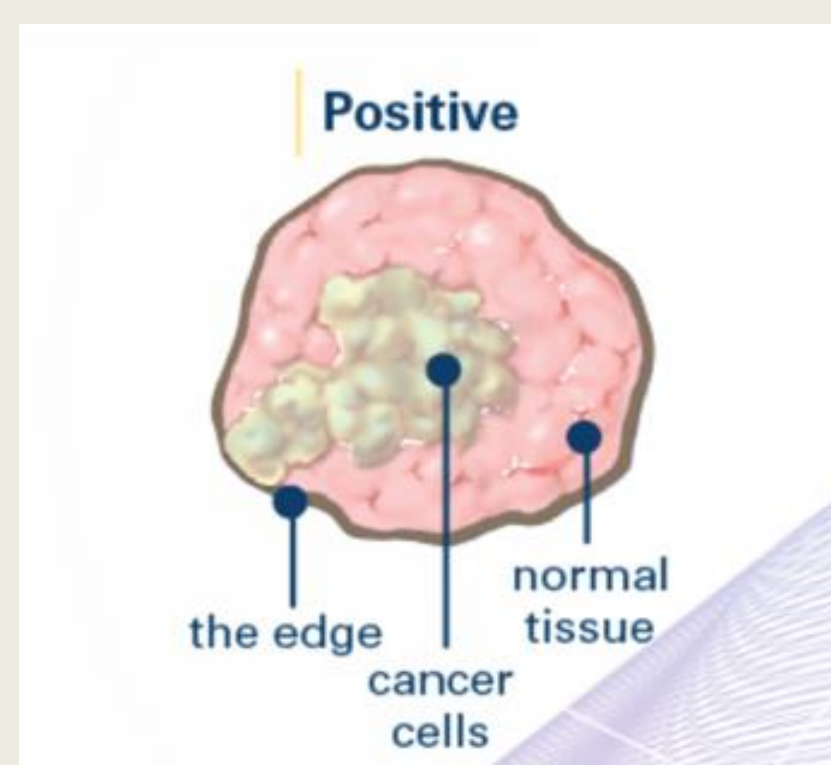


Figure 1. Positive tissue

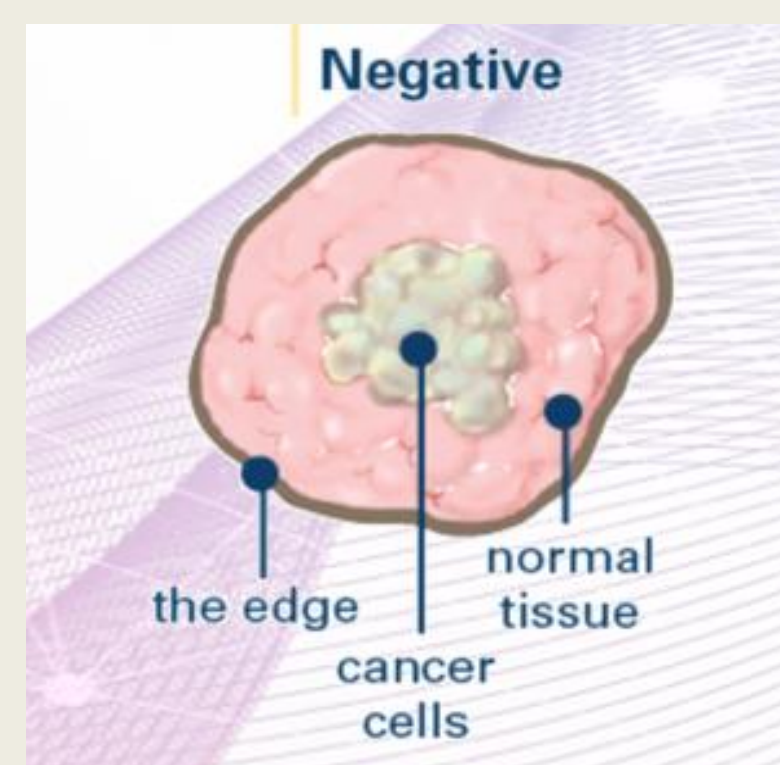


Figure 2. Negative tissue

My main responsibility is about **Machine Learning** using deep learning to identify biochemical information from spectra collected with Raman Spectroscopy. Building a classifier distinguishes normal and cancerous cells.

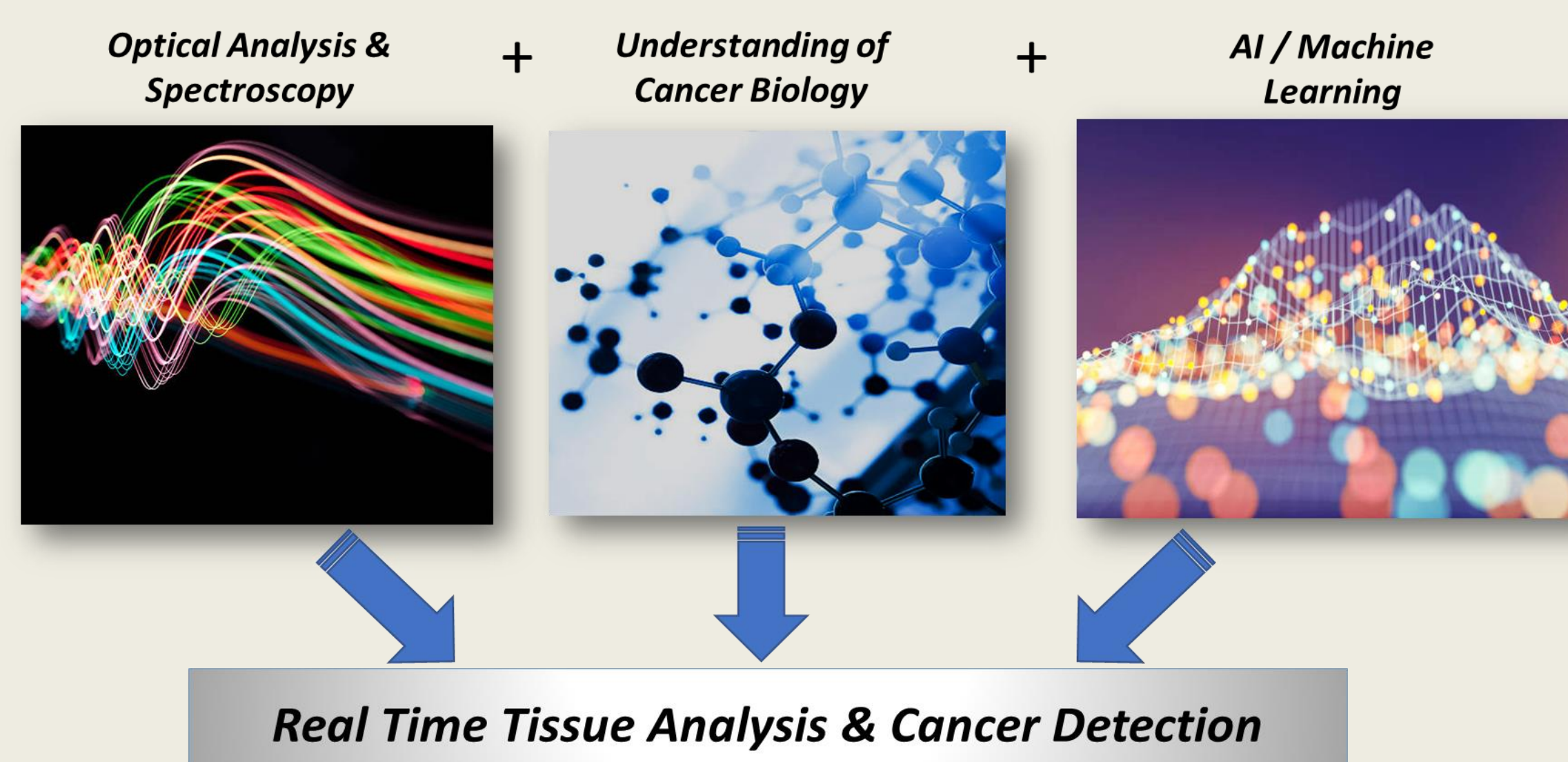


Figure 3. Convergence in Technologies

METHODS AND MATERIALS

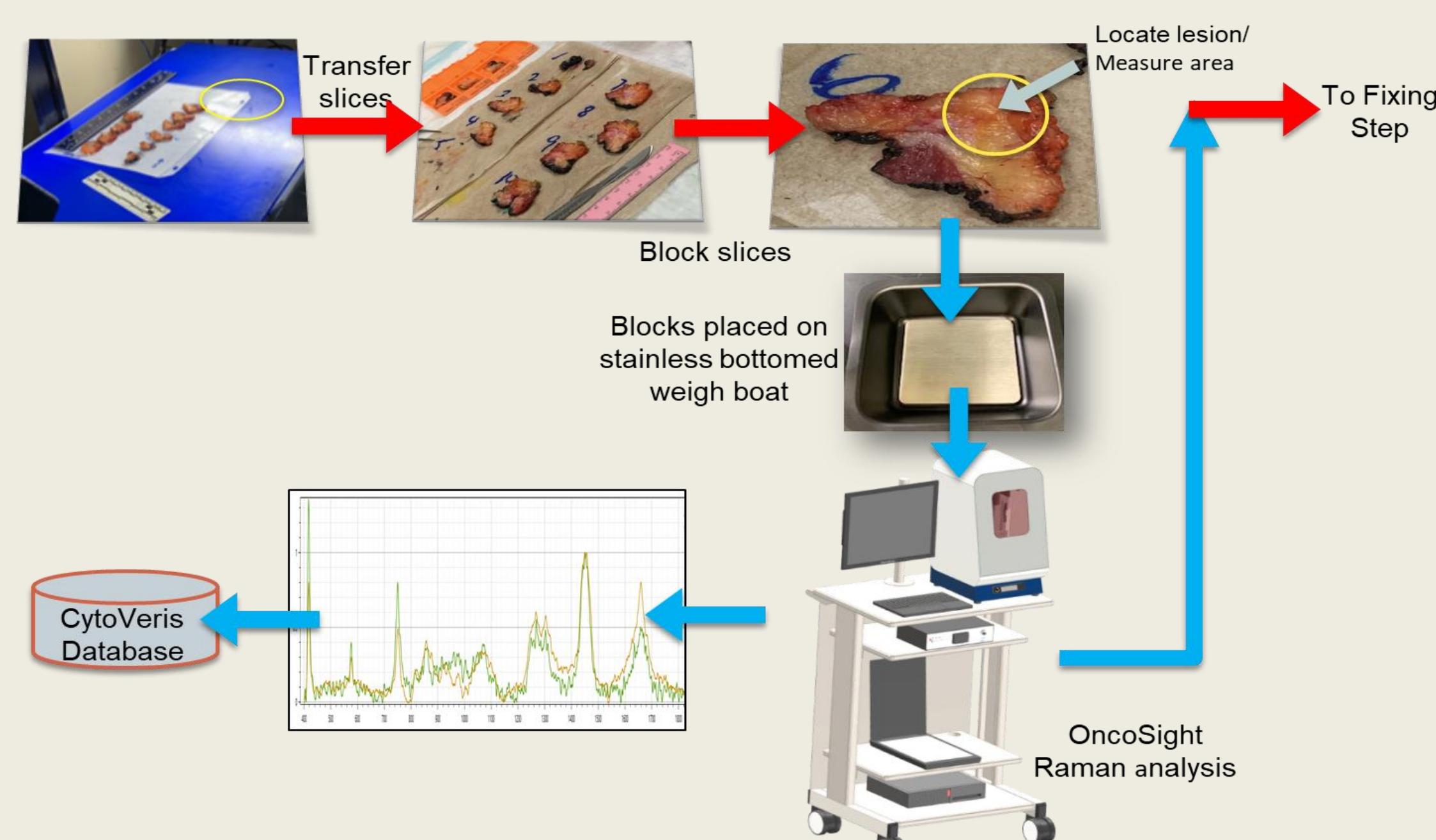


Figure 4. OncoSight Work Flow

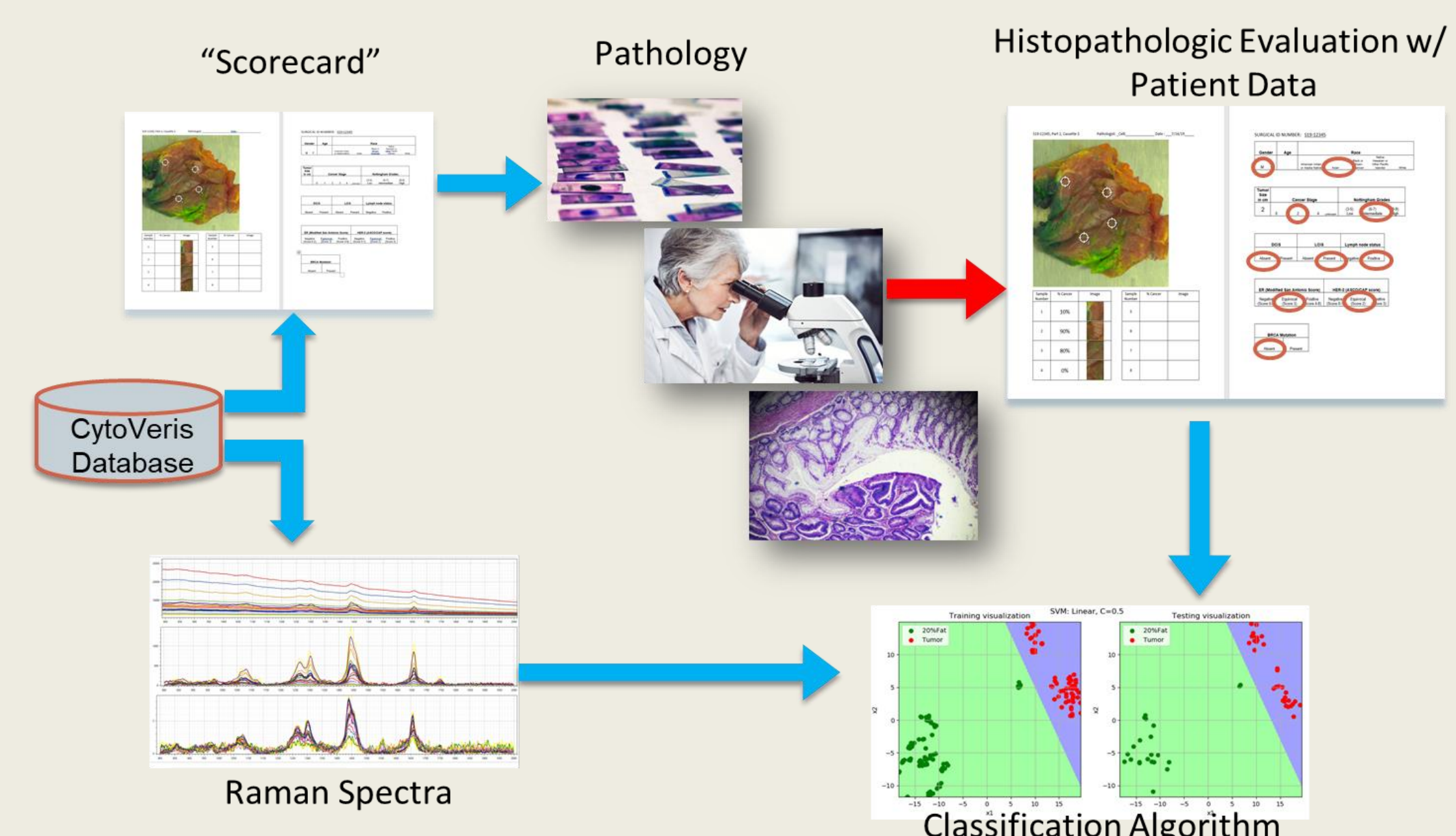


Figure 5. Pathology to CytoVeris Work Flow

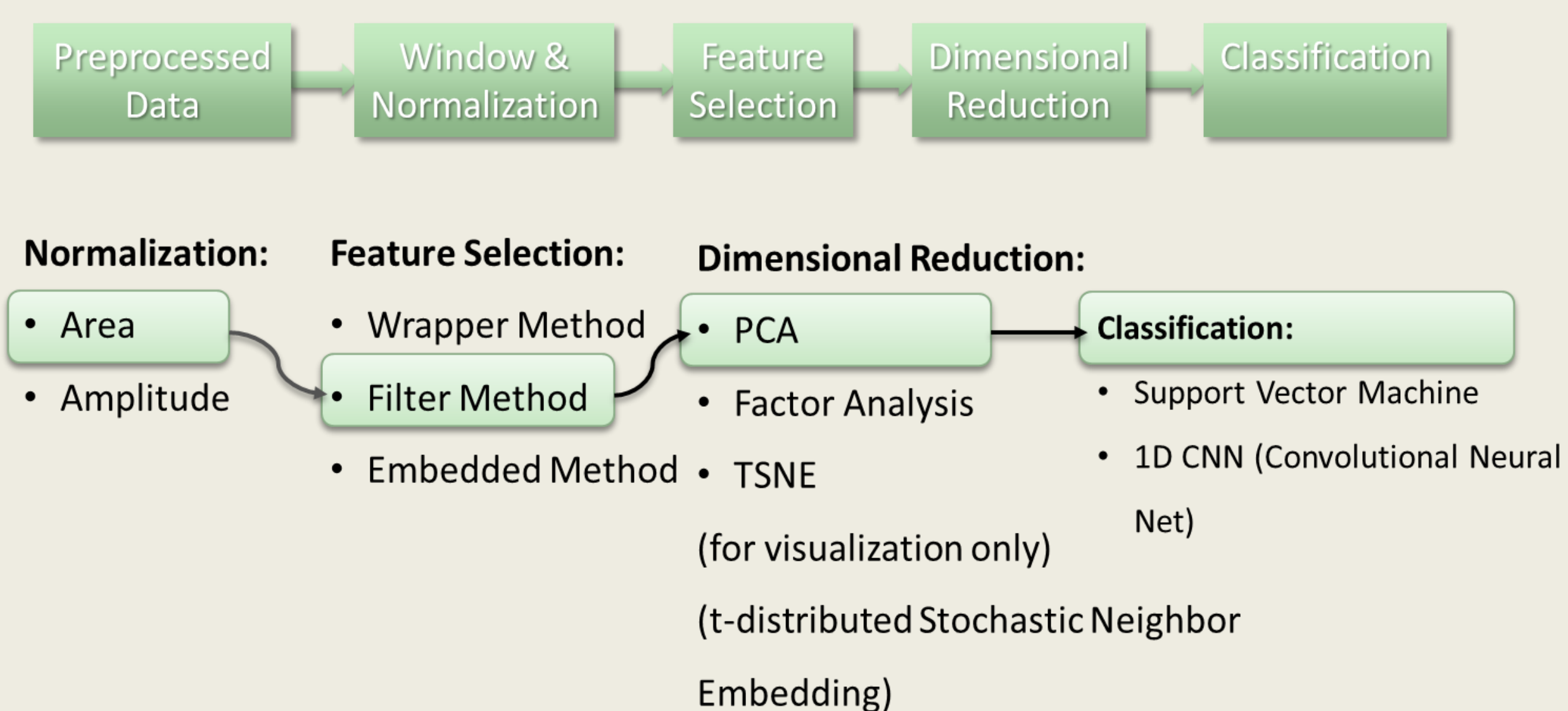


Figure 6. Classification Workflow

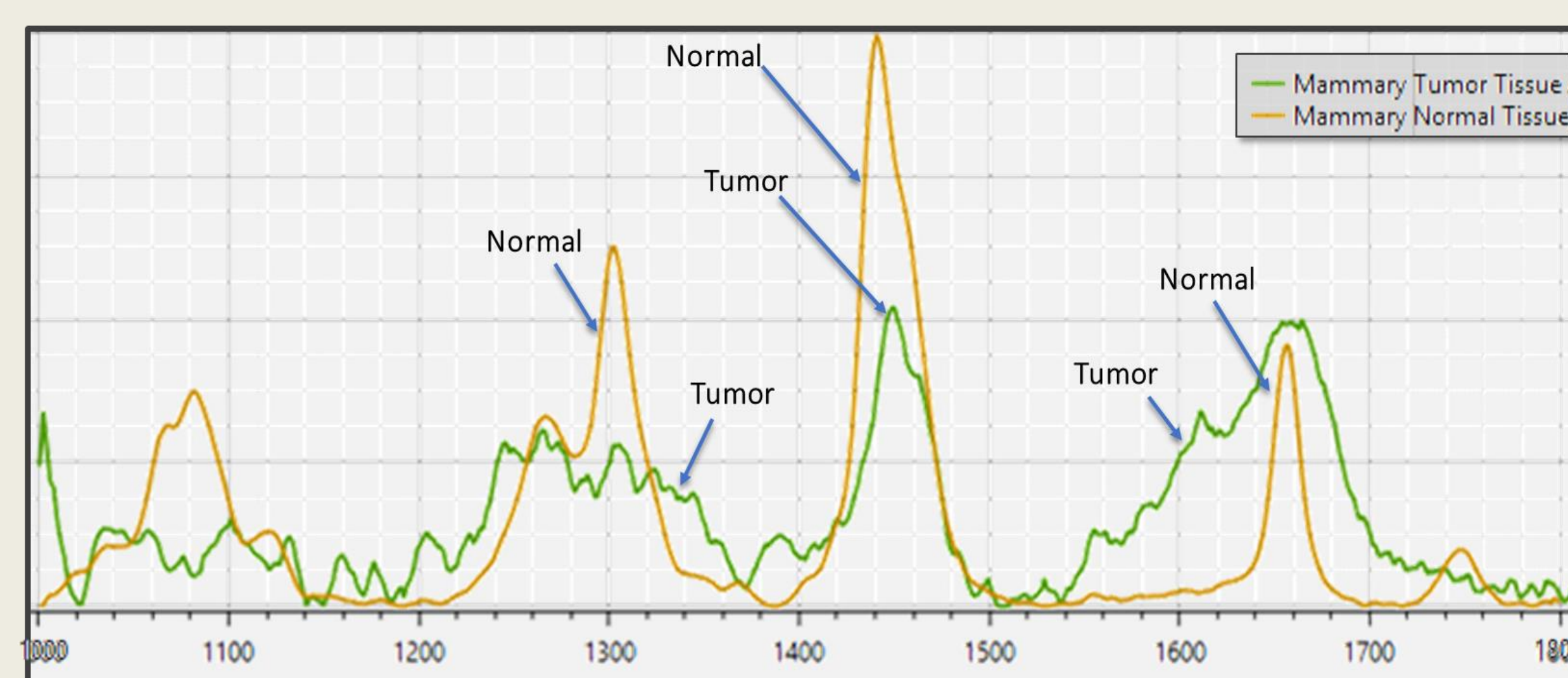


Figure 7. Input data

RESULTS

We have already built two kinds classifier: SVM(support vector machine) and CNN(convolutional neural network). Based on our experience, CNN is more robust than SVM. When we input the data with noise, CNN always gets a better accuracy.

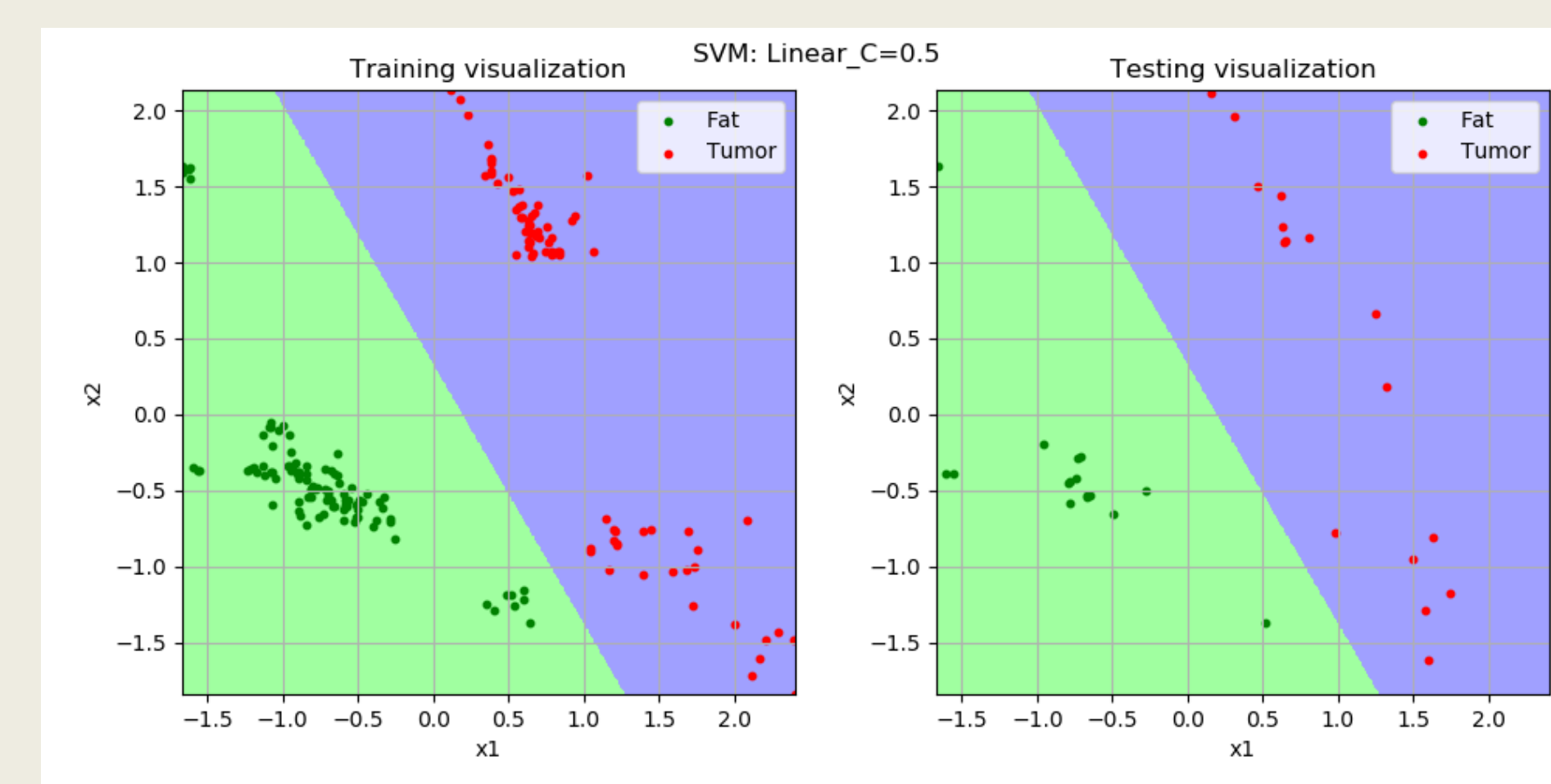


Figure 8. SVM(20%Fat vs. Tumor)

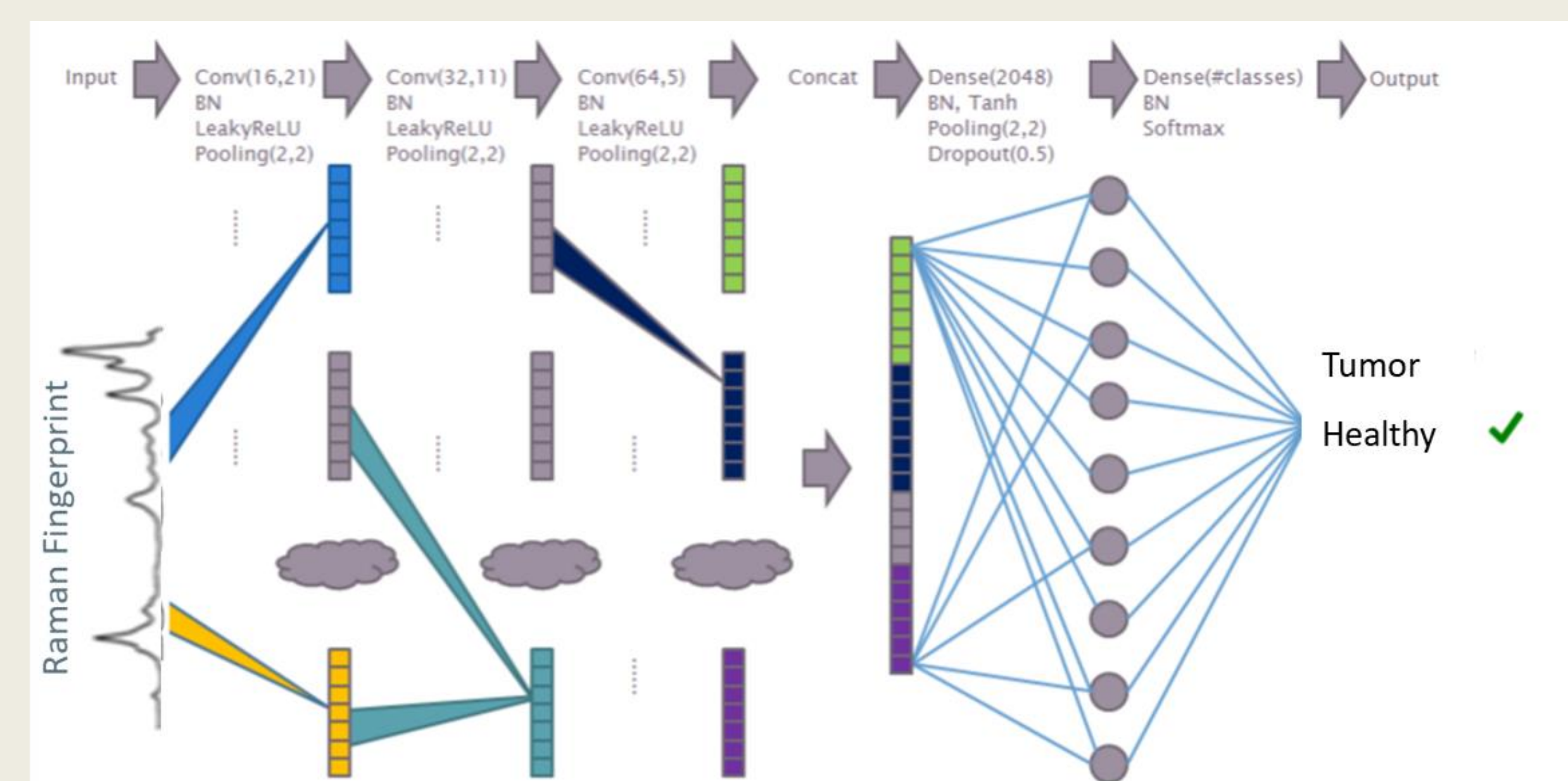


Figure 9. Convolutional Neural Network

CONCLUSIONS

Methods	KNN(K=2)	SVM(rbf)	SVM(linear)	CNN
After data preprocessing	0.85	0.92	0.98	1.00
After data augmentation	0.83	0.90	1.00	1.00

Table 1. Test accuracy

