

## INTRODUCTION

### Background

Radiomics has proven to be a powerful prognostic tool for cancer detection, and has previously been applied in lung, breast, prostate, and head-and-neck cancer studies with great success.

Conventional Radiomics-driven methods rely on pre-defined, hand-crafted radiomic feature sets that can limit their ability to characterize unique cancer

**Novel Discovery Radiomics Framework** where directly discovers custom radiomic features is proposed.

Novel **StochasticNet radiomic sequencers** for extracting custom radiomic features tailored for characterizing unique cancer tissue phenotype.

### Goal

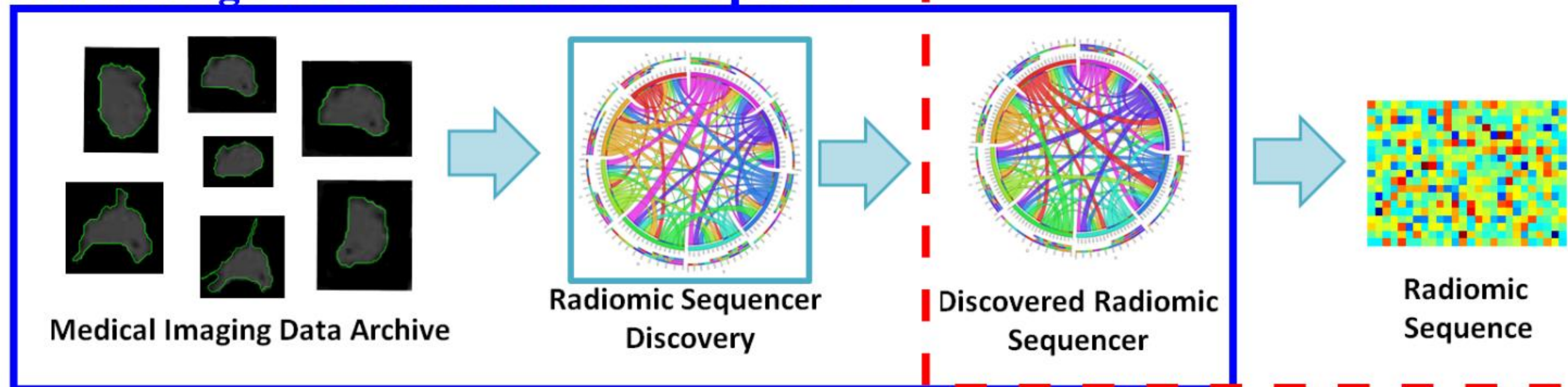
Having tailored radiomic features to discriminate cancerous tissue more efficient.

## METHODS

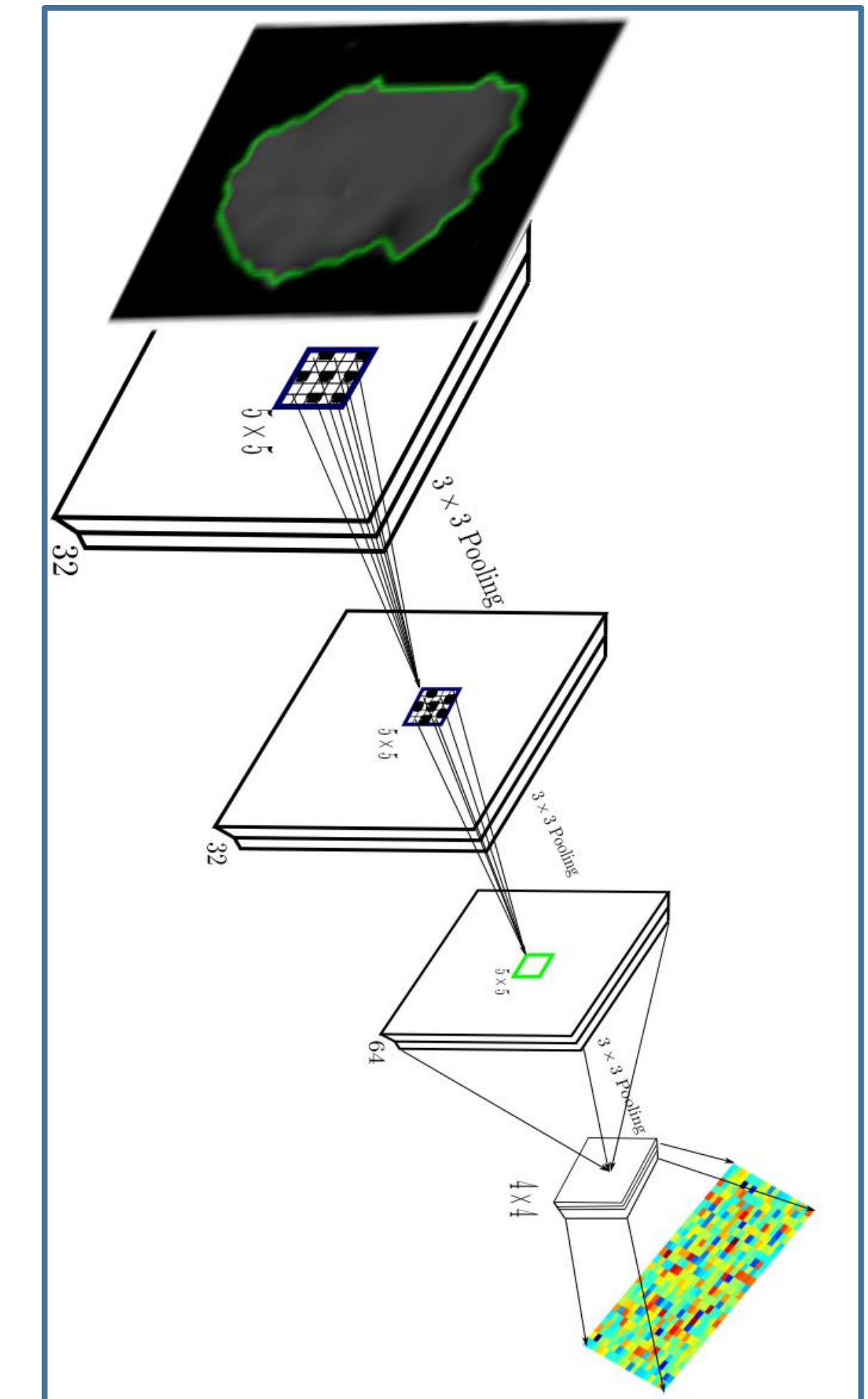
### Generating A Radiomic Sequence

#### New Patient

### Discovering The Custom Radiomic Sequencer



- The radiomic sequencer discovery process learns a radiomics sequencer that can extract highly customized radiomic features.
- This approach is built upon a deep convolutional StochasticNet architecture [1]. (A deep convolutional neural network (CNN) is represented as a random graph)
- Three stochastically-formed convolutional layers, each containing 32, 32, and 64 receptive fields (size  $5 \times 5$ ), respectively were incorporated.



## EXPERIMENTAL RESULTS

- A subset of 93 patient cases from the LIDC-IDRI dataset is utilized.
- An enriched dataset of 42,340 lung lesions was obtained via data augmentation. (The rotation of each malignant and benign lesion by  $45^\circ$  and  $10^\circ$  increments)
- These preliminary results illustrate the potential of the proposed discovery radiomics framework for improving cancer screening and diagnosis.

	Sensitivity	Specificity	Accuracy
<b>BDT</b>	<i>N/A</i>	<i>N/A</i>	54.32%
<b>DARS</b>	83.35%	20.18	75.01%
<b>SNRS</b>	<b>91.07%</b>	<b>75.98%</b>	<b>84.49%</b>

**BDT:** Belief decision trees [3]

**DARS:** Deep autoencoding radiomic sequencer [2]

**SNRS:** StochasticNet radiomic sequencer (proposed)

## ACKNOWLEDGMENTS

This research has been supported by the Ontario Institute of Cancer Research (OICR), Canada Research Chairs programs, Natural Sciences and Engineering Research Council of Canada (NSERC), and the Ministry of Research and Innovation of Ontario. The authors also thank Nvidia for the GPU hardware used in this study through the Nvidia Hardware Grant Program.

## REFERENCES

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