1.1. *Convolutional Neural Networks and analysis of Histology Images*

Development of techniques to perform automatic classification of histology images has become a fast growing research avenue in recent years[1–3]. Traditional approaches require extraction of features from histology images, followed with a variety of machine learning methods for classification. Identification and extraction of features suffer from biases arising from user intervention and knowledge, variations in type of tissue, disease and dataset as well as the questions the final model is attempting to answer[4]. To this end, Convolutional neural networks (CNNs) have gained popularity as the technique to build automatic classifiers for histology images[5,6]. CNNs employ a purely data driven approach to learn important morphological features from tiles of histology images and thus are generalizable to a variety of problems and datasets. Features of importance highly vary depending on disease and disease subtypes, and the use of CNNs removes the limitation of feature-based methods that may be limited by pre-defined or selective attributes. As CNNs require a large amount of training data to result in an effective classifier, histology images are usually tiled and utilized as input to CNN based methods. CNNs have proven to be successful in building classification models to answer a variety of questions from histology and morphology of cancer tissues[1,4,7–9].

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