Capstone Project Proposal: Blood Cell Classification

Currently, pathologists manually classify blood cells, which is time-consuming and prone to human error. Artificial Intelligence could speed up this process, leading to faster disease diagnosis. So, how can we automate blood ecll classification to reduce manual workload and improve diagnosis speed?

Blood cell classification is important because it plays a key role in medical diagnosis, treatment planning, and disease monitoring. Blood cell abnormalities are linked to serious conditions such as: Leukemia, Anemia, Infections, etc. Hospitals and labs handle thousands of samples daily. Automating this process could reduce operational costs through cutting down labor intensive manual work. By developing a model for blood cell classification, we could improve medical efficiency, enhance patient care, and increase hospital/lab efficiency.

To deem this project successful, we will need to correctly classify different types of blood cells (white, red) with a high accuracy of about 90% or better on a well trained convolutional neural network (CNN). The binary classification model should train well on new images, maintaining high accuracy across different datasets and does not overfit. Model predictions should be trustworthy, interpretable, and deployable.

The focus of this business initiative is to automate blood cell classification using deep learning, specifically CNN. This will improve diagnostic speed through reducing time required for manual classification. The model will be interpretable and prove medical AI trustworthiness. This AI-powered blood cell classification system will improve healthcare efficiency.

The constraints within this space can include the model struggling with edge cases, such as unusual cell shapes, overlapping cells, or poor-quality images that may lead to misclassification. The dataset may have class imbalances, with fewer images of rare blood cell types and therefore lead to a less robust model. These constraints are not ever-restricting and can be solved throughout the process with techniques such as data augmentation and much more.

 The key stakeholders for this project would include but is not limited to: medical professionals, pathologists, researchers, FDA, and the AI team. These professionals and entities would be able to provide insight to the project and ensure its integrity. Our model will use the Kaggle dataset provided [here](). As well as medical literature to validate the model's integrity. We may also use a pre-trained convolutional neural network.

By successfully developing and deploying this AI-powered blood cell classification system, we can make a meaningful impact in the medical field—enhancing patient care, improving hospital efficiency, and reducing operational costs. This initiative represents a step forward in integrating AI into healthcare, ultimately leading to faster, more accurate disease diagnosis and improved treatment outcomes.