# Team 1 Final Abstract

Urinalysis is a popular diagnostic test used in clinics, allowing for the detection of disorders such as urinary tract infections, kidney disease, and metabolic and system diseases.[1] The current Beckman Coulter urinalysis technology, the APR system, uses an algorithm to categorize urine particles into 12 different particle types. While the system is able to correctly classify particles, there is only an 85% accuracy rate.[3] Approximately 15% of the time, the algorithm is unable to classify the particle, producing an inconclusive result. In order to classify these particles, lab technicians are hired to analyze these samples using manual microscopy. While the test itself is inexpensive, ranging from about $30-$60, it costs about $65-$70k annually to hire a lab technician thus significantly increasing the money needed to implement such a simple test.[2] While manual microscopy produces accurate results, the process is labor intensive and tedious for lab technicians, ultimately making it inefficient. Our goal was to improve upon the current particle classification methods by developing an updated algorithm to reduce the need for lab technicians. Using images provided by Beckman Coulter, we developed three Convolutional Neural Network (CNN) models to classify particles, aiming for 95%-97% accuracy rate. We aimed for this level of accuracy to meet the standards for FDA approval. After developing the three models, we conducted accuracy assessments in order to determine the best model for predictive analysis. After analyzing our data and conducting accuracy assessments, we determined that although the three models produced very similar results, our sequential model worked best for image analysis. Overall, our sequential model was able to analyze particles with an accuracy rate of 93% and a validation accuracy rate of about 64%.