Optical microscopy has a diffraction limit that prevents imaging of objects smaller than hundreds of nanometers, making it challenging to observe certain biological samples. Interferometric scattering microscopy (iSCAT) has shown promise in overcoming this limit by detecting and enhancing the scattering light from nanoparticles. However, speckle patterns produced by a large number of nanoparticles close to the diffraction limit make analysis difficult. In this thesis, we demonstrate the potential of using Deep Neural Networks (DNNs) with fast data simulation to analyze these difficult samples. With one of our models achieved 81.47% accuracy in classifying simulated image sequences of fluctuating speckle patterns with respect to particle count. And another one of our models localizes particle positions closely resembling the ground truth data.