**GRADUATE PROJECT ABSTRACT : BLOOD DROP SPLATTER MACHINE LEARNING PROJECT**

This study is centered on the evaluation of blood drop splatter on an agnostic surface. There are a

myriad of things that the forensic departments of police forces across the country can learn from blood

drop splatter in a crime scene. Information that may be gained with bloodstain pattern analysis include,

for example, the position of the individual when the blood was deposited (sitting, standing, etc.),  the

relative position of individuals at the time of bloodshed, the possible type of weapon used as well as

possible mechanisms that could have produced the blood staining on a surface. With the advent of

machine learning there are now enhancements that can be made to a process that requires painstaking

optical analysis. Before machine learning was introduced into the field of criminal forensics, criminal

investigators would take photos of the crime scene and later review them by eye to identify any clues

that would help solve the crime.

Though machine learning may not have entirely replaced the need for a trained eye in a forensic

examination, there are specific tasks that machine learning is well-suited for and where well-executed

can achieve accurate results that would best the effort of most humans. In this study we applied a 5-

layer convoluted neural network in such a task : categorization of blood drops by splatter angle , which

even experts with trained eyes can hardly classify correctly. Although CNN has achieved state-of-art

performance in image processing, it typically requires a large amount of training data. The challenge we

have is that we only have 2264 images of blood drops varying from 10 to 90 degrees. To enlarge

the training set and to make the CNN immune to the orientation of a blood drop, we rotated each blood

drop image randomly at 8 different angles. As a result, we obtained 20376 images, among which

80% is used as the training set, 10% as the dev set, and 10% as the testing set. The Dev set is used to

check the classification accuracy during the training process, which will be stopped early if the

classification accuracy drops on the Dev set. Hence, we would save our results on our experiments since

improving accuracy on a model can be an iterative process. We are currently conducting experiments in

determining an optimal or near-optimal structure of CNN that could classify blood drops correctly.