Methodology

# Installation

## Required Hardware

* 64-bit Modern operating system (Windows, MacOS, Linux)

## Required Software

* Python 3.6.3
* matplotlib 3.1.0
* numpy 1.17.0
* opencv-python 3.4.4.19
* Pillow 6.1.0
* XlsxWriter 1.1.8
* xlwt 1.3.0

## Setup

Install all required software and place the files in a directory which contains a “Data” and a “Images” folder with the included settings.txt file. A requirements file has been included which can be used to install all required software using the “pip install -r requirements.txt” command in the terminal.

## Settings File

The settings file contains al settings for the operation of the program, the settings are listed in the order they appear from left to right.

* Starting image number
* Ending image number
* Image set number (starts at zero)
* White value threshold
* Minimum gap value (negative)
* Maximum gap value (negative)
* Minimum pixel gap value
* Storage type (1 = xls, 2 = xlsx, 3 = csv)

# Procedures

To run the program, place the data folder into the data directory, adjust all necessary setting then call “python ImagePointsBased.py” in your terminal. When the program has finished running it will automatically save its results, images and heatmap within their respective directories. Images will be saved in the “Images” folder, with the results and heatmap saved in the working directory.