

# Kyffin Williams: Digital Analysis of Paintings

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## 1 Project Summary

Sir John “Kyffin” Williams is a Welsh landscape painter, also active in Patagonia, who is regarded as the defining artist of Wales in the 20<sup>th</sup> century.

## 2 Background

## 3 Goals and Objectives

### 3.1 Analysis Goals

The first goal for the analysis section of the Kyffin Williams Project is to statistical analyse colour space values of the pixels of an image. Typically taking the mean and standard deviation over a whole painting.

The two colour spaces this project will typically focus upon is RGB (Red, Green, Blue) and HSV (Hue, Saturation, Value) colour spaces. The project may explore other colour spaces further into the project.

After basic statistical analysis, the next step is to create histograms for each image in both colour spaces and use these to analyse the values these contain.

Part of the analysis will need to include a way of measuring the distance of two outputs from the associated technique.

## 4 Current Progress

### 4.1 Technical Challenges

### 4.2 Outline Design

### 4.3 Implementation Options and Choices

#### 4.3.1 Computer Vision & Image Processing Library Decision

Aside from directly reading pixel values using built-in language features or a simple image or graphics library, there are a variety of computer vision and image processing libraries. Each of which have numerous functions to manipulate and process images.

**OpenCV (Open Source Computer Vision)** (<http://opencv.org/>) is one of the more popular choices for Computer Vision libraries, boasting C, C++, Python and Java interfaces for several of the common platforms, including mobile devices. OpenCV leverages multicore processing and optimized C/C++ code to be able to handle real-time systems.

**FIJI (FIJI Is Just ImageJ)** (<http://fiji.sc/>) is Java-based image processing package, is akin to a distribution, packaging ImageJ, Java3D and a lot of other useful features to provide a coherent user interface for the packaged image libraries.

**IVT (Integrating Vision Toolkit)** (<http://ivt.sourceforge.net/>) aims to provide an easy to use, stand-alone C++ computer vision toolkit. It's features include camera interfaces and fast implementations of computer vision techniques as well as mathematical data structures and functions.

$$d = \sum_{x=0}^X |a_x - b_x|$$

$X$ : All dimensions present in both  $a$  and  $b$ .

$a$ : The first point.

$b$ : The second point.

Figure 1: Manhattan Distance

Library	License	Language Support	Platform Support	Installation	Usage
OpenCV	BSD	C, C++, Python, Java	Windows, Mac, Linux, Android, iOS	Medium	Easy - Fair.
FIJI	GPL Individual per plug-in	Java	?	Easy - Fair	Medium
IVT	Modified BSD	C++	Windows, Mac, Linux	Medium	Medium

Table 1: Details of Computer Vision Libraries

Library	Image Filtering	Transformations	Histograms	Structural Analysis
OpenCV	✓	✓	✓	✓
FIJI				
IVT				

Table 2: Features of Computer Vision Libraries

## **5 Project Planning**

### **5.1 Process Model**

### **5.2 Weekly Plan for the Project**

### **5.3 Demonstration Plan**

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