# Background and Related Work

## Introduction

My software will convert a picture into a cross stitch pattern. The user will be able to edit the pattern and customize it using different features of the program. !!!!!!!!!!!!!

## Cross Stitch

### **History and Basics**

Cross stitching is a type of embroidery stitch art (Setiabudi et al, 2017). A picture is created using colourful thread and little cross shaped stitches on fabric. Usually two strands of cotton thread are used (Dyer, 1997). The stitching is done on fabric that has small holes: aida or evenweave. The colour range of the threads can be vast, the most widely used is made by DMC. There are only a few types of stitches since the final result should look uniform. The simple cross is used most of the time, however a half stitch, quarter stitch, three-quarter stitch and backstitching is also used occasionally (Atkinson & Roberts, 1999).

A picture containing food, sushi

Description automatically generated

Figure - example of a cross stitch on aida

This art-form originated in Asia, and the oldest cross stitch dates back to 850 B.C. It became more popular in the Victorian era. Then, in 1980 cross stitch re-emerged again, and became how we know it today. It is one of the most popular type of needlework throughout the world (Leslie, 2007). It is a soothing and therapeutic hobby, and could help improve mental health (Hohmann, 2020).

A pattern is needed to make a counted cross stitch. A pattern consists of a grid with colourful squares (Biedl et al, 2005). The squares signal the position and colour of the stitch (Atkinson & Roberts, 1999). The size of a pattern is measured by the number of stitches across and down.

Diagram

Description automatically generated

Figure - simple cross stitch pattern (Fitzgerald, 2017)

Diagram

Description automatically generated

Figure – The way a pattern is converted to stitches (Biedl et al, 2005)

### Existing Software

There are a number of cross stitch pattern making software on the market with varied quality and features. The most popular and advanced one is WinStitch/MacStitch (2019). This is a commercial software, and it is regularly updated. Another example is PC Stitch (2016), which was the preferred software until it stopped getting updates. Both can be quite expensive for a hobbyist, so a good alternative can be free, open-source software. These generally have less features and not as clean UI; however, they can still create a pattern. These include XStitch (2020) and CStitch (Klein, 2017).

All of the above software can convert a picture into a pattern. WinStitch has a wide range of features and a professional looking UI, so it is a good source of ideas for this project. Some features proving very useful are the ability to select the size of the pattern before generating it, as well as the number of colours used. These will be essential for this project too. Moreover, WinStitch uses real thread colours in the pattern, this makes it very practical for the user to buy supplies. There are also a lot of options to edit the pattern, from changing thread colours to drawing on it. The biggest differences between the free and commercial applications are the number of features the user interface. WinStitch’s UI is very sleek and intuitive, while CStitch’s is quite old looking and sometimes hard to use. I will aim to design an attractive UI with a good but not an overwhelming number of features. This way this project could be a good middle ground for users for a lower price but high quality.



Figure 4- Painting and cross stitch. Pattern created in WinStitch (Batho, 2014)

## Frameworks

### WPF

### Windows Forms

### Comparison

## User Interface

### Another Subsection Title Rename Me

## Image manipulation

### Posterization

## Summary

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