

**EE596 Autumn**  
**Project Proposal**

**Font Recognition Through Deep  
Learning**

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# 1. Goal

The idea for this project is inspired by a [list](#) of project ideas for computer vision student projects published by Bristol University. The problem statement of this project is:

*Given an image of rendered text, classify the font used in the image.*

The images will contain randomly sampled text excerpts from some large text corpus. Fonts come in font families comprised of sometimes dozens of members. For example, Helvetica has around 50 different versions for sale on myfonts.com. Initially a network will be trained to tell apart 2 font types coming from 2 separate families with distinct features. Depending on success the project will be gradually extended to:

- Classify more than 2 fonts from separate families with distinct features
- Classify 2 fonts from separate families with similar features (e.g. Arial and Arial Black)
- Increase number of classes (up to 10)
- Decrease differences between classes

The text which will be considered is scoped to:

- English language
- English alphabet (lower- and upper-case)
- numbers 0-9
- include common punctuation characters
- written in black on a white background.
- written overall, but not exactly, horizontally.
- the entire text in the studied image is rendered in a single font

Glyphs (characters representing more than one letter) will be included in the experiment.

Fonts for the experiment are drawn from the Microsoft Typography. Incrementally the following fonts will be included:

- Arial
- Comic Sans
- Times New Roman
- Courier New
- Calibri
- Candara
- Consolas
- Georgia
- Corbel
- Arial Black

Only the regular font weight will be considered. For example, in the Microsoft Typography Arial is comprised of 4 fonts: Arial, Arial Italic, Arial Bold and Arial Bold Italic. In this example only Arial will be included. Note that Arial Black is a separate font family.

## 2. Method

A brief review of papers in this area suggests that this problem is typically considered in the context of optical character recognition (OCR). In this project the emphasis is on font rather than character recognition. Although inspiration can be drawn from related literature [1], the approach may be significantly different.

The project will be conducted in the following phases:

- Review literature (top 5 number of citations, then last 3 years)
- Generate data
- Train 3 incrementally “smarter” networks

### 2.1 Reviewing Literature

The literature on the topic seems relatively sparse with the top papers being over 20 years old and having hundreds of citations. The use of deep learning methods seems to be relatively uncommon in this problem domain.

Literature on creating models for general image classification will be reviewed [2].

### 2.2 Generating Data

Data will be generated in separate batches for each of the 3 networks. This will ensure that I will have a result I can report for each of the 3 networks instead of consuming a large amount of time on generating data that I don't end up using because I never got to the most complex network.

- The data will be generated using a python script with [StackOverflow](#) as a starting point on rendering fonts with python.
- Once rasterized, further regularization will be attempted using different croppings and small rotations of each image.
- Images will be rendered in resolutions of up to 1920 x 1080 greyscale pixels.

## 3. Training Networks

One challenge in the project will be to propose a model which works for the problem statement. Here too an incremental approach will be followed, first proposing a model that gives a better than chance guess on 2 classes and subsequently increasing the complexity and hopefully performance of the model.

## 4. Personal Interest

Having dabbled in typography in the past, I find the considerations which go into font design fascinating. While I can understand the justification for having serif versus sans serif fonts, some differences in fonts are very minute. For example, the differences between Arial (1982) and Helvetica (1957) are so small that they have been called controversial. What I think is a less known controversy is that Helvetica was designed in the 1950s to compete with Akzidenz Grotesk, a font released in 1896.

## 5. References

1. Liu, Y., et al., *Font recognition by dynamically weighting multiple deep learning neural networks*. 2019, Google Patents.
2. Harley, A.W., A. Ufkes, and K.G. Derpanis. *Evaluation of deep convolutional nets for document image classification and retrieval*. in *2015 13th International Conference on Document Analysis and Recognition (ICDAR)*. 2015. IEEE.