Reading Without Words

Analyzing Films with Colors and Indexed Histograms

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The Problem:

- How to develop a searchable database of feature films for scholars that would *not* be restricted to either (1) metadata or (2) language-based searches (using scripts and/or closed caption files)
- more broadly, how to find ways to search collections of films using **visual**, not verbal, search terms and obtaining results in the form of images

The Result: The Film Search Engine (http://www.filmtvsearch.net/cgi-bin/main.py/moviesearch/)

The Theoretical Provocation and Ultimate Goal:

> "Let us dream, then, of search engines that can pick a video out of a media-art archive by . . . the statistical likelihoods of individual image elements . . . **What new kind of knowledge will exist exclusively** in **the form of images**?"
>
> Wolfgang Ernst, *Digital Memory and the Archive*, [2013]

1st Iteration: Histogram Oriented Gradient Search

- We wanted an **object recognition system** that could recognize specific objects in a still image and search for similar objects in the database
- Histogram Oriented Gradients (**available on open source software such as OpenCV) are the key tool for making this possible**
- HOGs track the frequency of edges (of a particular angle and intensity) in a given portion of an image
- In collection of images, the computer can be trained to look for gradient patterns that match the desired search object
- **While the HOG analysis is computationally "cheap," the machine learning requires MUCH too much computing power**
- HOG searches are thus possible . . . with a supercomputer

2nd Iteration: Text-Based Search Leading to Images

- **We were forced back to starting with text-based searches of closed caption files**
- We created a PostgreSQL database to store the metadata and closed-caption files for each film
- Users can search for a text string and the database will return:

(1) A graph of the frequency of the search term over time

(2)a list of every line in the database containing the search term

(3) A still image of what is occurring on screen as the target string is uttered

This made us realize that the still images could be more than just tags – they could be a new source of data . . .

3rd Iteration: Searching by Color

- **We developed a search function for color palettes in images**
- the image description algorithm creates a histogram of the relative frequencies of particular numerical red, green, and blue values (in the range 0-255) that computers use to store color
- search returns can be read in the format: "X% of the pixels in this image have values within the range Red:0-15, Blue:32-47, and Green:128-143."
- all the still images in the database can then be compared using a distance metric (chi squared test)
- test users have been **"impressed with the similarities between images that this process reveals that unaided viewing cannot"**

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