Lina Jonns Efterträdare: Machine Vision and Lund's Photographic History

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The photograph, and its patterns of circulation, has a long history in Sweden. News of the 1839 invention of the Daguerreotype reached Sweden in three weeks, and as technical improvements steadily emerged in the ensuing years, new opportunities for professionals -- and new patterns of consumerism -- followed along. This was true in smaller cities such as Lund, no less than in the capital of Stockholm. One of the most well-known pictures of August Strindberg was taken in that southern city in 1899: Strindberg stands looking away from the camera, while a framed photographic portrait of the same author hanging on a nearby wall confronts the viewer directly. Often mistakenly attributed to the pioneering female photographer Lina Jonn (1861-1896), this double-portrait of Strindberg on his 50th birthday was in fact taken after she died by her employee and successor, Per Bagge.

Attribution questions around Lina Jonn's work are partly an artefact of her early death at age 35, and the continuing use of her name by successor firms run by relatives and former employees for decades afterwards. The overlapping careers and networks of corporate inheritance in photographic studios over time naturally suggest questions of influence, genre, style, and the auteur theory of the individual photographer. Although Lina Jonn's own work has never been digitized comprehensively, that of two employees and successors -- Per Bagge and Ida-Marie Ekelund -- have. The resulting dataset comprises approximately forty thousand images, split between the *Kulturen in Lund* museum and Lund University Library. And although Bagge's photographs are well-known, Ekelund's negatives were only recently discovered in 2012 underneath floorboards in an attic her studio once inhabited.

Now reunited online, these 40,000 photographs taken by employees and students of the pioneering female photographer Lina Jonn form the core of a new project at the intersection of photographic history and computational visual analysis. *Lina Jonns Efterträdare uses* Convolutional Neural Networks, a form of machine learning that mirrors how the human brain processes vision, to suggest new and intriguing possibilities for "distant viewing" of large-scale image collections such as those produced by Lina Jonn's successors. The project is an implementation of the Yale DHLab's PixPlot engine, open-source software available on Github that allows anyone to examine their own large-scale image collection and produce an interactive website.

Inspired by the work of di Lenardo et. al. on the Cini archive shown at DH2016, PixPlot begins with a pre-trained neural network, optimized for the captioning of modern images -- but uses the penultimate layer in this network as a featurization space with 2,048 abstract dimensions of vision. This high-dimensional space is then reduced down to two dimensions using UMAP (Uniform Manifold Approximation and Projection), an algorithm that (similar to t-SNE) attempts to preserve both local clusters and produce an interpretable global shape. Advanced WebGL

programming techniques enable the forty thousand photographs to exist inside a web browser, where the user can zoom in and out to examine visually-similar clusters of images. As a final step, we use k-means clustering to suggest some rough groupings of the images into constellations the user can then rename and adjust as they see fit.

Applied to the forty thousand pictures from Lund that comprise *Lina Jonns Efterträdare*, PixPlot shows striking patterns in figuration that reflect both early 20th-century photographic culture in Sweden and the genre conventions of studio photography in that era. This paper will explore what we can learn from this large photographic archive about conventions of visual figuration in Lund: bourgeois academic portraits, ground-breaking depictions of the working-class, and new urban developments and transportation infrastructure that marked this period of population growth in the south of Sweden. The paper concludes with some future directions for PixPlot's development, including IIIF-based image markup standards.

Links:
Beta version of PixPlot on Per Bagge's photo archive:
http://dh.library.yale.edu/projects/pixplot/bagge/

PixPlot 1.0 software repository:
http://github.com/yaledhlab/pix-plot

UMAP software repository:
https://github.com/lmcinnes/umap

Bagge, Per. *August Strindberg på 50-årsdagen.*
http://urn.kb.se/resolve?urn=urn:nbn:se:alvin:portal:record-121672

Sources:
di Lenardo, I., Seguin, B., Kaplan, F. (2016). Visual Patterns Discovery in Large Databases of Paintings. In *Digital Humanities 2016: Conference Abstracts*. Jagiellonian University & Pedagogical University, Kraków, pp. 169-172.

McInnes, L, Healy, J, *UMAP: Uniform Manifold Approximation and Projection for Dimension Reduction*, ArXiv e-prints 1802.03426, 2018

Söderberg, Rolf, and Pär Rittsel. *Den Svenska fotografins historia 1840-1940*. Stockholm: Bonnier fakta, 1983.

Tandberg, Olof G. Lina Jonn: *En berättelse om en fotografisk pionjär och hennes ateljé*. Stockholm: Atlantis, 2003.

Wahlöö, Claes. *Fotografin och Lund*. Lund: Föreningen Gamla Lund, 2002.