



# Seeing History

*The Visual Side of the Digital  
Turn*

@MelvinWevers

@ThomasSmits

Dr. Melvin Wevers - DHLab - KNAW HUC, Amsterdam

Thomas Smits - Radboud University, Nijmegen

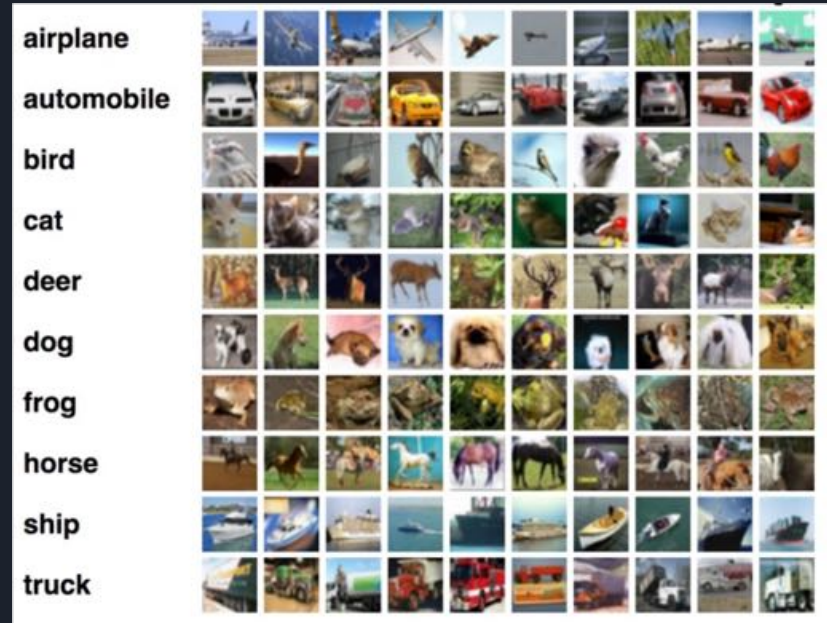
# Introduction

- The Digital Humanities are too text-heavy
- Large collections of visual material, limitations of searching with OCR
- Researcher-in-Residence at National Library of the Netherlands
- How can computers help us to explore and analyze large collection of historical visual material?

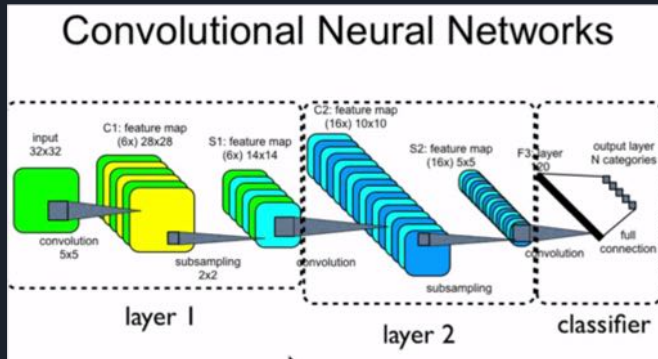
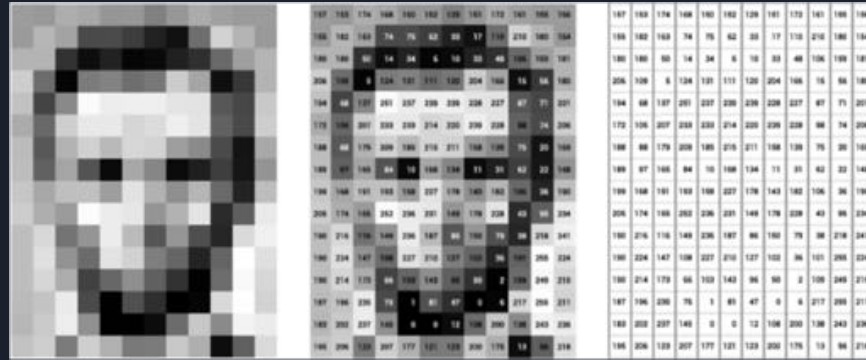


# Computer Vision

- Computer Vision - gain high-level understanding of images
- Object detection
- Convolutional neural networks



# From an image to a neural network





# Convolutional neural networks on historical visual material

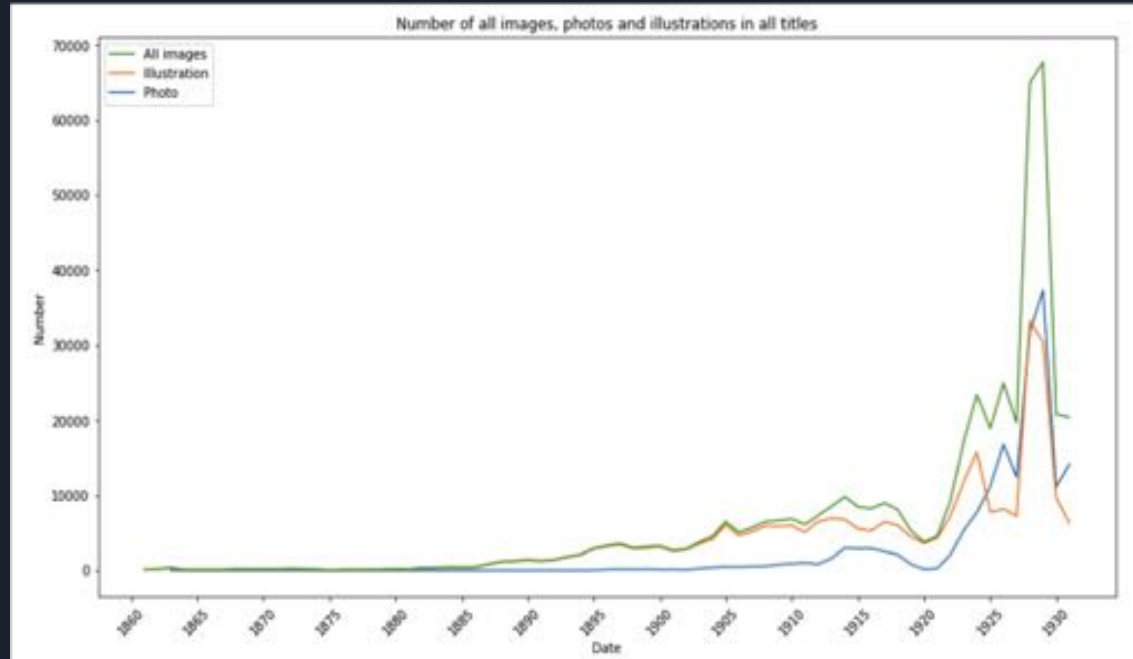
- Two datasets extracted from Delpher
  - CHRONIC (452,543 images of the news 1860-1930)
  - SIAMESET (426,000 historical advertisements 1945-1995)
- Three approaches
  - Detecting medium-specific features (separating photographs from illustrations)
  - querying images based on abstract visual aspects (clustering visually similar advertisements)
  - Training a neural network based on visual categories developed by domain experts

# Approach I: Medium-specific characteristics

- Research the transition between the use of illustrations and photographs by newspapers to visualize the news
- Classify images of CHRONIC as either illustration or photograph (F1-score: 0.9)

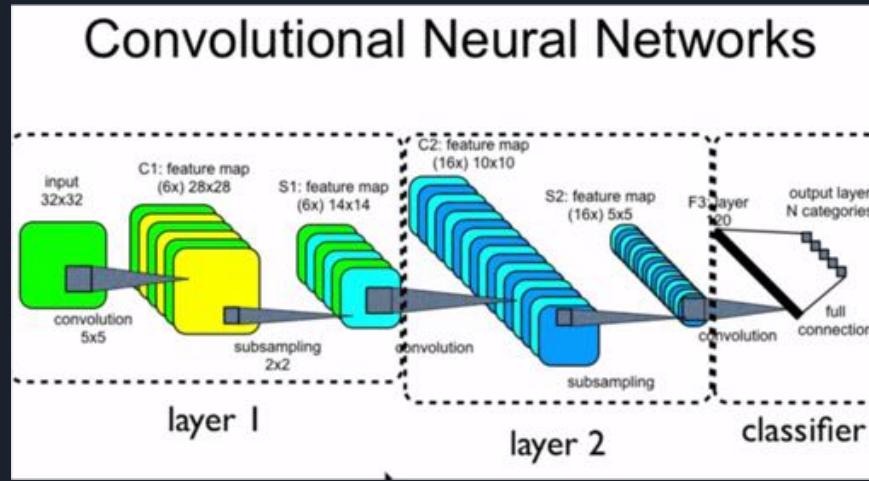


# Approach I: Medium-specific characteristics



# Approach II: SIAMESE

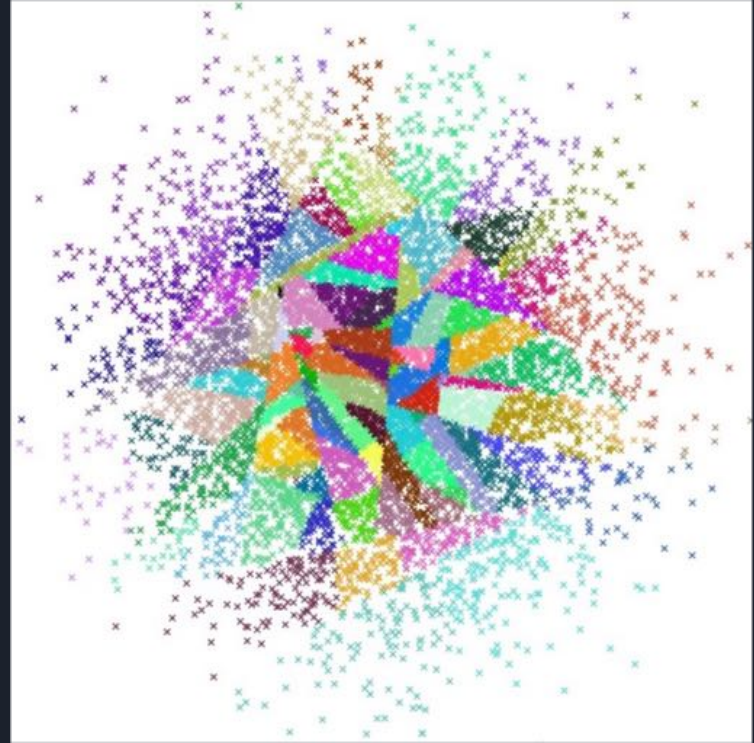
- Can we use convolutional neural networks to trace visual change in historical advertisements?
- Object detection for historical images is sub-optimal





# Approach II: Cluster on visual similarity

- Select image in penultimate layer
- Cluster in multidimensional space based on 2,048 visual aspects
- Find nearest neighbors in clustered space

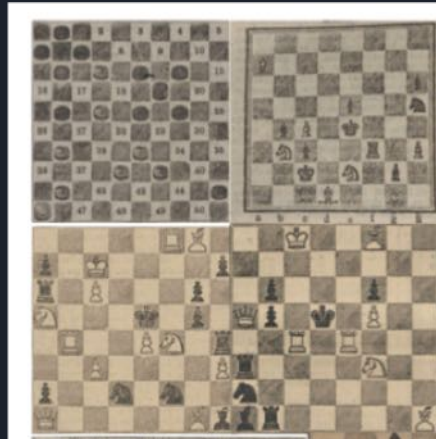
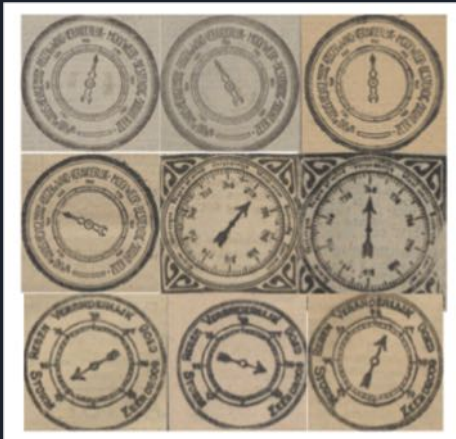


# Approach II: Style of advertising



# Approach III: Building your own classifiers

- Recognize nine relevant categories: buildings, cartoons, chess, crowds, logos, maps, schematics, sheet music, and weather reports
- Similar to OCR → provides direct access to visual content
- Visual similarity  $\neq$  stylistic similarity  $\neq$  conceptual similarity



# Approach III: Building your own classifiers

The screenshot displays a web browser window with the title "Image search query builder". The browser's address bar shows the URL "www.kbsearch.nl/query\_builder/". The page content includes the following elements:

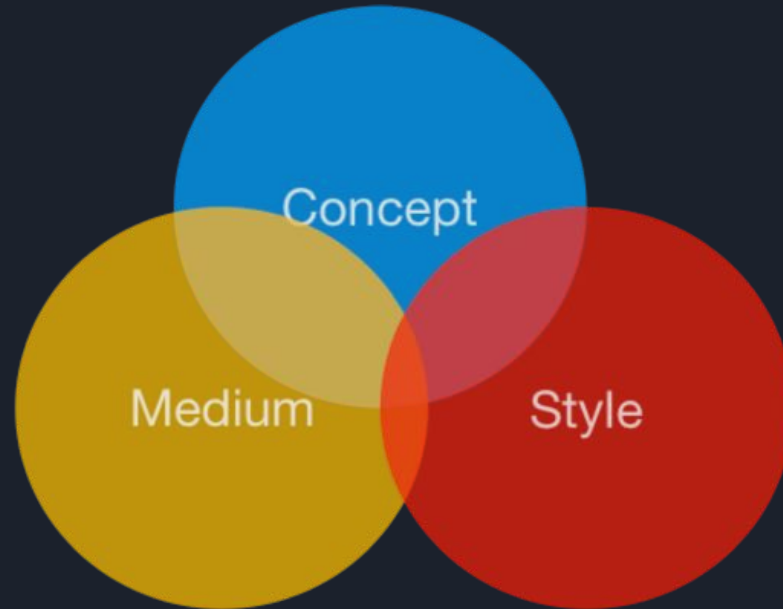
- Select date-range:** A date range selector with "1860-01-01" on the left and "1937-01-31" on the right, connected by a double-headed arrow.
- Select image type:** Three radio button options: "Photo", "Drawing", and "Photo or drawing" (which is selected).
- Select image category:** A dropdown menu currently showing "Any".
- Text in article:** A text input field.
- Preview image:** A small image showing a person riding an elephant, likely a historical photograph.
- URL:** A text box containing the URL: "http://www.kbsearch.nl/keyword/Image\_Spec?and date=from:1860-01-01&to:1937-01-31&type=Photo".
- Logo:** A logo for "WTC EXTRA 1.5" is visible at the bottom center.



# Conclusion: Opportunities

- CNNs offer opportunities for:
  - collection specialists
  - (digital) humanities researchers
- Explore and analyze large collections of visual sources

# Conclusion: 1) Structures of Visual Similarity



## Conclusion: 2) Historicity of images





# Conclusion: Studying Images and Text in Conjunction

## ImageTexts

### Studying Images and Texts in Conjunction

Melvin Wevers, DH Lab, KNAW HUC, The Netherlands  
Thomas Smits, Radboud University, The Netherlands  
Leonardo Impett, Max Planck Institute for Art History Rome, Italy

@Melvinwevers  
@Thomassmits  
@Leoiimpett

#### Research Question

The recent upsurge of large-scale analysis of visual material (Computer Vision) shifts the focus in Digital Humanities research away from texts. However, this has also led researchers to approach text and images as disjointed entities. **We analyze similarity and change in both textual and visual elements of car advertisements extracted from digitized newspapers.** By juxtaposing change over time in text and visual material, we aspire to show that the meaning of imagetexts can be studied by looking at the relation between the two forms of representation.

#### Dataset

Our dataset consists of 9,863 the advertisements for cars extracted from the Dutch newspaper De Volkskrant between 1945 and 1995. These advertisements have a visual and a textual component (see Fig. 1).



Fig. 1. Automobile advertisements from Volkskrant

#### Results: texts

Burstiness in ads increased and ten change points could be identified (see fig. 2). Periods of burstiness correspond to particular themes, such as fuel efficiency, environment, safety, and gadgets (see fig. 3)

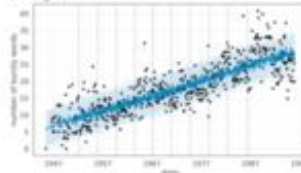


Fig. 2. Average Monthly Burstiness and change points in burstiness

Year	Top	Mid	Bot
1945	car	car	car
1950	car	car	car
1955	car	car	car
1960	car	car	car
1965	car	car	car
1970	car	car	car
1975	car	car	car
1980	car	car	car
1985	car	car	car
1990	car	car	car
1995	car	car	car

Fig. 3. Selection of twenty words in the five decades of the dataset





# Acknowledgements / Data



Martijn Kleppe



Willem-Jan Faber



Juliette Lonij



Leonardo Impett

Tools and data for CHRONIC and SIAMESE: <http://lab.kb.nl/>

@MelvinWevers

@ThomasSmits