

# ATTRIBUTION CHALLENGE

C. R. Johnson, Jr. (Cornell University),  
E. Hendriks (Van Gogh Museum), and  
L. van Tilborgh (Van Gogh Museum)

June 17, 2008

## Introduction

At the First International Workshop on Image Processing for Artist Identification (<http://www.digitalpaintinganalysis.org/literature/ProceedingsIA4AI-1.pdf>) one observation that emerged was the sense that copies made by others of Van Gogh paintings would show a relative abundance of large-valued wavelet coefficients at the finest scales. This was related to the hesitant brushstrokes of a copyist. The present challenge provides another test case for this observation, and of the larger issue of using computer-assisted painting brushwork analysis to help in distinguishing van Gogh's paintings from those of his contemporaries.

In this challenge, we have visible light images of four paintings by van Gogh (F518, F752, F764a, and F799) and four paintings by his contemporaries (S447, S448, S457, and S503). The ninth painting van Gogh's "Two Children" (F784) has a known contemporary copy (S506). We have data only for S506 and not for F784.

The distinction of paintings as by or not by a renowned master is one of the tasks of art historians and connoisseurs that draws public interest. When authenticity relies on categorizing style and technique issues, computer-based image processing schemes intended to produce set membership decisions from comparison with training sets should prove useful. To facilitate the cross-disciplinary collaboration that needs to occur for the development of the right tools for such a task, this document describes an attribution challenge in van Gogh studies for which a high quality dataset is available to selected academic teams of researchers.

## Van Gogh or Not Van Gogh

The Van Gogh painting

- F784 :: "Two Children" (Auvers, June 1890) [51.5 x 46.5]

has a known copy by Cuno Amiet

- S506 :: “Two Children” (1907) [51.3 x 46]

[All dimensions are in centimeters, with height before width.] As noted in (“Catalogue of acquisitions: paintings and drawings August 2000 - July 2001”, *Van Gogh Museum Journal*, p. 139, 2001), the colors in S506 have remained truer to the original colors than those of F784: “Areas that were initially pink and violet, for example, are now light blue and white.”

Training sets have been devised with four van Gogh paintings of similar style from the same period as F784

- F518 :: “Portrait of a Young Girl Against a Pink Background” (Arles, summer 1888) [51 x 49]
- F752 :: “Chestnut Tree in Flower: White Blossoms” (Auvers, May 1890) [63 x 50.5]
- F764a :: “Still Life: Vase with Rose Mallows” (Auvers, June 1890) [42 x 29]
- F799 :: “View at Auvers” (June-July 1890) [50 x 52]

and four from contemporaries

- S447 :: Louis Valtat “Red Cliffs near Anthéor” (c. 1903) [81.5 x 99.2]
- S448 :: Carl Moll “Schönbrunn” (c. 1910) [35.5 x 35.5]
- S457 :: Ernest Quost “Garden with Hollyhock” (before 1888) [42 x 54]
- S503 :: Claude Monet “Mills at Westzijderveld near Zaandam” (1871) [48.5 x 74.2]

The question is to ascertain what numerical features distinguish the two test sets and subsequently can be used to attempt to associate the test painting with one group or the other. The ensuing challenge will be to convert the mathematical features of distinction into language familiar to the art historian.

## Art Historical Distinctions

In distinguishing paintings by Vincent from those of his contemporaries, art historians rely on several general statements regarding his painting style, including:

- vigorous brushwork
- heavy dark outlines

- repetitive, nonoverlapping strokes
- perspective slightly distorted from reality
- brushwork style used to form shape, rather than modifying brushwork style to form of subject
- often see beginning and end of many individual strokes

In contrast to this group of attributes, we provide some comments on the four paintings by contemporaries noting specific distinctions with Vincent’s paintings:

- S447: too messy; too full; active nervous brushstrokes everywhere; strokes more intermingled than van Gogh’s
- S448: too “nice”; too impresionistic; perspective too correct; brushstrokes too neat, too orderly; composition in planes but too regular
- S457: more academic; more realistic depiction in form, van Gogh often distorts reality a bit
- S503: subject unusual for van Gogh; Japanese-like perspective; using water to draw viewer into picture typical of Barbizon school; missing dots, stripes, lines of van Gogh

## Dataset

F518 and F752 are in the collection of the Kröller-Müller Museum. All other paintings in this challenge for which data is made available are in the collection of the Van Gogh Museum.

With any museum’s understandable sensitivity to the uncontrolled distribution of high-resolution color images of the paintings in their collection, the image data to be provided for the challenge presented in this document will be “checkerboarded” on the right half. The right half of each high resolution color image will have every other square blacked out in a checkerboard pattern, which makes the images unappealing for unauthorized commercial reproduction. But for the set membership discrimination image processing task at hand, the assumption being made is that the half-checkerboarding does not interfere significantly with the image processing - that may in fact begin with a segmentation of the painting into manageable blocks - in that the remaining unblackened squares exhibit essentially the same statistical features as in the full set of squares covering the entire painting, at least up to the scale of the squares. In the dataset for the challenge in this document the checkerboard squares are 200 x 200 pixels in images of approximately 200 dpi across the painting surface. The reason for checkerboarding only half of the painting is to preserve some portion of the image at a larger scale.



f518.tif



f752.tif



f764a.tif



f799.tif



s447.tif



s448.tif



s457.tif



s503.tif



s506.tif