



Gabor filter augmented with surround inhibition for improved contour detection by texture suppression

Nicolai Petkov and Martijn B. Wieling

Institute for Mathematics and Computing Science,
University of Groningen, PO Box 800, 9700 AV Groningen, The Netherlands
petkov@cs.rug.nl

Introduction

Gabor functions are adequate models of simple cell receptive fields and Gabor-energy filters have been used to model complex cells. Such filters augmented with non-classical receptive field inhibition [2] were demonstrated to mimic various perceptual effects [3]. Furthermore, they substantially outperform previously known contour detection algorithms [1]. Nowadays Gabor filters are widely used in various scientific fields: visual perception, computational neuroscience, image processing and computer vision. We implemented a Gabor filter augmented with surround inhibition and made it available on the internet (www.cs.rug.nl/~imaging or www.cs.rug.nl/~petkov) for use by other researchers. Users can choose from the image material available on the site or upload their own images. The site includes a number of examples related to visual perception.

Internet implementation: access via www.cs.rug.nl/~imaging or www.cs.rug.nl/~petkov

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[N. Petkov](#) and [M.B. Wieling](#), University of Groningen,
Department of Computing Science, Intelligent Systems


Send comments to m.b.wieling@student.rug.nl or petkov@cs.rug.nl.

On this site you can execute a program that implements the Gabor filter augmented with additional processing steps. You can select an input image or upload your own input image. You can specify the parameter values of the filter and submit the job for execution. After the program completes (in a few seconds to few minutes, depending on the size of the problem and the current system load) the input image and the resulting output image will be displayed in the page. You can save the results on your system.

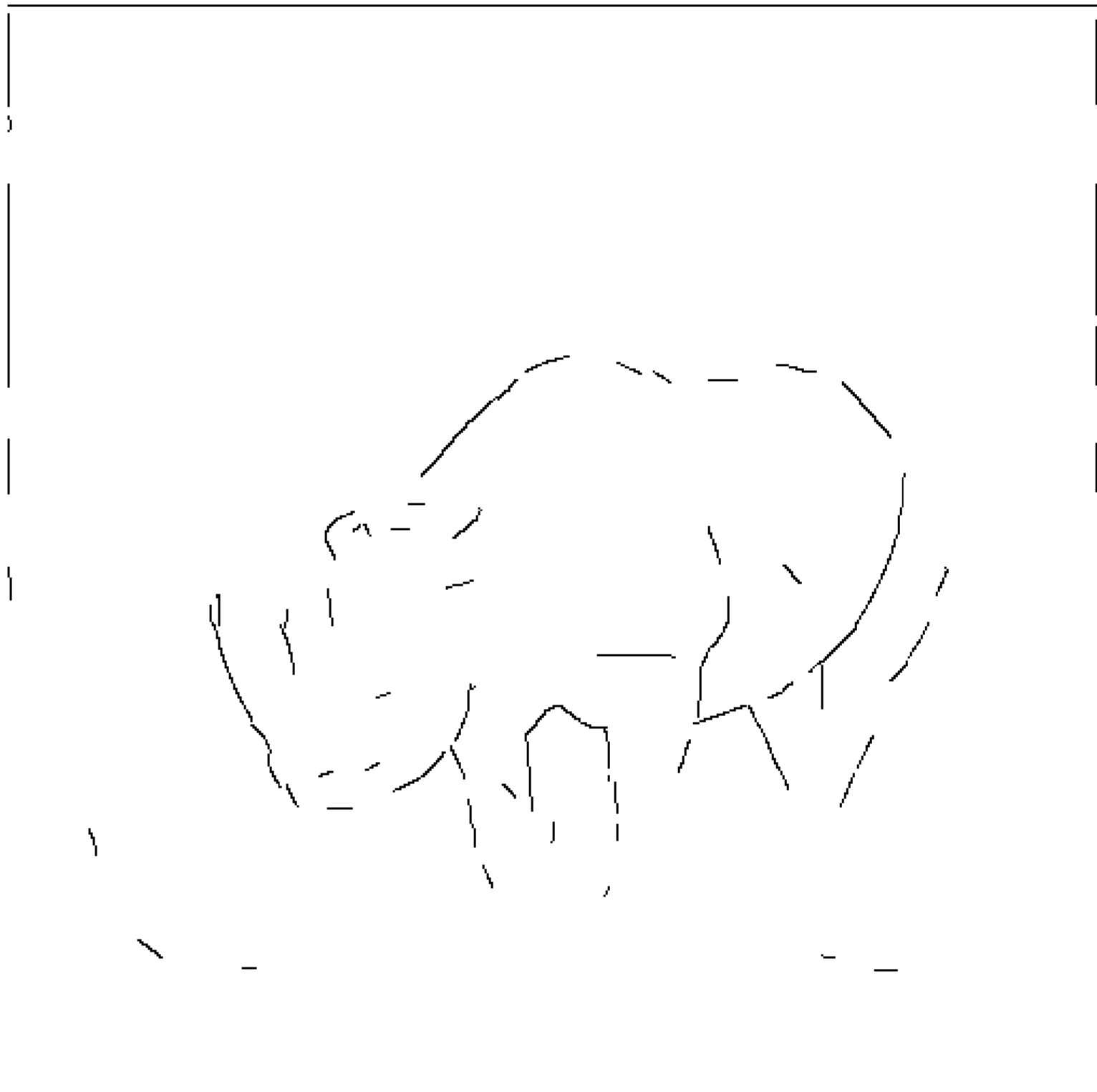
Click here for [explanations](#), [references](#) and [examples](#).

Input image: **Output image:** Invert output

[Upload images](#)



Click [here](#) to download the input image.



Click [here](#) to download the output image.
Click [here](#) to download a text file with the parameter values used.

Gabor filtering

Wavelength	Orientation(s) (deg.)	Phase offset(s) (deg.)	Aspect Ratio	Bandwidth	Number of orientations
<input type="text" value="4"/>	<input type="text" value="0"/>	<input type="text" value="0.90"/>	<input type="text" value="0.5"/>	<input type="text" value="1"/>	<input type="text" value="16"/>

Half-wave rectification (HWR)

Enable HWR **HWR threshold (%)**

Superposition of phases

Surround inhibition

Select inhibition type

Superposition for isotropic inhibition

Alpha **K₁** **K₂**

Thinning and thresholding

Enable thinning

Enable hysteresis thresholding

hysteresis thresholding

T-low **T-high**

Displayed orientation(s): 0, 22.5, 45, 67.5, 90, 112.5, 135, 157.5, 180, 202.5, 225, 247.5, 270, 292.5, 315, 337.5

Display specific orientation(s) Display all orientation(s)

0

22.5

45

67.5

90

112.5

135

157.5

Note: please make sure the correct button is selected.

References

- [1] C. Grigorescu, N. Petkov, and M. A. Westenberg. Contour detection based on nonclassical receptive field inhibition. *IEEE Trans. Image Processing*, 12(7):729–739, 2003.
- [2] H. C. Nothdurft, J. L. Gallant, and D. C. van Essen. Response modulation by texture surround in primate area V1: Correlates of "popout" under anesthesia. *Vis. Neurosci.*, 16:15–34, 1999.
- [3] N. Petkov and M. A. Westenberg. Suppression of contour perception by band-limited noise and its relation to non-classical receptive field inhibition. *Biol. Cybern.*, 88(3):236–246, 2003.