



# *Properties and Applications of the Simplified Generalized Perpendicular Bisector*

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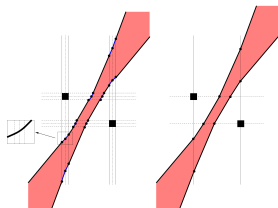


April, 2011  
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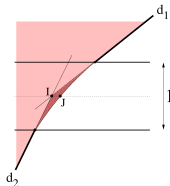


## What is the Simplified Generalized Perpendicular Bisector (SGPB)? [1,2]

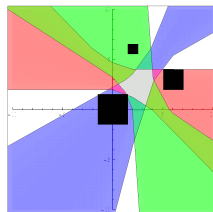
- Set of the perpendicular bisector (PB) of all the couple of points that belong to two given regions  $\Rightarrow$  GBP, SGPB.



GBP



SGPB



Circumcenter

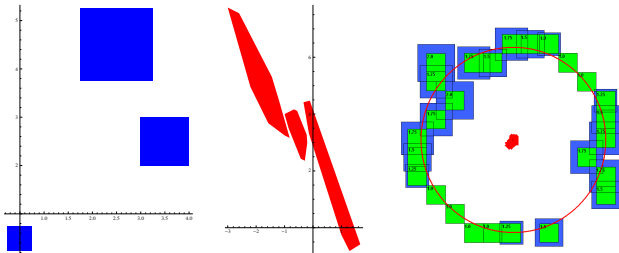
- Pixels of same or different sizes.

[1] Rodríguez, M., Sere, A., Largeteau-Skapin, G., Andres, E., *Generalized perpendicular bisector and circumcenter* In Computational modeling of objects represented in images, Comp'Image. Volume 6026 of LNCS., Buffalo, USA, Springer (2010) 1-10.

[2] Andres, E. Largeteau-Skapin, G., Rodríguez, M., *Generalized perpendicular bisector and exhaustive discrete circle recognition.*, Submitted for publication at Graphical Models (2010).

## Properties

- In 2D, the SGPB is composed with at most 10 line segments and half-lines.
- Its dual is a convex polygon with at most 8 vertices and 8 edges.



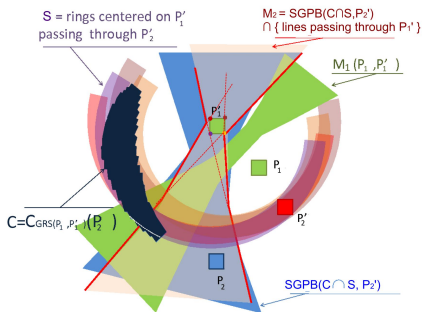
**FIGURE:** The dual of the three SGPB corresponding to three pixels of different sizes and application to noisy circle recognition.

# Illustration of the rotation reconstruction using the SGPB

Method of Fontijne [3]

- reconstruction of a rotation ;
- from  $n$  points  $p_i$  and their images  $p'_i$  ;
- incremental determination of PB ;

”Visualization” of the error generated by this method



[3] Fontijne, D., Dorst, L. *Reconstructing rotations and rigid body motions from points correspondences as a sequence of reflections*. In : Applied Geometric Algebras in Computer Science and Engineering, AGACSE 2010, Amsterdam, The Netherlands (2010)