

Bibliography

- [1] Helmut Alt, Bernd Behrends, and Johannes Blömer. Approximate matching of polygonal shapes. In *Proceedings of the Seventh Annual ACM Symposium on Computational Geometry*, pages 186–193, 1991.
- [2] Helmut Alt and Michael Godau. Measuring the resemblance of polygonal curves. In *Proceedings of the Eighth Annual Symposium on Computational Geometry*, pages 102–109, 1992.
- [3] Esther M. Arkin, L. Paul Chew, Daniel P. Huttenlocher, Klara Kedem, and Joseph S. B. Mitchell. An efficiently computable metric for comparing polygonal shapes. In *Proceedings of the First Annual ACM-SIAM Symposium on Discrete Algorithms*, pages 129–137, 1990.
- [4] Marshall Bern, David Eppstein, Leonidas Guibas, John Hershberger, Subhash Suri, and Jan Wolter. The centroid of points with approximate weights. In *Proceedings of Third Annual European Symposium on Algorithms*, pages 460–472, 1995.
- [5] Paul J. Besl and Neil D. McKay. A method for registration of 3-d shapes. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 14(2):239–256, February 1992.
- [6] W. S. Chan and F. Chin. Approximation of polygonal curves with minimum number of line segments or minimum errors. *International Journal of Computational Geometry & Applications*, 6(1):59–77, March 1996.
- [7] R. Chandrasekaran and A. Tamir. Open questions concerning Weiszfeld’s algorithm for the Fermat-Weber location problem. *Mathematical Programming, Series A*, 44(3):293–295, November 1989.
- [8] L. Paul Chew, Dorit Dor, Alon Efrat, and Klara Kedem. Geometric pattern matching in d-dimensional space. In *Proceedings of Third Annual European Symposium on Algorithms*, pages 264–279, 1995.

- [9] L. Paul Chew, Michael T. Goodrich, Daniel P. Huttenlocher, Klara Kedem, Jon M. Kleinberg, and Dina Kravets. Geometric pattern matching under euclidean motion. In *Proceedings of the Fifth Canadian Conference on Computational Geometry*, pages 151–156, 1993.
- [10] Fernand S. Cohen, Zhaohui Huang, and Zhengwei Yang. Invariant matching and identification of curves using B-splines curve representation. *IEEE Transactions On Image Processing*, 4(1):1–10, January 1995.
- [11] Scott D. Cohen and Leonidas J. Guibas. Shape-based illustration indexing and retrieval - some first steps. In *Proceedings of the ARPA Image Understanding Workshop*, pages 1209–1212, February 1996.
- [12] Scott D. Cohen and Leonidas J. Guibas. The earth mover’s distance: Lower bounds and invariance under translation. Technical Report STAN-CS-TR-97-1597, Stanford University, October 1997. Currently available online at <http://elib.stanford.edu/>.
- [13] Scott D. Cohen and Leonidas J. Guibas. Partial matching of planar polylines under similarity transformations. In *Proceedings of the Eighth Annual ACM-SIAM Symposium on Discrete Algorithms*, pages 777–786, January 1997.
- [14] Madirakshi Das, Edward M. Riseman, and Bruce A. Draper. FOCUS: Searching for multi-colored objects in a diverse image database. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 756–761, June 1997.
- [15] Mark de Berg, Marc van Kreveld, Mark Overmars, and Otried Schwarzkopf. *Computational Geometry: Algorithms and Applications*, chapter 5, pages 93–117. Springer-Verlag, 1997.
- [16] D. H. Douglas and T. K. Peucker. Algorithms for the reduction of the number of points required to represent a line or its caricature. *The Canadian Cartographer*, 10(2):112–122, 1973.
- [17] D. C. Dowson and B. V. Landau. The Fréchet distance between multivariate normal distributions. *Journal of Multivariate Analysis*, 12(3):450–455, 1982.
- [18] Zvi Drezner. A note on the Weber location problem. *Annals of Operations Research*, 40(1–4):153–161, 1992.
- [19] Herbert Edelsbrunner. *Algorithms in Combinatorial Geometry*. Springer-Verlag, 1987.

- [20] Herbert Edelsbrunner. Simulation of simplicity: A technique to cope with degenerate cases in geometric algorithms. *ACM Transactions On Graphics*, 9(1):66–104, January 1990.
- [21] Herbert Edelsbrunner and Leonidas J. Guibas. Topologically sweeping an arrangement. *Journal of Computer and System Sciences*, 38(1):165–194, February 1989.
- [22] François Ennesser and Gérard Medioni. Finding Waldo, or focus of attention using local color information. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 17(8):805–809, August 1995.
- [23] A. Etemadi. Robust segmentation of edge data. In *International Conference on Image Processing and its Applications*, pages 311–314, April 1992.
- [24] David Eu and Godfried T. Toussaint. On approximating polygonal curves in two and three dimensions. *CVGIP: Graphical Models and Image Processing*, 56:231–246, May 1994.
- [25] Gene H. Golub and Charles F. Van Loan. *Matrix Computations*. The Johns Hopkins University Press, 1989.
- [26] Yihong Gong, Guido Proietti, and Christos Faloutsos. Image indexing and retrieval based on human perceptual color clustering. In *Proceedings of Computer Vision and Pattern Recognition*, pages 578–583, June 1998.
- [27] Glenn Healey and Amit Jain. Retrieving multispectral satellite images using physics-based invariant representations. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 18(8):842–848, August 1996.
- [28] Glenn Healey and David Slater. Global color constancy: recognition of objects by use of illumination-invariant properties of color distributions. *Journal of the Optical Society of America A*, 11(11):3003–3010, November 1994.
- [29] Paul S. Heckbert. A seed fill algorithm. In Andrew S. Glassner, editor, *Graphics Gems*, pages 275–277,721–722. Academic Press, Inc., 1990.
- [30] D. R. Heisterkamp and P. Bhattacharya. Matching of 3d polygonal arcs. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 19(1):68–73, January 1997.
- [31] D. R. Heisterkamp and P. Bhattacharya. Matching 2d polygonal arcs by using a subgroup of the unit quaternions. *Computer Vision and Image Understanding*, 69(2):246–249, February 1998.

- [32] Frederick S. Hillier and Gerald J. Lieberman. *Introduction to Mathematical Programming*, pages 202–229. McGraw-Hill, 1990.
- [33] David Hoffman. Personal communication, 1999.
- [34] Jiawei Hong and Xiaonan Tan. Recognize the similarity between shapes under affine transformation. In *Second International Conference on Computer Vision*, pages 489–493, 1988.
- [35] Daniel P. Huttenlocher, Klara Kedem, and Micha Sharir. The upper envelope of Voronoi surfaces and its applications. *Discrete and Computational Geometry*, 9(3):267–291, 1993.
- [36] Daniel P. Huttenlocher, Gregory A. Klanderman, and William J. Rucklidge. Comparing images using the Hausdorff distance. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 15(9):850–863, September 1993.
- [37] Hiroshi Imai and Masao Iri. Polygonal approximations of a curve – formulations and algorithms. In Godfried T. Toussaint, editor, *Computational morphology : A computational geometric approach to the analysis of form*, pages 71–86. Elsevier Science Publishers, 1988.
- [38] Richard Johnsonbaugh and W. E. Pfaffenberger. *Foundations of Mathematical Analysis*. Marcel Dekker, Inc., 1981.
- [39] Alan Kalvin, Edith Schonberg, Jacob T. Schwartz, and Micha Sharir. Two-dimensional model-based, boundary matching using footprints. *The International Journal of Robotics Research*, 5(4):38–55, Winter 1986.
- [40] Behzad Kamgar-Parsi, Avraham Margalit, and Azriel Rosenfeld. Matching general polygonal arcs. *CVGIP: Image Understanding*, 53(2):227–234, March 1991.
- [41] I. Norman Katz. Local convergence in Fermat’s problem. *Mathematical Programming*, 6(1):89–104, February 1974.
- [42] Harold W. Kuhn. A note on Fermat’s problem. *Mathematical Programming*, 4:98–107, 1973.
- [43] Yehezkel Lamdan, Jacob T. Schwartz, and Haim J. Wolfson. Object recognition by affine invariant matching. In *Proceedings of Computer Vision and Pattern Recognition*, pages 335–344, 1988.

- [44] Yehezkel Lamdan, Jacob T. Schwartz, and Haim J. Wolfson. On recognition of 3-d objects from 2-d images. In *Proceedings of the 1988 IEEE International Conference on Robotics and Automation*, pages 1407–1413, 1988.
- [45] D.G. Lowe. Three-dimensional object recognition from single two-dimensional images. *Artificial Intelligence*, 31:355–395, 1987.
- [46] W. Y. Ma and B. S. Manjunath. NETRA: A toolbox for navigating large image databases. In *Proceedings of the IEEE International Conference on Image Processing*, volume 1, pages 568–571, 1997. Currently available online at <http://maya.ece.ucsb.edu/Netra/>.
- [47] Geoffrey J. McLachlan and Kaye E. Basford. *Mixture Models : Inference and Applications to Clustering*. Marcel Dekker, 1989.
- [48] Geoffrey J. McLachlan and Thriyambakam Krishnan. *The EM Algorithm and Extensions*. Wiley Series in Probability and Statistics. John Wiley & Sons, Inc., 1997.
- [49] Avraham Melkman and Joseph O'Rourke. On polygonal chain approximation. In Godfried T. Toussaint, editor, *Computational morphology : A computational geometric approach to the analysis of form*, pages 87–95. Elsevier Science Publishers, 1988.
- [50] Gaspard Monge. Mémoire sur la théorie des déblais et des remblais, 1781.
- [51] W. Niblack, R. Barber, W. Equitz, M. Flickner, E. Glasman, D. Petkovic, P. Yanker, C. Faloutsos, and G. Taubin. The QBIC project: querying images by content using color, texture, and shape. In *Proceedings of the SPIE*, volume 1908, pages 173–187, 1993.
- [52] R. L. Ogniewicz and O. Kübler. Hierarchic Voronoi skeletons. *Pattern Recognition*, 28(3):343–359, March 1995.
- [53] I. Olkin and F. Pukelsheim. The distance between two random vectors with given dispersion matrices. *Linear Algebra and its Applications*, 48:257–263, 1982.
- [54] S. K. Parui, S. Eswara Sarma, and D. Dutta Majumder. How to discriminate shapes using the shape vector. *Pattern Recognition Letters*, 4(3):201–204, July 1986.
- [55] E. J. Pauwels, T. Moons, L. J. Van Gool, and A. Oosterlinck. Recognition of planar shapes under affine distortion. *International Journal of Computer Vision*, 14(1):49–65, January 1995.

- [56] T. Pavlidis. *Structural Pattern Recognition*. Springer-Verlag, 1977.
- [57] Shmuel Peleg, Michael Werman, and Hillel Rom. A unified approach to change of resolution: Space and gray-level. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 11(7):739–742, July 1989.
- [58] William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery. *Numerical Recipes in C*. Cambridge University Press, second edition, 1992.
- [59] Svetlozar T. Rachev. The Monge-Kantorovich mass transference problem and its stochastic applications. *Theory of Probability and Its Applications*, 29(4):647–676, 1984.
- [60] Svetlozar T. Rachev and Ludger Rüschendorf. *Mass Transportation Problems*, volume I: Theory. Springer, 1998.
- [61] Svetlozar T. Rachev and Ludger Rüschendorf. *Mass Transportation Problems*, volume II: Applications. Springer, 1998.
- [62] Paul L. Rosin and Geoff A.W. West. Nonparametric segmentation of curves into various representations. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 17(12):1140–1153, December 1995.
- [63] Günter Rote. Computing the minimum Hausdorff distance between two point sets on a line under translation. *Information Processing Letters*, 38(3):123–127, 1991.
- [64] Yossi Rubner. *Perceptual Metrics for Image Database Navigation*. PhD thesis, Stanford University, 1999.
- [65] Yossi Rubner, Leonidas J. Guibas, and Carlo Tomasi. The earth mover’s distance, multi-dimensional scaling, and color-based image retrieval. In *Proceedings of the APRA Image Understanding Workshop*, pages 661–668, May 1997.
- [66] Yossi Rubner and Carlo Tomasi. Texture metrics. In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, October 1998. To appear.
- [67] Yossi Rubner, Carlo Tomasi, and Leonidas J. Guibas. Adaptive color-image embeddings for database navigation. In *Proceedings of the 1998 Asian Conference on Computer Vision*, pages 104–111, January 1998.
- [68] Yossi Rubner, Carlo Tomasi, and Leonidas J. Guibas. The earth mover’s distance as a metric for image retrieval. Technical Report STAN-CS-TN-98-86, Computer Science Department, Stanford University, September 1998.

- [69] Yossi Rubner, Carlo Tomasi, and Leonidas J. Guibas. A metric for distributions with applications to image databases. In *Proceedings of the IEEE International Conference on Computer Vision*, pages 59–66, January 1998.
- [70] William J. Rucklidge. Locating objects using the Hausdorff distance. In *Proceedings of the IEEE International Conference on Computer Vision*, pages 457–464, 1995.
- [71] William J. Rucklidge. Efficient guaranteed search for gray-level patterns. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 717–723, June 1997.
- [72] Brian Scassellati, Sophoclis Alexopoulos, and Myron Flickner. Retrieving images by 2d shape: a comparison of computation methods with human perceptual judgments. In *Proceedings of the SPIE*, volume 2185, pages 2–14, 1994.
- [73] Jacob T. Schwartz and Micha Sharir. Identification of partially obscured objects in two and three dimensions by matching noisy characteristic curves. *The International Journal of Robotics Research*, 6(2):29–44, Summer 1987.
- [74] Jianbo Shi and Carlo Tomasi. Good features to track. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 593–600, June 1994.
- [75] Allen W. Spivey and Robert M. Thrall. *Linear Optimization*, chapter 6, pages 213–243. Holt, Rinehart, & Winston, 1970.
- [76] Jorge Stolfi. Personal communication, 1994.
- [77] Michael J. Swain and Dana H. Ballard. Indexing via color histograms. In *Proceedings of the IEEE International Conference on Computer Vision*, pages 390–393, 1990.
- [78] Carlo Tomasi. Personal communication, 1999.
- [79] Godfried T. Toussaint. On the complexity of approximating polygonal curves in the plane. In *Proceedings of the IASTED International Symposium on Robotics and Automation*, pages 59–62, 1985.
- [80] Emanuele Trucco and Alessandro Verri. *Introductory Techniques for 3-D Computer Vision*. Prentice-Hall, Inc., 1998.
- [81] Shinji Umeyama. Least-squares estimation of transformation parameters between two point patterns. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 13(4):376–380, April 1991.

- [82] V. V. Vinod and Hiroshi Murase. Focused color intersection with efficient searching for object extraction. *Pattern Recognition*, 30(10):1787–1797, 1997.
- [83] V. V. Vinod, Hiroshi Murase, and Chie Hashizume. Focussed color intersection with efficient searching for object detection and image retrieval. In *Proceedings of the Third IEEE International Conference on Multimedia Computing and Systems*, pages 229–233, 1996.
- [84] Endre Vazonyi Weiszfeld. Sur le point par lequel la somme des distances de n points donnés est minimum. *Tohoku Mathematics Journal*, 43:355–386, 1937.
- [85] Michael Werman and Shmuel Peleg. Halftoning as optimal quantization. In *Eighth International Conference on Pattern Recognition*, pages 1114–1116, October 1986.
- [86] Michael Werman, Shmuel Peleg, and Azriel Rosenfeld. A distance metric for multidimensional histograms. *Computer Vision, Graphics, and Image Processing*, 32(3):328–336, December 1985.
- [87] George O. Wesolowsky. The Weber problem: History and perspectives. *Location Science*, 1(1):5–23, May 1993.
- [88] Gunter Wyszecki and Walter S. Styles. *Color Science: Concepts and Methods, Quantitative Data and Formulae*. Wiley, 1982.