

Some title here

Michal Staniaszek

February 24, 2015

Abstract

this is the abstract

Contents

1	Introduction	2
2	Background	3

Chapter 1

Introduction

Chapter 2

Background

Bibliography

- [1] Dror Aiger, Niloy J Mitra, and Daniel Cohen-Or. “4-points congruent sets for robust pairwise surface registration”. In: *ACM Transactions on Graphics (TOG)*. Vol. 27. 3. ACM. 2008, p. 85.
- [2] Luís A Alexandre. “3D descriptors for object and category recognition: a comparative evaluation”. In: *Workshop on Color-Depth Camera Fusion in Robotics at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vilamoura, Portugal*. Vol. 1. 2. 2012.
- [3] Bogdan Alexe, Thomas Deselaers, and Vittorio Ferrari. “What is an object?” In: *Computer Vision and Pattern Recognition (CVPR), 2010 IEEE Conference on*. IEEE. 2010, pp. 73–80.
- [4] Ricardo Baeza-Yates, Berthier Ribeiro-Neto, et al. *Modern information retrieval*. Vol. 463. ACM press New York, 1999.
- [5] Serge Belongie, Jitendra Malik, and Jan Puzicha. “Shape matching and object recognition using shape contexts”. In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 24.4 (2002), pp. 509–522.
- [6] Mirela Ben-Chen and Craig Gotsman. “Characterizing Shape Using Conformal Factors.” In: *3DOR*. 2008, pp. 1–8.
- [7] Paul J Besl and Ramesh C Jain. “Three-dimensional object recognition”. In: *ACM Computing Surveys (CSUR)* 17.1 (1985), pp. 75–145.
- [8] Paul J Besl and Neil D McKay. “Method for registration of 3-D shapes”. In: *Robotics-DL tentative*. International Society for Optics and Photonics. 1992, pp. 586–606.
- [9] Liefeng Bo, Xiaofeng Ren, and Dieter Fox. “Hierarchical matching pursuit for image classification: Architecture and fast algorithms”. In: *Advances in neural information processing systems*. 2011, pp. 2115–2123.
- [10] Oren Boiman, Eli Shechtman, and Michal Irani. “In defense of nearest-neighbor based image classification”. In: *Computer Vision and Pattern Recognition, 2008. CVPR 2008. IEEE Conference on*. IEEE. 2008, pp. 1–8.
- [11] Nils Bore, Patric Jensfelt, and John Folkesson. “Finding Frequent 3D structures in Human Environments”. In: (2014).
- [12] Anna Bosch, Andrew Zisserman, and Xavier Munoz. “Representing shape with a spatial pyramid kernel”. In: *Proceedings of the 6th ACM international conference on Image and video retrieval*. ACM. 2007, pp. 401–408.
- [13] Michael M Bronstein and Iasonas Kokkinos. “Scale-invariant heat kernel signatures for non-rigid shape recognition”. In: *Computer Vision and Pattern Recognition (CVPR), 2010 IEEE Conference on*. IEEE. 2010, pp. 1704–1711.
- [14] Gabriel J Brostow et al. “Segmentation and recognition using structure from motion point clouds”. In: *Computer Vision–ECCV 2008*. Springer, 2008, pp. 44–57.
- [15] Björn Browatzki et al. “Going into depth: Evaluating 2D and 3D cues for object classification on a new, large-scale object dataset”. In: *Computer Vision Workshops (ICCV Workshops), 2011 IEEE International Conference on*. IEEE. 2011, pp. 1189–1195.
- [16] Benjamin Bustos et al. “Feature-based similarity search in 3D object databases”. In: *ACM Computing Surveys (CSUR)* 37.4 (2005), pp. 345–387.
- [17] Chin Seng Chua and Ray Jarvis. “Point signatures: A new representation for 3d object recognition”. In: *International Journal of Computer Vision* 25.1 (1997), pp. 63–85.
- [18] Haili Chui and Anand Rangarajan. “A new point matching algorithm for non-rigid registration”. In: *Computer Vision and Image Understanding* 89.2 (2003), pp. 114–141.

- [19] Moo K Chung et al. "Encoding cortical surface by spherical harmonics". In: *Statistica Sinica* 18.4 (2008), p. 1269.
- [20] Ulrich Clarenz, Martin Rumpf, and Alexandru Telea. "Robust feature detection and local classification for surfaces based on moment analysis". In: *Visualization and Computer Graphics, IEEE Transactions on* 10.5 (2004), pp. 516–524.
- [21] Dorin Comaniciu and Peter Meer. "Mean shift: A robust approach toward feature space analysis". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 24.5 (2002), pp. 603–619.
- [22] Navneet Dalal and Bill Triggs. "Histograms of oriented gradients for human detection". In: *Computer Vision and Pattern Recognition, 2005. CVPR 2005. IEEE Computer Society Conference on*. Vol. 1. IEEE. 2005, pp. 886–893.
- [23] Michael Elad, Ayellet Tal, and Sigal Ar. *Content based retrieval of VRML objects—an iterative and interactive approach*. Springer, 2002.
- [24] Li Fei-Fei and Pietro Perona. "A bayesian hierarchical model for learning natural scene categories". In: *Computer Vision and Pattern Recognition, 2005. CVPR 2005. IEEE Computer Society Conference on*. Vol. 2. IEEE. 2005, pp. 524–531.
- [25] Pedro F Felzenszwalb et al. "Object detection with discriminatively trained part-based models". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 32.9 (2010), pp. 1627–1645.
- [26] Bernd Fritzke et al. "A growing neural gas network learns topologies". In: *Advances in neural information processing systems* 7 (1995), pp. 625–632.
- [27] Andrea Frome et al. "Recognizing objects in range data using regional point descriptors". In: *Computer Vision-ECCV 2004*. Springer, 2004, pp. 224–237.
- [28] Thomas Funkhouser and Philip Shilane. "Partial matching of 3 D shapes with priority-driven search". In: *ACM International Conference Proceeding Series*. Vol. 256. Citeseer. 2006, pp. 131–142.
- [29] Ran Gal and Daniel Cohen-Or. "Salient geometric features for partial shape matching and similarity". In: *ACM Transactions on Graphics (TOG)* 25.1 (2006), pp. 130–150.
- [30] Timothy Gatzke et al. "Curvature maps for local shape comparison". In: *Shape Modeling and Applications, 2005 International Conference*. IEEE. 2005, pp. 244–253.
- [31] Natasha Gelfand et al. "Robust global registration". In: *Symposium on geometry processing*. Vol. 2. 3. 2005, p. 5.
- [32] Aleksey Golovinskiy, Vladimir G Kim, and Thomas Funkhouser. "Shape-based recognition of 3D point clouds in urban environments". In: *Computer Vision, 2009 IEEE 12th International Conference on*. IEEE. 2009, pp. 2154–2161.
- [33] Shengyin Gu et al. "Surface-histogram: A new shape descriptor for protein-protein docking". In: *Proteins: Structure, Function, and Bioinformatics* 80.1 (2012), pp. 221–238.
- [34] K. Haris et al. "Hybrid image segmentation using watersheds and fast region merging". In: *Image Processing, IEEE Transactions on* 7.12 (1998), pp. 1684–1699.
- [35] Paul Heider et al. "Local Shape Descriptors, a Survey and Evaluation". In: *Proceedings of the 4th Eurographics Conference on 3D Object Retrieval*. 2011, pp. 49–56.
- [36] Berthold Klaus Paul Horn. "Extended gaussian images". In: *Proceedings of the IEEE* 72.12 (1984), pp. 1671–1686.
- [37] Piotr Indyk and Rajeev Motwani. "Approximate nearest neighbors: towards removing the curse of dimensionality". In: *Proceedings of the thirtieth annual ACM symposium on Theory of computing*. ACM. 1998, pp. 604–613.
- [38] Cheuk Yiu Ip et al. "Using shape distributions to compare solid models". In: *Proceedings of the seventh ACM symposium on Solid modeling and applications*. ACM. 2002, pp. 273–280.
- [39] Natraj Iyer et al. "Three-dimensional shape searching: state-of-the-art review and future trends". In: *Computer-Aided Design* 37.5 (2005), pp. 509–530.
- [40] Andrew E. Johnson and Martial Hebert. "Using spin images for efficient object recognition in cluttered 3D scenes". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 21.5 (1999), pp. 433–449.
- [41] Michael Kazhdan, Thomas Funkhouser, and Szymon Rusinkiewicz. "Rotation invariant spherical harmonic representation of 3 D shape descriptors". In: *Symposium on geometry processing*. Vol. 6. 2003.

- [42] Michael Kazhdan, Thomas Funkhouser, and Szymon Rusinkiewicz. "Symmetry descriptors and 3D shape matching". In: *Proceedings of the 2004 Eurographics/ACM SIGGRAPH symposium on Geometry processing*. ACM. 2004, pp. 115–123.
- [43] Khaled Khairy and Jonathon Howard. "Spherical harmonics-based parametric deconvolution of 3D surface images using bending energy minimization". In: *Medical image analysis* 12.2 (2008), pp. 217–227.
- [44] Jan Knopp et al. "Hough transform and 3D SURF for robust three dimensional classification". In: *Computer Vision—ECCV 2010*. Springer, 2010, pp. 589–602.
- [45] Marcel Körtgen et al. "3D shape matching with 3D shape contexts". In: *The 7th central European seminar on computer graphics*. Vol. 3. 2003, pp. 5–17.
- [46] Kevin Lai et al. "A Scalable Tree-Based Approach for Joint Object and Pose Recognition." In: *AAAI*. 2011.
- [47] Kevin Lai et al. "Sparse distance learning for object recognition combining rgb and depth information". In: *Robotics and Automation (ICRA), 2011 IEEE International Conference on*. IEEE. 2011, pp. 4007–4013.
- [48] Yehezkel Lamdan and Haim J Wolfson. "Geometric hashing: A general and efficient model-based recognition scheme". In: (1988).
- [49] Xinju Li and Igor Guskov. "Multiscale Features for Approximate Alignment of Point-based Surfaces." In: *Symposium on geometry processing*. Vol. 2. Citeseer. 2005.
- [50] Rong Liu et al. "A Part-aware Surface Metric for Shape Analysis". In: *Computer Graphics Forum*. Vol. 28. 2. Wiley Online Library. 2009, pp. 397–406.
- [51] Herve Lombaert et al. "FOCUSR: Feature Oriented Correspondence Using Spectral Regularization—A Method for Precise Surface Matching". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 35.9 (2013), pp. 2143–2160.
- [52] David G Lowe. "Distinctive image features from scale-invariant keypoints". In: *International journal of computer vision* 60.2 (2004), pp. 91–110.
- [53] Siddharth Manay et al. "Integral invariants for shape matching". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 28.10 (2006), pp. 1602–1618.
- [54] Sancho McCann and David G Lowe. "Local naive bayes nearest neighbor for image classification". In: *Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on*. IEEE. 2012, pp. 3650–3656.
- [55] Ajmal S Mian, Mohammed Bennamoun, and Robyn Owens. "Three-dimensional model-based object recognition and segmentation in cluttered scenes". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 28.10 (2006), pp. 1584–1601.
- [56] Krystian Mikolajczyk and Cordelia Schmid. "A performance evaluation of local descriptors". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 27.10 (2005), pp. 1615–1630.
- [57] Krystian Mikolajczyk and Cordelia Schmid. "Scale & affine invariant interest point detectors". In: *International journal of computer vision* 60.1 (2004), pp. 63–86.
- [58] C.A. Mueller, K. Pathak, and A. Birk. "Object recognition in RGBD images of cluttered environments using graph-based categorization with unsupervised learning of shape parts". In: *Intelligent Robots and Systems (IROS), 2013 IEEE/RSJ International Conference on*. 2013, pp. 2248–2255.
- [59] Christian A. Mueller, Paul G. Plöger, and Matthew S. Roscoe. "Towards Scalable 3D Object Shape Categorization". In: *Active Semantic Perception Workshop on Intelligent Robots and Systems (IROS)* (2012).
- [60] Marius Muja and David G Lowe. "Fast Approximate Nearest Neighbors with Automatic Algorithm Configuration." In: *VISAPP (1)* 2 (2009).
- [61] Marius Muja and David G. Lowe. "Scalable Nearest Neighbor Algorithms for High Dimensional Data". In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 36.11 (2014), pp. 2227–40.
- [62] Delphine Nain et al. "Statistical shape analysis of brain structures using spherical wavelets". In: *Biomedical Imaging: From Nano to Macro, 2007. ISBI 2007. 4th IEEE International Symposium on*. IEEE. 2007, pp. 209–212.

- [63] Erickson R Nascimento et al. "BRAND: A robust appearance and depth descriptor for RGB-D images". In: *Intelligent Robots and Systems (IROS), 2012 IEEE/RSJ International Conference on*. IEEE. 2012, pp. 1720–1726.
- [64] David Nister and Henrik Stewenius. "Scalable recognition with a vocabulary tree". In: *Computer Vision and Pattern Recognition, 2006 IEEE Computer Society Conference on*. Vol. 2. IEEE. 2006, pp. 2161–2168.
- [65] Marcin Novotni, Patrick Degener, and Reinhard Klein. "Correspondence generation and matching of 3D shape subparts". In: *Rapport technique CG-2005-2, ISSN (2005)*, pp. 1610–8892.
- [66] Robert Osada et al. "Matching 3D models with shape distributions". In: *Shape Modeling and Applications, SMI 2001 International Conference on*. IEEE. 2001, pp. 154–166.
- [67] Robert Osada et al. "Shape distributions". In: *ACM Transactions on Graphics (TOG)* 21.4 (2002), pp. 807–832.
- [68] Maks Ovsjanikov et al. "One point isometric matching with the heat kernel". In: *Computer Graphics Forum*. Vol. 29. 5. Wiley Online Library. 2010, pp. 1555–1564.
- [69] Maks Ovsjanikov et al. "Shape Google: a computer vision approach to invariant shape retrieval". In: *Proc. NORDIA* 1.2 (2009).
- [70] Panagiotis Papadakis et al. "Efficient 3D shape matching and retrieval using a concrete radialized spherical projection representation". In: *Pattern Recognition* 40.9 (2007), pp. 2437–2452.
- [71] Mark Pauly, Richard Keiser, and Markus Gross. "Multi-scale Feature Extraction on Point-Sampled Surfaces". In: *Computer graphics forum*. Vol. 22. 3. Wiley Online Library. 2003, pp. 281–289.
- [72] James Philbin et al. "Object retrieval with large vocabularies and fast spatial matching". In: *Computer Vision and Pattern Recognition, 2007. CVPR'07. IEEE Conference on*. IEEE. 2007, pp. 1–8.
- [73] Tahir Rabbani, Frank van den Heuvel, and G Vosselmann. "Segmentation of point clouds using smoothness constraint". In: *International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences* 36.5 (2006), pp. 248–253.
- [74] Yong Rui and Thomas Huang. "Optimizing learning in image retrieval". In: *Computer Vision and Pattern Recognition, 2000. Proceedings. IEEE Conference on*. Vol. 1. IEEE. 2000, pp. 236–243.
- [75] Radu Bogdan Rusu, Nico Blodow, and Michael Beetz. "Fast point feature histograms (FPFH) for 3D registration". In: *Robotics and Automation, 2009. ICRA'09. IEEE International Conference on*. IEEE. 2009, pp. 3212–3217.
- [76] Radu Bogdan Rusu et al. "Detecting and segmenting objects for mobile manipulation". In: *Computer Vision Workshops (ICCV Workshops), 2009 IEEE 12th International Conference on*. IEEE. 2009, pp. 47–54.
- [77] Radu Bogdan Rusu et al. "Fast 3d recognition and pose using the viewpoint feature histogram". In: *Intelligent Robots and Systems (IROS), 2010 IEEE/RSJ International Conference on*. IEEE. 2010, pp. 2155–2162.
- [78] Firooz A. Sadjadi and Ernest L. Hall. "Three-Dimensional Moment Invariants". In: *Pattern Analysis and Machine Intelligence, IEEE Transactions on PAMI-2.2 (1980)*, pp. 127–136.
- [79] Kate Saenko et al. "Practical 3-D object detection using category and instance-level appearance models". In: *Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on*. IEEE. 2011, pp. 793–800.
- [80] Philip Shilane and Thomas Funkhouser. "Distinctive regions of 3D surfaces". In: *ACM Transactions on Graphics (TOG)* 26.2 (2007), p. 7.
- [81] Philip Shilane and Thomas Funkhouser. "Selecting distinctive 3D shape descriptors for similarity retrieval". In: *Shape Modeling and Applications, 2006. SMI 2006. IEEE International Conference on*. IEEE. 2006, pp. 18–18.
- [82] Josef Sivic and Andrew Zisserman. "Video Google: A text retrieval approach to object matching in videos". In: *Computer Vision, 2003. Proceedings. Ninth IEEE International Conference on*. IEEE. 2003, pp. 1470–1477.
- [83] Fridtjof Stein and Gérard Medioni. "Structural indexing: Efficient 3-D object recognition". In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 14.2 (1992), pp. 125–145.

- [84] Jian Sun, Maks Ovsjanikov, and Leonidas Guibas. "A Concise and Provably Informative Multi-Scale Signature Based on Heat Diffusion". In: *Computer graphics forum*. Vol. 28. 5. Wiley Online Library. 2009, pp. 1383–1392.
- [85] Johan WH Tangelder and Remco C Veltkamp. "A survey of content based 3D shape retrieval methods". In: *Multimedia tools and applications* 39.3 (2008), pp. 441–471.
- [86] Roberto Toldo, Umberto Castellani, and Andrea Fusiello. "A bag of words approach for 3d object categorization". In: *Computer Vision/Computer Graphics Collaboration Techniques*. Springer, 2009, pp. 116–127.
- [87] Federico Tombari, Samuele Salti, and Luigi Di Stefano. "A combined texture-shape descriptor for enhanced 3D feature matching". In: *Image Processing (ICIP), 2011 18th IEEE International Conference on*. IEEE. 2011, pp. 809–812.
- [88] Federico Tombari, Samuele Salti, and Luigi Di Stefano. "Unique signatures of histograms for local surface description". In: *Computer Vision–ECCV 2010*. Springer, 2010, pp. 356–369.
- [89] Oliver Van Kaick et al. "A survey on shape correspondence". In: *Computer Graphics Forum*. Vol. 30. 6. Wiley Online Library. 2011, pp. 1681–1707.
- [90] Walter Wohlkinger and Markus Vincze. "Ensemble of shape functions for 3d object classification". In: *Robotics and Biomimetics (ROBIO), 2011 IEEE International Conference on*. 2011, pp. 2987–2992.
- [91] Walter Wohlkinger and Markus Vincze. "Shape-based depth image to 3D model matching and classification with inter-view similarity". In: *Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on*. IEEE. 2011, pp. 4865–4870.
- [92] H Woo et al. "A new segmentation method for point cloud data". In: *International Journal of Machine Tools and Manufacture* 42.2 (2002), pp. 167–178.
- [93] MF Zakaria et al. "Fast algorithm for the computation of moment invariants". In: *Pattern Recognition* 20.6 (1987), pp. 639–643.
- [94] Cha Zhang and Tsuhan Chen. "Efficient feature extraction for 2D/3D objects in mesh representation". In: *Image Processing, 2001. Proceedings. 2001 International Conference on*. Vol. 3. IEEE. 2001, pp. 935–938.
- [95] Hao Zhang et al. "Deformation-Driven Shape Correspondence". In: *Computer Graphics Forum*. Vol. 27. 5. Wiley Online Library. 2008, pp. 1431–1439.