References

[1] *Wpclipart*, 2015-01-20. `http://www.wpclipart.com/medical/anatomy/eye/Human_eye_cross-sectional_view.png.html`.

[2] Adam Hoover, Valentina Kouznetsova, and Michael Goldbaum. *Locating blood vessels in retinal images by piecewise threshold probing of a matched filter response. Medical Imaging, IEEE Transactions on*, 19(3):203–210, 2000.

[3] Timothy J Bennett and Chris J Barry. *Ophthalmic imaging today: an ophthalmic photographer's viewpoint–a review. Clinical & experimental ophthalmology*, 37 (1):2–13, 2009.

[4] Rui Bernardes, Pedro Serranho, and Conceição Lobo. *Digital ocular fundus imaging: a review. Ophthalmologica*, 226(4):161–181, 2011.

[5] Michael D Abràmoff, Mona K Garvin, and Milan Sonka. *Retinal imaging and image analysis. Biomedical Engineering, IEEE Reviews in*, 3:169–208, 2010.

[6] Muhammad Moazam Fraz, P Remagnino, Andreas Hoppe, Bunyarit Uyyanonvara, Alicja R Rudnicka, Christopher G Owen, and Sarah A Barman. *Blood vessel segmentation methodologies in retinal images–a survey. Computer methods and programs in biomedicine*, 108(1):407–433, 2012.

[7] R Williams, M Airey, H Baxter, J Forrester, T Kennedy-Martin, and A Girach. *Epidemiology of diabetic retinopathy and macular oedema: a systematic review. Eye*, 18(10):963–983, 2004.

[8] Anders Heijl, M Cristina Leske, Bo Bengtsson, Leslie Hyman, Boel Bengtsson, and Mohamed Hussein. *Reduction of intraocular pressure and glaucoma progression: results from the early manifest glaucoma trial. Archives of ophthalmology*, 120(10):1268–1279, 2002.

[9] Larry D Hubbard, Rosemary J Brothers, William N King, Limin X Clegg, Ronald Klein, Lawton S Cooper, A Richey Sharrett, Matthew D Davis, Jianwen Cai, Atherosclerosis Risk in Communities Study Group, et al. *Methods for evaluation of retinal microvascular abnormalities associated with hypertension/sclerosis in the atherosclerosis risk in communities study. Ophthalmology*, 106(12):2269–2280, 1999.

[10] World Health Organization et al. *Global initiative for the elimination of avoidable blindness: action plan 2006-2011*. 2007.

[11] A Foster and S Resnikoff. *The impact of vision 2020 on global blindness. Eye*, 19 (10):1133–1135, 2005.

[12] Subhasis Chaudhuri, Shankar Chatterjee, Norman Katz, Mark Nelson, and Michael Goldbaum. *Detection of blood vessels in retinal images using two-dimensional matched filters. IEEE Transactions on medical imaging*, 8(3):263–269, 1989.

[13] Mohammed Al-Rawi, Munib Qutaishat, and Mohammed Arrar. *An improved matched filter for blood vessel detection of digital retinal images. Computers in Biology and Medicine*, 37(2):262–267, 2007.

[14] Hooshiar Zolfagharnasab and Ahmad Reza Naghsh-Nilchi. *Cauchy based matched filter for retinal vessels detection. Journal of medical signals and sensors*, 4(1):1, 2014.

[15] Gang Wang, Zhicheng Wang, Yufei Chen, and Weidong Zhao. *Robust point matching method for multimodal retinal image registration. Biomedical Signal Processing and Control*, 19:68–76, 2015.

[16] Jack J Kanski. *Clinical ophthalmology. Elsevier Health Sciences, London, UK*, 2007.

[17] T Teng, M Lefley, and D Claremont. *Progress towards automated diabetic ocular screening: a review of image analysis and intelligent systems for diabetic retinopathy. Medical and Biological Engineering and Computing*, 40(1):2–13, 2002.

[18] Conor Heneghan, John Flynn, Michael O'Keefe, and Mark Cahill. *Characterization of changes in blood vessel width and tortuosity in retinopathy of prematurity using image analysis. Medical image analysis*, 6(4):407–429, 2002.

[19] Enrico Grisan and Alfredop Ruggeri. *A divide et impera strategy for automatic classification of retinal vessels into arteries and veins.* In *Engineering in medicine and biology society, 2003. Proceedings of the 25th annual international conference of the IEEE*, volume 1, pages 890–893. IEEE, 2003.

[20] A Haddouche, Mouloud Adel, Monique Rasigni, J Conrath, and Salah Bourennane. *Detection of the foveal avascular zone on retinal angiograms using markov random fields. Digital Signal Processing*, 20(1):149–154, 2010.

[21] James Lowell, Andrew Hunter, David Steel, Ansu Basu, Robert Ryder, and R Lee Kennedy. *Measurement of retinal vessel widths from fundus images based on 2-d modeling. Medical Imaging, IEEE Transactions on*, 23(10):1196–1204, 2004.

[22] Frédéric Zana and Jean-Claude Klein. *A multimodal registration algorithm of eye fundus images using vessels detection and hough transform. Medical Imaging, IEEE Transactions on*, 18(5):419–428, 1999.

[23] K Fritzsche, Ali Can, Hong Shen, C Tsai, J Turner, H Tanenbuam, C Stewart, Badrinath Roysam, JS Suri, and S Laxminarayan. *Automated model based segmentation, tracing and analysis of retinal vasculature from digital fundus images. State-of-The-Art Angiography, Applications and Plaque Imaging Using MR, CT, Ultrasound and X-rays*, pages 225–298, 2003.

[24] Cástor Mariño, Manuel G Penedo, Marta Penas, María J Carreira, and F Gonzalez. *Personal authentication using digital retinal images. Pattern Analysis and Applications*, 9(1):21–33, 2006.

[25] Cemal Köse, Cevat İki, et al. *A personal identification system using retinal vasculature in retinal fundus images*. *Expert Systems with Applications*, 38(11):13670–13681, 2011.

[26] Joes Staal, Michael D Abràmoff, Meindert Niemeijer, Max A Viergever, and Bram van Ginneken. *Ridge-based vessel segmentation in color images of the retina*. *Medical Imaging, IEEE Transactions on*, 23(4):501–509, 2004.

[27] Meindert Niemeijer, Joes Staal, Bram van Ginneken, Marco Loog, and Michael D Abramoff. *Comparative study of retinal vessel segmentation methods on a new publicly available database*. In *Medical Imaging 2004*, pages 648–656. International Society for Optics and Photonics, 2004.

[28] Chanjira Sinthanayothin, James F Boyce, Helen L Cook, and Thomas H Williamson. *Automated localisation of the optic disc, fovea, and retinal blood vessels from digital colour fundus images*. *British Journal of Ophthalmology*, 83 (8):902–910, 1999.

[29] Yannis Tolias, Stavros M Panas, et al. *A fuzzy vessel tracking algorithm for retinal images based on fuzzy clustering*. *Medical Imaging, IEEE Transactions on*, 17(2): 263–273, 1998.

[30] Saurabh Garg, Jayanthi Sivaswamy, and Siva Chandra. *Unsupervised curvature-based retinal vessel segmentation*. pages 344–347, 2007.

[31] Jean Serra. *Introduction to mathematical morphology*. *Computer vision, graphics, and image processing*, 35(3):283–305, 1986.

[32] Thomas Walter and Jean-Claude Klein. *Segmentation of color fundus images of the human retina: Detection of the optic disc and the vascular tree using morphological techniques*. In *Medical Data Analysis*, pages 282–287. Springer, 2001.

[33] Rafael C Gonzalez. *Digital image processing*. Pearson Education India, 2009.

[34] Tim McInerney and Demetri Terzopoulos. *T-snakes: Topology adaptive snakes*. *Medical image analysis*, 4(2):73–91, 2000.

[35] Lucia Espona, María J Carreira, Marcos Ortega, and Manuel G Penedo. *A snake for retinal vessel segmentation*. In *Pattern Recognition and Image Analysis*, pages 178–185. Springer, 2007.

[36] Koen A Vermeer, Frans M Vos, HG Lemij, and Albert M Vossepoel. *A model based method for retinal blood vessel detection*. *Computers in Biology and Medicine*, 34 (3):209–219, 2004.

[37] Li Wang, Abhir Bhalerao, and Roland Wilson. *Analysis of retinal vasculature using a multiresolution hermite model*. *Medical Imaging, IEEE Transactions on*, 26(2): 137–152, 2007.

[38] Vijay Mahadevan, Harihar Narasimha-Iyer, Badrinath Roysam, and Howard L Tanenbaum. *Robust model-based vasculature detection in noisy biomedical images*. *Information Technology in Biomedicine, IEEE Transactions on*, 8(3):360–376, 2004.

[39] Benson SY Lam and Hong Yan. *A novel vessel segmentation algorithm for pathological retina images based on the divergence of vector fields. Medical Imaging, IEEE Transactions on*, 27(2):237–246, 2008.

[40] Benson SY Lam, Yongsheng Gao, and AW-C Liew. *General retinal vessel segmentation using regularization-based multiconcavity modeling. Medical Imaging, IEEE Transactions on*, 29(7):1369–1381, 2010.

[41] Leon O Chua and Lin Yang. *Cellular neural networks: Applications. Circuits and Systems, IEEE Transactions on*, 35(10):1273–1290, 1988.

[42] Tamas Roska and Leon O Chua. *The cnn universal machine: an analogic array computer. Circuits and Systems II: Analog and Digital Signal Processing, IEEE Transactions on*, 40(3):163–173, 1993.

[43] Luis Ibanez, William Schroeder, Lydia Ng, and Josh Cates. *The itk software guide.* 2003.

[44] Xiaoyi Jiang and Daniel Mojon. *Adaptive local thresholding by verification-based multithreshold probing with application to vessel detection in retinal images. Pattern Analysis and Machine Intelligence, IEEE Transactions on*, 25(1):131–137, 2003.

[45] Muhammed Gökhan Cinsdikici and Doğan Aydın. *Detection of blood vessels in ophthalmoscope images using mf/ant (matched filter/ant colony) algorithm. Computer methods and programs in biomedicine*, 96(2):85–95, 2009.

[46] M Ashraful Amin and Hong Yan. *High speed detection of retinal blood vessels in fundus image using phase congruency. Soft Computing*, 15(6):1217–1230, 2011.

[47] Bob Zhang, Lin Zhang, Lei Zhang, and Fakhri Karray. *Retinal vessel extraction by matched filter with first-order derivative of gaussian. Computers in biology and medicine*, 40(4):438–445, 2010.

[48] João VB Soares, Jorge JG Leandro, Roberto M Cesar, Herbert F Jelinek, and Michael J Cree. *Retinal vessel segmentation using the 2-d gabor wavelet and supervised classification. Medical Imaging, IEEE Transactions on*, 25(9):1214–1222, 2006.

[49] Elisa Ricci and Renzo Perfetti. *Retinal blood vessel segmentation using line operators and support vector classification. Medical Imaging, IEEE Transactions on*, 26(10):1357–1365, 2007.

[50] Carmen Alina Lupaşcu, Domenico Tegolo, and Emanuele Trucco. *Fabc: retinal vessel segmentation using adaboost. Information Technology in Biomedicine, IEEE Transactions on*, 14(5):1267–1274, 2010.

[51] Lili Xu and Shuqian Luo. *A novel method for blood vessel detection from retinal images. Biomedical engineering online*, 9(1):14, 2010.

[52] Xinge You, Qinmu Peng, Yuan Yuan, Yiu-ming Cheung, and Jiajia Lei. *Segmentation of retinal blood vessels using the radial projection and semi-supervised approach. Pattern Recognition*, 44(10):2314–2324, 2011.

[53] Diego Marín, Arturo Aquino, Manuel Emilio Gegúndez-Arias, and José Manuel Bravo. *A new supervised method for blood vessel segmentation in retinal images by using gray-level and moment invariants-based features. Medical Imaging, IEEE Transactions on*, 30(1):146–158, 2011.

[54] Giri Babu Kande, P Venkata Subbaiah, and T Satya Savithri. *Unsupervised fuzzy based vessel segmentation in pathological digital fundus images. Journal of medical systems*, 34(5):849–858, 2010.

[55] Frederic Zana and Jean-Claude Klein. *Segmentation of vessel-like patterns using mathematical morphology and curvature evaluation. Image Processing, IEEE Transactions on*, 10(7):1010–1019, 2001.

[56] Ana Maria Mendonca and Aurelio Campilho. *Segmentation of retinal blood vessels by combining the detection of centerlines and morphological reconstruction. Medical Imaging, IEEE Transactions on*, 25(9):1200–1213, 2006.

[57] Muhammad Moazam Fraz, SA Barman, Paolo Remagnino, Andreas Hoppe, Abdul Basit, Bunyarit Uyyanonvara, Alicja R Rudnicka, and Christopher G Owen. *An approach to localize the retinal blood vessels using bit planes and centerline detection. Computer methods and programs in biomedicine*, 108(2):600–616, 2012.

[58] Mohammad Saleh Miri and Ali Mahloojifar. *Retinal image analysis using curvelet transform and multistructure elements morphology by reconstruction. Biomedical Engineering, IEEE Transactions on*, 58(5):1183–1192, 2011.

[59] Lucia Espona, María J Carreira, MG Penedo, and Marcos Ortega. *Retinal vessel tree segmentation using a deformable contour model*. In *Pattern Recognition, 2008. ICPR 2008. 19th International Conference on*, pages 1–4. IEEE, 2008.

[60] Bashir Al-Diri, Andrew Hunter, and David Steel. *An active contour model for segmenting and measuring retinal vessels. Medical Imaging, IEEE Transactions on*, 28(9):1488–1497, 2009.

[61] Yongping Zhang, Wynne Hsu, and Mong Li Lee. *Detection of retinal blood vessels based on nonlinear projections. Journal of Signal Processing Systems*, 55(1-3): 103–112, 2009.

[62] Renzo Perfetti, Elisa Ricci, Daniele Casali, and Giovanni Costantini. *Cellular neural networks with virtual template expansion for retinal vessel segmentation. Circuits and Systems II: Express Briefs, IEEE Transactions on*, 54(2):141–145, 2007.

[63] C Alonso-Montes, DL Vilarino, P Dudek, and MG Penedo. *Fast retinal vessel tree extraction: A pixel parallel approach. International Journal of Circuit Theory and Applications*, 36(5-6):641–651, 2008.

[64] Miguel A Palomera-Pérez, M Elena Martinez-Perez, Hector Benítez-Pérez, and Jorge Luis Ortega-Arjona. *Parallel multiscale feature extraction and region growing: application in retinal blood vessel detection. Information Technology in Biomedicine, IEEE Transactions on*, 14(2):500–506, 2010.

[65] M Elena Martínez-Pérez, Alun D Hughes, Alice V Stanton, Simon A Thom, Anil A Bharath, and Kim H Parker. *Retinal blood vessel segmentation by means of scale-space analysis and region growing.* In *Medical Image Computing and Computer-Assisted Intervention–MICCAI'99*, pages 90–97. Springer, 1999.

[66] M Elena Martinez-Perez, Alun D Hughes, Simon A Thom, Anil A Bharath, and Kim H Parker. *Segmentation of blood vessels from red-free and fluorescein retinal images. Medical image analysis*, 11(1):47–61, 2007.

[67] MEM Perez, Alun D Hughes, SA Thorn, and Kim H Parker. *Improvement of a retinal blood vessel segmentation method using the insight segmentation and registration toolkit (itk).* In *Engineering in Medicine and Biology Society, 2007. EMBS 2007. 29th Annual International Conference of the IEEE*, pages 892–895. IEEE, 2007.

[68] Andrea Anzalone, Federico Bizzarri, Mauro Parodi, and Marco Storace. *A modular supervised algorithm for vessel segmentation in red-free retinal images. Computers in biology and medicine*, 38(8):913–922, 2008.

[69] Marios Vlachos and Evangelos Dermatas. *Multi-scale retinal vessel segmentation using line tracking. Computerized Medical Imaging and Graphics*, 34(3):213–227, 2010.

[70] Sameh A Salem, Nancy M Salem, and Asoke K Nandi. *Segmentation of retinal blood vessels using a novel clustering algorithm (racal) with a partial supervision strategy. Medical & biological engineering & computing*, 45(3):261–273, 2007.

[71] Chang Yao and Hou-jin Chen. *Automated retinal blood vessels segmentation based on simplified pcnn and fast 2d-otsu algorithm. Journal of Central South University of Technology*, 16:640–646, 2009.

[72] JB Antoine Maintz and Max A Viergever. *A survey of medical image registration. Medical image analysis*, 2(1):1–36, 1998.

[73] Hava Lester and Simon R Arridge. *A survey of hierarchical non-linear medical image registration. Pattern recognition*, 32(1):129–149, 1999.

[74] Lisa Gottesfeld Brown. *A survey of image registration techniques. ACM computing surveys (CSUR)*, 24(4):325–376, 1992.

[75] Barbara Zitova and Jan Flusser. *Image registration methods: a survey. Image and vision computing*, 21(11):977–1000, 2003.

[76] Aristeidis Sotiras, Christos Davatzikos, and Nikos Paragios. *Deformable medical image registration: A survey. Medical Imaging, IEEE Transactions on*, 32(7): 1153–1190, 2013.

[77] Francisco PM Oliveira and João Manuel RS Tavares. *Medical image registration: a review. Computer methods in biomechanics and biomedical engineering*, 17(2): 73–93, 2014.

[78] Mohammed Essadiki. *New technique for combining panchromatic and multispectral spot images for multipurpose image-maps. Mert Rory Sabuncu,"Entropy-Based Image Registration". Phd Thesis.*

[79] Jan Flusser and Tomá Suk. *Degraded image analysis: an invariant approach. Pattern Analysis and Machine Intelligence, IEEE Transactions on*, 20(6):590–603, 1998.

[80] Josien PW Pluim, JB Antoine Maintz, and Max A Viergever. *Mutual-information-based registration of medical images: a survey. Medical Imaging, IEEE Transactions on*, 22(8):986–1004, 2003.

[81] Sascha EA Muenzing, Bram van Ginneken, Max A Viergever, and Josien PW Pluim. *Dirboost–an algorithm for boosting deformable image registration: Application to lung ct intra-subject registration. Medical image analysis*, 18(3):449–459, 2014.

[82] Timo Mäkelä, Patrick Clarysse, Outi Sipilä, Nicoleta Pauna, Quoc Cuong Pham, Toivo Katila, and Isabelle E Magnin. *A review of cardiac image registration methods. Medical Imaging, IEEE Transactions on*, 21(9):1011–1021, 2002.

[83] Brian F Hutton, Michael Braun, Lennart Thurfjell, and Dennys Y Lau. *Image registration: an essential tool for nuclear medicine. European journal of nuclear medicine and molecular imaging*, 29(4):559–577, 2002.

[84] Julian G Rosenman, Elizabeth P Miller, Gregg Tracton, and Tim J Cullip. *Image registration: an essential part of radiation therapy treatment planning. International Journal of Radiation Oncology* Biology* Physics*, 40(1):197–205, 1998.

[85] Erik HW Meijering, Wiro J Niessen, and MA Viegever. *Retrospective motion correction in digital subtraction angiography: a review. Medical Imaging, IEEE Transactions on*, 18(1):2–21, 1999.

[86] Paul M Thompson, Roger P Woods, Michael S Mega, and Arthur W Toga. *Mathematical/computational challenges in creating deformable and probabilistic atlases of the human brain. Human brain mapping*, 9(2):81–92, 2000.

[87] David J Hawkes, D Barratt, Jane M Blackall, C Chan, Philip J Edwards, K Rhode, Graeme P Penney, Jamie McClelland, and Derek LG Hill. *Tissue deformation and shape models in image-guided interventions: a discussion paper. Medical Image Analysis*, 9(2):163–175, 2005.

[88] Matthieu Ferrant, Arya Nabavi, Benoıt Macq, Peter M Black, Ferenc A Jolesz, Ron Kikinis, and Simon K Warfield. *Serial registration of intraoperative mr images of the brain. Medical image analysis*, 6(4):337–359, 2002.

[89] Petra A Van den Elsen, Evert-Jan D Pol, and Max A Viergever. *Medical image matching-a review with classification. Engineering in Medicine and Biology Magazine, IEEE*, 12(1):26–39, 1993.

[90] Alan C Evans, Sean Marrett, Jaime Torrescorzo, Shyan Ku, and Louis Collins. *Mri-pet correlation in three dimensions using a volume-of-interest (voi) atlas. Journal of Cerebral Blood Flow & Metabolism*, 11(1 suppl):A69–A78, 1991.

[91] Haili Chui and Anand Rangarajan. *A new point matching algorithm for non-rigid registration. Computer Vision and Image Understanding*, 89(2):114–141, 2003.

[92] Artur V Cideciyan. *Registration of ocular fundus images. IEEE Engineering in medicine and biology*, 14(1):52–58, 1995.

[93] Charles V Stewart, Chia-Ling Tsai, and Badrinath Roysam. *The dual-bootstrap iterative closest point algorithm with application to retinal image registration. Medical Imaging, IEEE Transactions on*, 22(11):1379–1394, 2003.

[94] B Fischer, J Modersitzki, et al. *Intensity based image registration with a guaranteed one-to-one point match. Methods of information in medicine*, 43(4):327–330, 2004.

[95] George K Matsopoulos, Pantelis A Asvestas, Nikolaos A Mouravliansky, and Konstantinos K Delibasis. *Multimodal registration of retinal images using self organizing maps. Medical Imaging, IEEE Transactions on*, 23(12):1557–1563, 2004.

[96] Teuvo Kohonen and Panu Somervuo. *Self-organizing maps of symbol strings. Neurocomputing*, 21(1):19–30, 1998.

[97] Yuping Lin and Gérard Medioni. *Retinal image registration from 2d to 3d*. In *Computer Vision and Pattern Recognition, 2008. CVPR 2008. IEEE Conference on*, pages 1–8. IEEE, 2008.

[98] Tae Eun Choe and Isaac Cohen. *Registration of multimodal fluorescein images sequence of the retina*. In *Tenth IEEE International Conference on Computer Vision (ICCV'05) Volume 1*, volume 1, pages 106–113. IEEE, 2005.

[99] Chia-Ling Tsai, Chun-Yi Li, Gehua Yang, and Kai-Shung Lin. *The edge-driven dual-bootstrap iterative closest point algorithm for registration of multimodal fluorescein angiogram sequence. Medical Imaging, IEEE Transactions on*, 29(3): 636–649, 2010.

[100] Ali Can, Charles V Stewart, Badrinath Roysam, and Howard L. Tanenbaum. *A feature-based, robust, hierarchical algorithm for registering pairs of images of the curved human retina. Pattern Analysis and Machine Intelligence, IEEE Transactions on*, 24(3):347–364, 2002.

[101] Nicola Ritter, Robyn Owens, James Cooper, Robert H Eikelboom, and Paul P Van Saarloos. *Registration of stereo and temporal images of the retina. Medical Imaging, IEEE Transactions on*, 18(5):404–418, 1999.

[102] George K Matsopoulos, Nicolaos A Mouravliansky, Konstantinos K Delibasis, and Konstantina S Nikita. *Automatic retinal image registration scheme using global optimization techniques. Information Technology in Biomedicine, IEEE Transactions on*, 3(1):47–60, 1999.

[103] Jean Claude Nunes, Yasmina Bouaoune, Eric Delechelle, and Ph Bunel. *A multiscale elastic registration scheme for retinal angiograms. Computer Vision and Image Understanding*, 95(2):129–149, 2004.

[104] Gehua Yang, Charles V Stewart, Michal Sofka, and Chia-Ling Tsai. *Registration of challenging image pairs: Initialization, estimation, and decision. Pattern Analysis and Machine Intelligence, IEEE Transactions on*, 29(11):1973–1989, 2007.

[105] Jian Zheng, Jie Tian, Yakang Dai, Kexin Deng, and Jian Chen. *Retinal image registration based on salient feature regions*. In *Engineering in Medicine and Biology Society, 2009. EMBC 2009. Annual International Conference of the IEEE*, pages 102–105. IEEE, 2009.

[106] Thitiporn Chanwimaluang, Guoliang Fan, and Stephen R Fransen. *Hybrid retinal image registration. Information Technology in Biomedicine, IEEE Transactions on*, 10(1):129–142, 2006.

[107] Bin Fang and Yuan Yan Tang. *Elastic registration for retinal images based on reconstructed vascular trees. Biomedical Engineering, IEEE Transactions on*, 53 (6):1183–1187, 2006.

[108] France Laliberté, Langis Gagnon, and Yunlong Sheng. *Registration and fusion of retinal images-an evaluation study. Medical Imaging, IEEE Transactions on*, 22 (5):661–673, 2003.

[109] Thitiporn Chanwimaluang. *Advanced retinal imaging: feature extraction, 2-D registration, and 3-D reconstruction*. PhD thesis, Oklahoma State University, 2006.

[110] Derek LG Hill, Philipp G Batchelor, Mark Holden, and David J Hawkes. *Medical image registration. Physics in medicine and biology*, 46(3):R1, 2001.

[111] J Michael Fitzpatrick, Derek LG Hill, and Calvin R Maurer Jr. *Image registration. Handbook of medical imaging*, 2:447–513, 2000.

[112] Paul Viola and William M Wells III. *Alignment by maximization of mutual information. International journal of computer vision*, 24(2):137–154, 1997.

[113] Joseph V Hajnal, Nadeem Saeed, Elaine J Soar, Angela Oatridge, Ian R Young, and Graeme M Bydder. *A registration and interpolation procedure for subvoxel matching of serially acquired mr images. Journal of computer assisted tomography*, 19 (2):289–296, 1995.

[114] Karl J Friston, Steven Williams, Robert Howard, Richard SJ Frackowiak, and Robert Turner. *Movement-related effects in fmri time-series. Magnetic resonance in medicine*, 35(3):346–355, 1996.

[115] Karl Friston, John Ashburner, Christopher D Frith, J-B Poline, John D Heather, Richard SJ Frackowiak, et al. *Spatial registration and normalization of images. Human brain mapping*, 3(3):165–189, 1995.

[116] John Ashburner, Karl J Friston, et al. *Nonlinear spatial normalization using basis functions. Human brain mapping*, 7(4):254–266, 1999.

[117] Derek LG Hill and Philipe Batchelor. *Registration methodology: concepts and algorithms. Medical Image Registration*, pages 39–70, 2001.

[118] Claudio Castellini and Georg Passig. *Ultrasound image features of the wrist are linearly related to finger positions*. In *Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on*, pages 2108–2114. IEEE, 2011.

[119] Mark C Lee, Matthew Solomito, and Archit Patel. *Supine magnetic resonance imaging cobb measurements for idiopathic scoliosis are linearly related to measurements from standing plain radiographs*. *Spine*, 38(11):E656–E661, 2013.

[120] Richard S Likes. *Moving gradient zeugmatography*, December 22 1981. US Patent 4,307,343.

[121] Donald B Twieg. *The k-trajectory formulation of the nmr imaging process with applications in analysis and synthesis of imaging methods*. *Medical Physics*, 10 (5):610–621, 1983.

[122] Anthony Apicella, J Shane Kippenhan, and Joachim H Nagel. *Fast multi-modality image matching*. In *1989 Medical Imaging*, pages 252–263. International Society for Optics and Photonics, 1989.

[123] Ariff Kassam and Michael L Wood. *Fourier registration of three-dimensional brain mr images: Exploiting the axis of rotation*. *Journal of Magnetic Resonance Imaging*, 6(6):894–902, 1996.

[124] Roger P Woods, Simon R Cherry, and John C Mazziotta. *Rapid automated algorithm for aligning and reslicing pet images*. *Journal of computer assisted tomography*, 16(4):620–633, 1992.

[125] Roger P Woods, Scott T Grafton, Colin J Holmes, Simon R Cherry, and John C Mazziotta. *Automated image registration: I. general methods and intrasubject, intramodality validation*. *Journal of computer assisted tomography*, 22(1):139–152, 1998.

[126] Roger P Woods, John C Mazziotta, Simon R Cherry, et al. *Mri-pet registration with automated algorithm*. *Journal of computer assisted tomography*, 17(4):536–546, 1993.

[127] Claude Elwood Shannon. *A mathematical theory of communication*. *ACM SIGMOBILE Mobile Computing and Communications Review*, 5(1):3–55, 2001.

[128] Claude E Shannon. *Communication in the presence of noise*. *Proceedings of the IRE*, 37(1):10–21, 1949.

[129] Isabelle M Germano. *Advanced techniques in image-guided brain and spine surgery*. Thieme Medical Publishers, Incorporated, 2002.

[130] Derek L Hill, Colin Studholme, and David J Hawkes. *Voxel similarity measures for automated image registration*. In *Visualization in Biomedical Computing 1994*, pages 205–216. International Society for Optics and Photonics, 1994.

[131] János Aczél and Zoltán Daróczy. *On measures of information and their characterizations*. *New York*, 1975.

[132] Igor Vajda. *Theory of statistical inference and information*, volume 11. Kluwer Academic Pub, 1989.

[133] Josien P Pluim, JB Antoine Maintz, and Max A Viergever. *Mutual information matching and interpolation artifacts*. In *Medical Imaging'99*, pages 56–65. International Society for Optics and Photonics, 1999.

[134] Geoffrey Egnal and Kostas Daniilidis. *Image registration using mutual information*. 2000.

[135] André Collignon. *Multi-modality medical image registration by maximization of mutual information*. 1998.

[136] Colin Studholme, Derek LG Hill, and David J Hawkes. *An overlap invariant entropy measure of 3d medical image alignment*. *Pattern recognition*, 32(1):71–86, 1999.

[137] B.v. Ginneken M. Loog M.D. Abramoff M. Niemeijer, J.J. Staal. *Drive: digital retinal images for vessel extraction*. *Methods for Evaluating Segmentation and Indexing techniques Dedicated to Retinal Ophthalmology*, 2004.

[138] Na Lu, Jharon Silva, Yu Gu, Scott Gerber, Hulin Wu, Harris Gelbard, Stephen Dewhurst, and Hongyu Miao. *Directional histogram ratio at random probes: A local thresholding criterion for capillary images*. *Pattern recognition*, 46(7):1933–1948, 2013.

[139] Paul Mitchell, Harry Leung, Jie Jin Wang, Elena Rochtchina, Anne J Lee, Tien Y Wong, and Ronald Klein. *Retinal vessel diameter and open-angle glaucoma: the blue mountains eye study*. *Ophthalmology*, 112(2):245–250, 2005.

[140] Harry Leung, Jie Jin Wang, Elena Rochtchina, Tien Y Wong, Ronald Klein, and Paul Mitchell. *Impact of current and past blood pressure on retinal arteriolar diameter in an older population*. *Journal of hypertension*, 22(8):1543–1549, 2004.

[141] William T. Freeman and Edward H Adelson. *The design and use of steerable filters*. *IEEE Transactions on Pattern analysis and machine intelligence*, 13(9):891–906, 1991.

[142] Luo Gang, Opas Chutatape, and Shankar M Krishnan. *Detection and measurement of retinal vessels in fundus images using amplitude modified second-order gaussian filter*. *Biomedical Engineering, IEEE Transactions on*, 49(2):168–172, 2002.

[143] Alistair Fielder and Ken Cocker. *Automatic extraction of the structure of the retinal blood vessel network of premature infants*. *J Med Assoc Thai*, 90(9):1780–92, 2007.

[144] Thomas Lindblad, Jason M Kinser, T Lindblad, and JM Kinser. *Image processing using pulse-coupled neural networks*. Springer, 1998.

[145] Marco Dorigo and Christian Blum. *Ant colony optimization theory: A survey*. *Theoretical computer science*, 344(2):243–278, 2005.

[146] Hind Azegrouz, Emanuele Trucco, Baljean Dhillon, Thomas MacGillivray, and IJ MacCormick. *Thickness dependent tortuosity estimation for retinal blood vessels*. In *Engineering in Medicine and Biology Society, 2006. EMBS'06. 28th Annual International Conference of the IEEE*, pages 4675–4678. IEEE, 2006.

[147] Alejandro F Frangi, Wiro J Niessen, Koen L Vincken, and Max A Viergever. *Multiscale vessel enhancement filtering*. In *Medical Image Computing and Computer-Assisted Intervention—MICCAI'98*, pages 130–137. Springer, 1998.

[148] Tapabrata Chakraborti, Dhiraj K Jha, Ananda S Chowdhury, and Xiaoyi Jiang. *A self-adaptive matched filter for retinal blood vessel detection. Machine Vision and Applications*, 26(1):55–68, 2014.

[149] Axel Pinz, Stefan Bernögger, Peter Datlinger, and Andreas Kruger. *Mapping the human retina. Medical Imaging, IEEE Transactions on*, 17(4):606–619, 1998.

[150] Guido Tascini, Giorgio Passerini, Paolo Puliti, and Primo Zingaretti. *Retina vascular network recognition*. In *Medical Imaging 1993*, pages 322–329. International Society for Optics and Photonics, 1993.

[151] Ali Can, Hong Shen, James N Turner, Howard L Tanenbaum, and Badrinath Roysam. *Rapid automated tracing and feature extraction from retinal fundus images using direct exploratory algorithms. Information Technology in Biomedicine, IEEE Transactions on*, 3(2):125–138, 1999.

[152] Huiqi Li and Opas Chutatape. *Fundus image features extraction*. In *Engineering in Medicine and Biology Society, 2000. Proceedings of the 22nd Annual International Conference of the IEEE*, volume 4, pages 3071–3073. IEEE, 2000.

[153] Yiming Wang and Samuel C Lee. *A fast method for automated detection of blood vessels in retinal images*. In *Signals, Systems & Computers, 1997. Conference Record of the Thirty-First Asilomar Conference on*, volume 2, pages 1700–1704. IEEE, 1997.

[154] Nahed Solouma, Abou-Bakr M Youssef, Yehia Badr, and Yasser M Kadah. *Real-time retinal tracking for laser treatment planning and administration*. In *Medical Imaging 2001*, pages 1311–1321. International Society for Optics and Photonics, 2001.

[155] Piotr Jasiobedzki, David McLeod, and Chris J Taylor. *Detection of non-perfused zones in retinal images*. In *Computer-Based Medical Systems, 1991. Proceedings of the Fourth Annual IEEE Symposium*, pages 162–169. IEEE, 1991.

[156] Fiederic Zana and Jean-Claude Klein. *Robust segmentation of vessels from retinal angiography*. In *Digital Signal Processing Proceedings, 1997. DSP 97., 1997 13th International Conference on*, volume 2, pages 1087–1090. IEEE, 1997.

[157] Benson SY Lam, Yongsheng Gao, and Alan Wee-Chung Liew. *General retinal vessel segmentation using regularization-based multiconcavity modeling. Medical Imaging, IEEE Transactions on*, 29(7):1369–1381, 2010.

[158] Alejandro F Frangi, Wiro J Niessen, Koen L Vincken, and Max A Viergever. *Multiscale vessel enhancement filtering*. In *Medical Image Computing and Computer-Assisted Intervention—MICCAI'98*, pages 130–137. Springer, 1998.

[159] Damian JJ Farnell, FN Hatfield, P Knox, M Reakes, S Spencer, D Parry, and SP Harding. *Enhancement of blood vessels in digital fundus photographs via the application of multiscale line operators*. *Journal of the Franklin institute*, 345(7): 748–765, 2008.

[160] Xiaohong Gao, Anil Bharath, Alice Stanton, Alun Hughes, Neil Chapman, and Simon Thom. *A method of vessel tracking for vessel diameter measurement on retinal images*. In *Image processing, 2001. Proceedings. 2001 International conference on*, volume 2, pages 881–884. IEEE, 2001.

[161] Bianca Kochner, Dietrich Schuhmann, Markus Michaelis, Gerd Mann, and Karl-Hans Englmeier. *Course tracking and contour extraction of retinal vessels from color fundus photographs: Most efficient use of steerable filters for model-based image analysis*. In *Medical Imaging'98*, pages 755–761. International Society for Optics and Photonics, 1998.

[162] Liang Zhou, Mark S Rzeszotarski, Lawrence J Singerman, and Jeanne M Chokreff. *The detection and quantification of retinopathy using digital angiograms*. *Medical Imaging, IEEE Transactions on*, 13(4):619–626, 1994.

[163] O Chutatape, Liu Zheng, and SM Krishnan. *Retinal blood vessel detection and tracking by matched gaussian and kalman filters*. In *Engineering in Medicine and Biology Society, 1998. Proceedings of the 20th Annual International Conference of the IEEE*, volume 6, pages 3144–3149. IEEE, 1998.

[164] Ja-Won Seo and Seong Dae Kim. *Novel pca-based color-to-gray image conversion*. In *Image Processing (ICIP), 2013 20th IEEE International Conference on*, pages 2279–2283. IEEE, 2013.

[165] C Cunnane. *Statistical distributions for flood frequency analysis*. *Operational Hydrology Report (WMO)*, 1989.

[166] Pierre Chaussé et al. *Computing generalized method of moments and generalized empirical likelihood with r*.

[167] Krzysztof Kochanek, Witold G Strupczewski, and Iwona Markiewicz. *On feasibility of l-moments method for distributions with cumulative distribution function and its inverse inexpressible in the explicit form*.

[168] DN Joanes and CA Gill. *Comparing measures of sample skewness and kurtosis*. *The statistician*, pages 183–189, 1998.

[169] MG Bulmer. *Principles of statistics dover*. *New York, USA*, 1979.

[170] Thitiporn Chanwimaluang and Guoliang Fan. *An efficient blood vessel detection algorithm for retinal images using local entropy thresholding*. In *Circuits and Systems, 2003. ISCAS'03. Proceedings of the 2003 International Symposium on*, volume 5, pages V–21. IEEE, 2003.

[171] Nikhil R Pal and Sankar K Pal. *Entropic thresholding*. *Signal processing*, 16(2): 97–108, 1989.

[172] Tom Fawcett. *An introduction to roc analysis*. *Pattern recognition letters*, 27(8): 861–874, 2006.

[173] Lucia Ballerini. *Temporal matched filters for integration of ocular fundus images*. In *Proc. IEEE Conf. Digital Signal Processing*, volume 2, pages 1161–1164, 1997.

[174] Frederik Maes, Andre Collignon, Dirk Vandermeulen, Guy Marchal, and Paul Suetens. *Multimodality image registration by maximization of mutual information*. *Medical Imaging, IEEE Transactions on*, 16(2):187–198, 1997.

[175] Philippe Thévenaz and Michael Unser. *Optimization of mutual information for multiresolution image registration*. *Image Processing, IEEE Transactions on*, 9 (12):2083–2099, 2000.

[176] Mark P Wachowiak, Renata Smolíková, Yufeng Zheng, Jacek M Zurada, and Adel S Elmaghraby. *An approach to multimodal biomedical image registration utilizing particle swarm optimization*. *Evolutionary Computation, IEEE Transactions on*, 8(3):289–301, 2004.

[177] Jeff Orchard. *Efficient least squares multimodal registration with a globally exhaustive alignment search*. *Image Processing, IEEE Transactions on*, 16(10): 2526–2534, 2007.

[178] Eli Peli, Reed A Augliere, and George T Timberlake. *Feature-based registration of retinal images*. *Medical Imaging, IEEE Transactions on*, 6(3):272–278, 1987.

[179] Heba M Taha, Nashwa El-Bendary, Aboul Ella Hassanien, Yehia Badr, and Vaclav Snasel. *Retinal feature-based registration schema*. In *Informatics Engineering and Information Science*, pages 26–36. Springer, 2011.

[180] Douglas E Becker, Ali Can, James N Turner, Howard L Tanenbaum, and Badrinath Roysam. *Image processing algorithms for retinal montage synthesis, mapping, and real-time location determination*. *Biomedical Engineering, IEEE Transactions on*, 45(1):105–118, 1998.

[181] William E Hart and Michael H Goldbaum. *Registering retinal images using automatically selected control point pairs*. In *Image Processing, 1994. Proceedings. ICIP-94., IEEE International Conference*, volume 3, pages 576–580. IEEE, 1994.

[182] Roger Jagoe, Christopher I Blauth, Peter L Smith, John V Arnold, Kenneth Taylor, and Richard Wootton. *Automatic geometrical registration of fluorescein retinal angiograms*. *Computers and Biomedical Research*, 23(5):403–409, 1990.

[183] Joseph Jy-Haw Yu, Biing-Man Hung, and Chone-Lin Liou. *Fast algorithm for digital retinal image alignment*. In *Engineering in Medicine and Biology Society, 1989. Images of the Twenty-First Century., Proceedings of the Annual International Conference of the IEEE Engineering in*, pages 374–375. IEEE, 1989.

[184] C-L Tsai, Charles V Stewart, Badrinath Roysam, and Howard L Tanenbaum. *Covariance-driven retinal image registration initialized from small sets of landmark correspondences*. In *Biomedical Imaging, 2002. Proceedings. 2002 IEEE International Symposium on*, pages 333–336. IEEE, 2002.

[185] Er-Hu Zhang, Yan Zhang, and Tian-Xu Zhang. *Automatic retinal image registration based on blood vessels feature point*. In *Machine Learning and Cybernetics, 2002. Proceedings. 2002 International Conference on*, volume 4, pages 2010–2015. IEEE, 2002.

[186] Conor Heneghan, Paul Maguire, Neil Ryan, and Philip De Chazal. *Retinal image registration using control points*. In *Biomedical Imaging, 2002. Proceedings. 2002 IEEE International Symposium on*, pages 349–352. IEEE, 2002.

[187] J Park, JM Keller, PD Gader, and RA Schuchard. *Hough-based registration of retinal images*. In *Systems, Man, and Cybernetics, 1998. 1998 IEEE International Conference on*, volume 5, pages 4550–4555. IEEE, 1998.

[188] Sanjay Ranade and Azriel Rosenfeld. *Point pattern matching by relaxation. Pattern recognition*, 12(4):269–275, 1980.

[189] David G Lowe. *Distinctive image features from scale-invariant keypoints. International journal of computer vision*, 60(2):91–110, 2004.

[190] DavidG Lowe. *Object recognition from local scale-invariant features*. In *Computer vision, 1999. The proceedings of the seventh IEEE international conference on*, volume 2, pages 1150–1157. Ieee, 1999.

[191] Krystian Mikolajczyk and Cordelia Schmid. *A performance evaluation of local descriptors. Pattern Analysis and Machine Intelligence, IEEE Transactions on*, 27 (10):1615–1630, 2005.

[192] Stephen Se, David Lowe, and Jim Little. *Vision-based mobile robot localization and mapping using scale-invariant features*. In *Robotics and Automation, 2001. Proceedings 2001 ICRA. IEEE International Conference on*, volume 2, pages 2051–2058. IEEE, 2001.

[193] Tony Lindeberg. *Feature detection with automatic scale selection. International journal of computer vision*, 30(2):79–116, 1998.

[194] Herbert Bay, Tinne Tuytelaars, and Luc Van Gool. *Surf: Speeded up robust features*. In *Computer vision–ECCV 2006*, pages 404–417. Springer, 2006.

[195] Philippe C Cattin, Herbert Bay, Luc Van Gool, and Gábor Székely. *Retina mosaicing using local features*. In *Medical Image Computing and Computer-Assisted Intervention–MICCAI 2006*, pages 185–192. Springer, 2006.

[196] Jian Chen, Jie Tian, Noah Lee, Jian Zheng, R Theodore Smith, and Andrew F Laine. *A partial intensity invariant feature descriptor for multimodal retinal image registration. IEEE transactions on bio-medical engineering*, 57(7):1707, 2010.

[197] Li Chen, Yang Xiang, YaoJie Chen, and XiaoLong Zhang. *Retinal image registration using bifurcation structures*. In *Image Processing (ICIP), 2011 18th IEEE International Conference on*, pages 2169–2172. IEEE, 2011.

[198] Stefan Leutenegger, Margarita Chli, and Roland Y Siegwart. *Brisk: Binary robust invariant scalable keypoints*. In *Computer Vision (ICCV), 2011 IEEE International Conference on*, pages 2548–2555. IEEE, 2011.

[199] Nagendra Pratap Singh and Rajeev Srivastava. *Retinal blood vessels segmentation by using gumbel probability distribution function based matched filter*. *Computer Methods and Programs in Biomedicine*, 129:40–50, 2016.

[200] Elmar Mair, Gregory D Hager, Darius Burschka, Michael Suppa, and Gerhard Hirzinger. *Adaptive and generic corner detection based on the accelerated segment test*. In *Computer Vision–ECCV 2010*, pages 183–196. Springer, 2010.

[201] Edward Rosten and Tom Drummond. *Fusing points and lines for high performance tracking*. In *Computer Vision, 2005. ICCV 2005. Tenth IEEE International Conference on*, volume 2, pages 1508–1515. IEEE, 2005.

[202] Margarita Chli and Andrew J Davison. *Active matching*. In *Computer Vision– ECCV 2008*, pages 72–85. Springer, 2008.

[203] Du-Ming Tsai and Chien-Ta Lin. *Fast normalized cross correlation for defect detection*. *Pattern Recognition Letters*, 24(15):2625–2631, 2003.

[204] Nagendra Pratap Singh and Rajeev Srivastava. *Segmentation of retinal blood vessels by using a matched filter based on second derivative of gaussian*. *International Journal of Biomedical Engineering and Technology*, 21(3):229–246, 2016.