

## REFERENCES

1. Agarwal, SC, Dumitriu, M, Tomlinson, GA & Grynopas, MD 2004, 'Medieval trabecular bone architecture: the influence of age, sex, and lifestyle', *American Journal of Physical Anthropology*, vol. 124, no.1 , pp. 33-44.
2. Aguado, D, Montoya, T, Borrás, L, Seco, A & Ferre, J 2008, 'Using SOM and PCA for analysing and interpreting data from a P-removal SBR', *Engineering Applications of Artificial Intelligence*, vol. 21, no. 6, pp. 919-930.
3. Allain, C, & Cloitre, M 1991, 'Characterizing the lacunarity of random and deterministic fractal sets', *Physical Review A*, vol. 44, no. 6, pp. 3552.
4. Andrew, Phillips, TM 2012, 'Structural Optimisation: Biomechanics of the Femur', *Engineering and Computational Mechanics*, vol. 165, pp. 1286.
5. Apostol, L, Boudousq, B, Basset, O, Odet, C, Yot, S, Tabary, J, Jean-Marc, D, Boller, E, Kotzki, PO & Peyrin, F 2006, 'Relevance of 2D radiographic texture analysis for the assessment of 3D bone micro-architecture', *Medical Physics*, vol. 33, no. 9, pp. 3546-56.
6. Arivazhagan, S, Subash Kumar, TG & Ganesan, L 2007, 'Texture classification using curvelet transform', *International Journal of Wavelets, Multiresolution and Information Processing* , vol.5, no.3, pp. 451-464.
7. Avery, TE, & Berlin, GL 1992, 'Fundamentals of remote sensing and airphoto interpretation', Prentice Hall.
8. Bankoff, ADP 2012, 'Biomechanical Characteristics of the Bone', Intech, Brazil.
9. Bauer, JS, Kohlmann, S, Eckstein, F, Mueller, D, Lochmüller, EM, & Link, TM 2006, ' Structural analysis of trabecular bone of the proximal femur using multislice computed tomography: a comparison with dual X-ray absorptiometry for predicting biomechanical strength in vitro', *Calcified Tissue International*, vol. 78, no. 2, pp. 78-89.

10. Benhamou, CL, Poupon, S, Lespessailles, E, Loiseau, S, Jennane, R, Siroux, V, & Pothuaud, L 2001, 'Fractal analysis of radiographic trabecular bone texture and bone mineral density: two complementary parameters related to osteoporotic fractures', *Journal of Bone and Mineral Research*, vol. 16, no. 4, pp. 697-704.
11. Bigun, J, Bigun, T & Nilsson, K 2004, 'Recognition by symmetry derivatives and the generalized structure tensor', *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 26, no. 12, pp. 1590-1605.
12. Blake, GM, & Fogelman, I 2007, 'Role of dual-energy X-ray absorptiometry in the diagnosis and treatment of osteoporosis', *Journal of Clinical Densitometry*, vol. 10, no. 1, pp. 102-110.
13. Boonen, S 2003, 'Preventing osteoporotic fractures with antiresorptive therapy: implications of microarchitectural changes', *Journal of Internal Medicine*, vol. 255, no. 1, pp. 1-12.
14. Brox, T & Weickert, J 2002, 'Diffusion and regularization of vector- and matrix-valued images', *Inverse Problems, Image Analysis, and Medical Imaging, Contemporary Mathematics*, vol. 313, pp. 251-268.
15. Brunader, Richard, K & Shelton, DK 2002, 'Radiologic bone assessment in the evaluation of osteoporosis', *American Family Physician*, vol. 65, no. 7, pp. 1357-1366.
16. Budde, MD & Frank JA 2012, 'Examining brain microstructure using structure tensor analysis of histological sections', *NeuroImage*, vol. 63, pp. 1-10.
17. Burstyn, I 2004, 'Principal component analysis is a powerful instrument in occupational hygiene enquiries', *Annals of Occupational Hygiene*, vol. 48, no.8, pp. 655 - 661.
18. Caldwell, CB, Willett, K, Cuncins, AV & Hearn, TC 1995, 'Characterization of vertebral strength using digital radiographic analysis of bone structure', *Medical Physics*, vol. 22, pp. 611.
19. Caligiuri, P, Giger, ML & Favus, M 1994, 'Multifractal radiographic analysis of osteoporosis', *Medical Physics*, vol. 21, pp. 503.
20. Chang, T & Kuo, CCJ 1993, 'Texture analysis and classification using tree structured Wavelet transform', *IEEE Transaction on Image Processing*, vol. 2, no. 4, pp. 429-441.

21. Chappard, C, Imbault, BB, Lemineur, G, Giraudeau, B, Basillais, A, Harba, R & Benhamou, CL 2005, 'Anisotropy changes in post-menopausal osteoporosis: characterization by a new index applied to trabecular bone radiographic images', *Osteoporosis International*, vol. 16, no. 10, pp. 1193-1202.
22. Cheung, AC, Bredella, MA, Grasruck, M, Leidecker, C & Gupta, R 2009, 'Reproducibility of trabecular structure analysis using flat-panel volume computed tomography', *Skeletal Radiology*, vol. 38, no. 10, pp. 1003-1008.
23. Christopher, JJ, & Ramakrishnan, S 2008, 'Assessment And Classification Of Mechanical Strength Components Of Human Femur Trabecular Bone Using Texture Analysis And Neural Network', *Journal of Medical Systems*, vol. 32, no. 2, pp. 117-122.
24. Cichanski, A, Nowicki, K, Mazurkiewicz, A & Topolinski, T 2010, 'Investigation Of Statistical Relationships Between Quantities Describing Bone Architecture, Its Fractal Dimensions And Mechanical Properties', *Acta of Bioengineering and Biomechanics*, vol. 12, no. 4, pp.69-77
25. Corroller, LT, Halgrin, J, Pithioux, M, Guenoun, D, Chabrand, P, & Champsaur, P 2012, 'Combination of texture analysis and bone mineral density improves the prediction of fracture load in human femurs', *Osteoporosis International*, vol. 23, no. 1, pp. 163-169.
26. Cowin SC 1985, 'The relationship between the elastic tensor and the fabric tensor', *Mechanical Material*, vol. 4, pp. 137-47.
27. Dalle Carbonare & Giannini, S 2004, 'Bone microarchitecture as an important determinant of bone strength', *Journal of Endocrinological Investigation*, vol. 27, pp. 99-105.
28. Defosse, H, Hall, RM, Walker, PG, Wroblewski, BM, Siney, PD, & Purbach, B 2003, 'Determination of the trabecular bone direction from digitised radiographs', *Medical Engineering & Physics*, vol. 25, no. 9, pp. 719-729.
29. Delmas, PD, & Seeman, E 2004, 'Changes in bone mineral density explain little of the reduction in vertebral or nonvertebral fracture risk with anti-resorptive therapy', *Bone*, vol. 34, no. 4, pp. 599-604.
30. Dempster, DD 2003, 'Bone microarchitecture and strength', *Osteoporosis International*, vol. 14, pp. 54-56.

31. Dianhui Wang & Guang-Bin Huang 2005, 'Protein Sequence Classification Using Extreme Learning Machine', Proceedings of International Joint Conference on Neural Networks, vol. 3, pp. 1406-1411.
32. Diederichs, G, Link, TM, Kentenich, M, Schwieger, K, Huber, MB, Burghardt, AJ & Issever, AS 2009, 'Assessment of trabecular bone structure of the calcaneus using multi-detector CT: correlation with micro CT and biomechanical testing', Bone, vol. 44, no.5, pp. 976-983.
33. Dincel, VE, Sengelen, M, Sepici, V, Cavusoglu, T & Sepici, B 2008, 'The association of proximal femur geometry with hip fracture risk', Clinical Anatomy., vol. 21, pp. 575-580.
34. Dong, P 2000 , 'Test of a new lacunarity estimation method for image texture analysis', International journal of Remote Sensing., vol. 21, no.17, pp. 3369-3373.
35. Dong, P 2009, ' Lacunarity analysis of raster datasets and 1D, 2D, and 3D point patterns', Journal Computers & Geosciences, vol. 35, no. 10, pp. 2100-2110.
36. Donnelly, E 2011, 'Methods for assessing bone quality: a review', Clinical Orthopaedics and Related Research, vol. 469, pp. 2128-2138.
37. Dougherty, G & Henebry, GM 2001, 'Fractal signature and lacunarity in the measurement of the texture of trabecular bone in clinical CT images', Medical Engineering and Physics, vol. 23, no. 6, pp. 369-380.
38. Dougherty, G & Henebry, GM 2002, 'Lacunarity analysis of spatial pattern in CT images of vertebral trabecular bone for assessing osteoporosis', Medical Engineering and Physics, vol. 24, no.2, pp. 129-38.
39. Ebbesen, EN, Thomsen, JS, Nielsen, BH, Rasmussen, NHJ, & Mosekilde, L 1999, 'Lumbar vertebral body compressive strength evaluated by dual-energy X-ray absorptiometry, quantitative computed tomography, and ashing', Bone, vol. 25, no. 6, pp. 713-724.
40. Esgiar, AN & Chakravorty, PN 2005, 'Wave Nature of Fractal Lacunarity: A Higher Resolution Scale to Capture Subtle Changes in ECG Signals', Computers in Cardiology, pp. 1009-1012.

41. Fardellone, P 2008, 'Predicting the fracture risk in 2008', *Joint Bone Spine*, vol. 75, pp. 661-664.
42. Faulkner, KG, Cummings, SR, Black, D, Palermo, L, Glu'ler, CC & Genant, HK 1993, 'Simple measurement of femoral geometry predicts hip fracture: the study of osteoporotic fractures', *Journal of Bone Mineral Research*, vol. 8, pp. 1211-1217.
43. Faulkner, KG, Wacker, WK, Barden, HS, Simonelli, C, Burke, B, K, Ragi, S & Rio, LD 2006, 'Femur strength index predicts hip fracture independent of bone density and hip axis length', *Osteoporosis International*, vol. 17, pp. 593-599.
44. Fawcett, T 2006, 'An introduction to ROC analysis', *Pattern Recognition Letters*, vol. 27, no. 8, pp. 861-874.
45. Fazzalari, NL, Moore, RJ, Manthey, BA & Vernon-Roberts, B 1992, 'Comparative study of iliac crest and subchondral femoral bone in osteoarthritic patients,' *Bone*, vol. 13, pp.331-335.
46. Ferrigno, G & Carnevali, P 1998, 'Principal component analysis of chest wall movement in selected pathologies', *Medical and Biological Engineering and Computing*, vol. 36, no. 4, pp. 445-451.
47. Freeman, JJ, Wopenka, B, Silva, MJ, & Pasteris, JD 2001, 'Raman spectroscopic detection of changes in bioapatite in mouse femora as a function of age and in vitro fluoride treatment', *Calcified Tissue International*, vol. 68, no. 3, pp. 156-162.
48. Fritscher, K, Grunerbl, A, Hanni, M, Suhm, N, Hengg, C & Schubert R 2009, 'Trabecular bone analysis in CT and X-ray images of the proximal femur for the assessment of local bone quality', *IEEE Transactions on Medical Imaging*. vol. 28, no. 10, pp. 1560-75.
49. Frost, HM 1999, 'On the Trabecular Thickness Number Problem', *Journal of Bone and Mineral Research*, vol. 14, no. 11, pp. 1816-1821.
50. Gai, S, Yang, G & Wan, M 2013, 'Employing quaternion wavelet transform for bank note classification', *Neurocomputing*, vol. 1, no. 18, pp. 171-178.
51. Gallo, A, Moschini, M, Cerioli, C & Masoero, F 2013, 'Use of principal component analysis to classify forages and predict their calculated energy content', *Animal*, pp. 1-10.

52. Gefen, Y, Meir, Y, Mandelbrot, M & Aharony, A 1983, 'Geometric implementation of hypercubic lattices with noninteger dimensionality by use of low lacunarity fractal lattices', *Physics Review Letters*, pp. 145–148.
53. Geraets, WG, Stelt, P & Elders, PJ 1993, 'The radiographic trabecular pattern during menopause', *Bone*, vol. 14, no. 6, pp. 859-864.
54. Gnudi, S, Malavolta, N, Testi, D & Viceconti, M 2004, 'Differences in proximal femur geometry distinguish vertebral from femoral neck fractures in osteoporotic women', *British Journal of Radiology*, vol. 77, pp. 219–223.
55. Gnudi, S, Ripamonti, C, Lisi, L, Fini, M, Giardino, R & Giavaresi, G 2002, 'Proximal femur geometry to detect and distinguish femoral neck fractures from trochanteric fractures in postmenopausal woman', *Osteoporosis International*, vol. 13, pp. 69–73.
56. Gomberg, BR, Saha, KP, & Felix W, Wehrli, FW 2005, 'Method for Cortical Bone Structural Analysis from Magnetic Resonance Images', *Academic Radiology*, vol. 12, no. 10, pp. 1320–1332.
57. Gomberg, BR, Wehrli, FW, Punam, KS & Song, HK 2003, 'Noninvasive Assessment of Bone Architecture by Magnetic Resonance Micro-Imaging-Based Virtual Bone Biopsy', *Proceedings of IEEE*, vol. 91, pp. 1520-1542.
58. Gonzalez, RC & Woods, RE 2001, *Digital image processing*, second edition, Prentice Hall, Upper Saddle River, New Jersey.
59. Goulet, RW, Goldstein, SA, Ciarelli, MJ, Kuhn, JL, Brown, MB & Feldkamp LA 1994, 'The relationship between the structural and orthogonal compressive properties of trabecular bone', *Journal of Biomechanics*, vol. 27, no. 4, pp. 375-398.
60. Granlund & Wiklund, J 1991, 'Multidimensional orientation estimation with applications to texture analysis and optical flow', *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 13, no. 8, pp.775-790.
61. Granlund, GH & Knutsson, H 1995, 'Signal Processing for Computer Vision', Springer.

62. Gregory, JS, Junold, RM, Undrill, PE & Aspden, RM 1999, 'Analysis of trabecular bone structure using Fourier transforms and neural networks', *IEEE Transactions on Technology In Biomedicine*, vol. 3, no. 4, pp. 289-294.
63. Gregory, JS, Stewart, A, Undrill, PE, Reid, DM & Aspden, RM 2004, 'Identification of hip fracture patients from radiographs using Fourier analysis of the trabecular structure: a cross-sectional study', *BMC Medical Imaging*, vol. 4, no. 1, pp. 4.
64. Guanlei, X, Xiaotong, W & Xiaogang, X 2009, 'Generalized Hilbert transform and its properties in 2D LCT domain', *Signal Processing*, vol. 89, no. 7, pp. 1395-1402.
65. Gustafson, EJ 1998, 'Quantifying landscape spatial pattern: what is the state of the art?', *Ecosystems*, vol. 1, pp. 143-156.
66. Hagmann, P, Jonasson, L, Maeder, P, Thiran, JP, Wedeen, VJ & Meuli, R 2006, 'Understanding diffusion MR imaging techniques: from scalar diffusion-weighted imaging to diffusion tensor imaging and beyond', *Radiographics*, vol. 1, pp. 205-23.
67. Haller, EA 2011, 'Adaptive histogram equalization in GIS', *Annals of the University of Craiova, Mathematics and Computer Science Series*, vol. 38, no. 1, pp. 100-104.
68. Henebry, GM & Kux, HJH 1995, 'Lacunarity as a texture measure for SAR imagery', *International Journal of Remote Sensing*, vol. 16, no. 3, pp. 565-571.
69. Hernandez, & Keaveny, TM 2006, 'Bone: A biomechanical perspective on bone quality', vol. 39, no. 6, pp. 1173-1181.
70. Hoechstetter, S, Walz, U & Thinh, NX 2011, 'Adapting lacunarity techniques for gradient-based analyses of landscape surfaces', *Ecological Complexity*, vol. 8, no. 3, pp. 229-238.
71. Huang, BW, Chang, CH, Wang, FS, Lin, AD, Tsai, YC, Huang, MY & Tseng, JG 2012, 'Dynamic characteristics of a hollow femur', *Life Science Journal*, vol. 9, no. 1, pp. 723-726.
72. Huang, GB, Zhu, QY, & Siew, CK 2006, 'Extreme learning machine: theory and applications', *Neurocomputing*, vol. 70, no. 1, pp. 489-501.

73. Hughes, NP, Roberts, SJ & Tarassenko, L 2004, 'Semi-supervised learning of probabilistic models for ECG segmentation', Proceedings of the IEEE Twenty Sixth Annual International Conference Engineering in Medicine and Biology Society, San Francisco, CA , vol. 1, pp. 434-437.
74. Imbault, BB, Lemineur, G Chappard, C, Harba, R & Benhamou, CL 2005, 'A new anisotropy index on trabecular bone radiographic images using the fast Fourier transform', BMC Medical Imaging, doi:10.1186/1471-2342-5-4.
75. Ito, M, Nakata, T, Akifumi N & Uetani M 2011, 'Age-related changes in bone density, geometry and biomechanical properties of the proximal femur: CT-based 3D hip structure analysis in normal postmenopausal women', Bone, vol. 48, no. 3, pp. 627-630.
76. Ito, M, Nakata, T, Nishida, A & Uetani, M 2011, 'Age-related changes in bone density, geometry and biomechanical properties of the proximal femur: CT-based 3D hip structure analysis in normal postmenopausal women', Bone, vol. 48, no. 3, pp. 627-630.
77. Jacqueline, H, Cole, Marjolein, CH & Meulen, VD 2011, 'Whole Bone Mechanics and Bone Quality', Clinical Orthopaedics Related Research, vol. 469, no. 8, pp. 2139-2149
78. Javad, HM, Bert, VR & Keita, I 2012, 'A novel approach to estimate trabecular bone anisotropy using fabric tensors derived from stress tensors. Proceeding of the Ninth International Conference on Biomedical Engineering, Innsbruck, Austria, pp. 15-17.
79. Jenkins, CR, Thien, FC, Wheatley, JR & Reddel, HK 2005, 'Traditional and patient-centred outcomes with three classes of asthma medication', European Respiratory Journal, vol. 26, no.1, pp.36-44.
80. Jiang, C, Pitt, RE, Bertram, JEA & Aneshansley, DJ 1998, 'Fractal-based image texture analysis of trabecular bone architecture', Medical and Biological Engineering and Computing, vol. 37, no. 4, pp. 413-418.
81. Jin, YW, Heo, MS Lee, SS, Choi, SC & Huh, KH 2007, 'Comparison of trabecular bone anisotropies based on fractal dimensions and mean intercept length determined by principal axes of inertia', Medical Biological Engineering Computing, vol. 45, pp. 357-364



82. Karlsson, MK, Obrant, KJ & Josefsson, PO 2006, Osteoporotic fractures, Rockwood and Green's Fractures in Adults, sixth edition, Lippincott Williams and Wilkins, Philadelphia, USA.
83. Keaveny, TM, Morgan, EF, Niebur, GL & Yeh, OC 2001, 'Biomechanics of trabecular bone', Annual Review of Biomedical Engineering, vol. 3, pp. 307-333.
84. Keller, JM, Chen, S & Crownover, RM 1989, 'Texture description and segmentation through fractal geometry', Computer Vision, Graphics, and Image Processing, vol. 45, no. 2, pp. 150-166.
85. Ketcham, RA & Ryan, TM 2004, 'Quantification and visualization of anisotropy in trabecular bone', Journal of Microscopy, vol. 213, pp. 158-71.
86. Kim, J, Shin, H, Lee, Y, & Lee, M 2007, 'Algorithm for classifying arrhythmia using Extreme Learning Machine and principal component analysis', Proceedings of 29th Annual International Conference Engineering in Medicine and Biology Society, pp. 3257-3260.
87. Kleerekoper, M, Villanueva, AR, Stanciu, J, Rao, DS & Parfitt, AM 1985, 'The role of three dimensional trabecular microstructure in the pathogenesis of vertebral compression fractures', Calcified Tissue International, vol. 37, no. 6, pp. 594-597.
88. Kroon D & Slump CH 2009, 'Coherence Filtering to Enhance the Mandibular Canal in Cone-Beam CT data', Annual Symposium of the IEEE-EMBS Benelux Chapter Enschede, Netherlands.
89. Kroon, DJ, Slump, CH & Maal, TJ 2010, 'Optimized anisotropic rotational invariant diffusion scheme on cone-beam CT', In Medical Image Computing and Computer-Assisted Intervention, Springer Berlin Heidelberg, pp. 221-228.
90. Krug, R, Gamio, JC, Burghardt, A, Haase, S, Sedat, JW, Moss, WC, & Majumdar, S 2006, 'Wavelet Based Characterization of Vertebral Trabecular Bone Structure from MR Images of Specimen at 3 Tesla Compared to Micro CT Measurements', Proceedings of 27th Annual International Conference on Engineering in Medicine and Biology Society, pp. 7040-7043.

91. Kurabayashi, T, Hiroshi, N, Nozomi, T, Hiroshi, M & Kenichi, T 2009, 'Bone mineral density measurement in puerperal women, as a predictor of persistent osteopenia', *Journal of Bone and Mineral Metabolism*, vol. 27, no. 2, pp. 205-212.
92. Kwak, C, & Kwon, OW 2008, 'Cardiac disorder classification based on extreme learning machine', *Proceedings of World Academy of Science, Engineering and Technology*, Rome, pp.435-438.
93. Lammentausta, E, Hakulinen, MA, Jurvelin, JS, & Nieminen, MT 2006, 'Prediction of mechanical properties of trabecular bone using quantitative MRI', *Physics in Medicine and Biology*, vol. 51, no. 23, pp. 6187.
94. Landis, WJ 1995, 'The strength of a calcified tissue depends in part on the molecular structure and organization of its constituent mineral crystals in their organic matrix', *Bone*, vol. 16, no. 5, pp. 533-544.
95. Langton, CM, Pisharody, S, Keyak, JH 2009, 'Generation of a 3D proximal femur shape from a single projection 2D radiographic image', *Osteoporosis International*, vol. 20, no. 3, pp. 455-61.
96. Laskey, MA, Price, RI, Khoo, BCC & Prentice, A 2011, 'Proximal femur structural geometry changes during and following lactation', *Bone*, vol. 48, no. 4, pp. 755-759.
97. Lee, S, Jeong, JW, Lee, JW, Yoo, DS & Kim, S 2006, 'Distal radius bone mineral density estimation using the filling factor of trabecular bone in the X-ray image', *Proceeding of the Twenty Eighth IEEE Annual International Conference on Engineering in Medicine and Biology Society*, New York, pp.1980-1982.
98. Lemineur, G, Harba, R, Jennane, R, Estrade, A&Benhamou, L 2004, 'Fractal anisotropy measurement of bone texture radiographs', *Proceedings of International Symposium on Control, Communications and Signal Processing*, pp. 275-278.
99. Lespessailles, E, Chappard, C, Bonnet, N&Benhamou, CL 2006, 'Imaging techniques for evaluating bone microarchitecture', *Joint Bone Spine*, vol. 73, no. 3, pp. 254-261.
100. Lespessailles, E, Gadois, C, Lemineur, G, Do-Huu, JP & Benhamou, L 2007, 'Bone texture analysis on direct digital radiographic images: Precision study and relationship with bone mineral density at the ocalcis', *Calcified Tissue International*, vol. 80, no. 2, pp. 97-102.

101. Lespessailles, E, Jacquet, G, Harba, R, Jennane, R, Lousot, T, Viala, JF & Benhamou CL 1996, 'Anisotropy measurement obtained by fractal analysis of trabecular bone at the calcaneus and radius', *Revue du Rhumatisme*, vol. 63, no. 5, pp. 337-43.
102. Lee, WL, Chen, YC & Hsieh, KS (2003), 'Ultrasonic liver tissues classification by fractal feature vector based on M-band wavelet transform', *IEEE Transactions on Medical Imaging*, vol. 22, no. 3, pp. 382-392.
103. Lin, B & Yang, J 1986, 'A suggested lacunarity expression for Sierpinski carpets', *Journal of Physics A: Mathematical and General*, vol. 19, no. 2, pp. 49-52.
104. Lindeberg, T 1994, *Scale-space theory in computer vision*, Springer.
105. Linden, JCV, Homminga, J, Verhaar, JA & Weinans, H 2001, 'Mechanical consequences of bone loss in cancellous bone', *Journal of Bone Mineral Research*, vol.16, no. 3, pp. 457-465.
106. Link, TM, Majumdar, S, Lin, JC, Newitt, D, Augat, P, Ouyang, X, Mathur, A & Genant HK 1997, 'A comparative study of trabecular bone properties in the spine and femur using high resolution MRI and CT', *Journal of Bone and Mineral Research*, vol. 13, no. 1, pp. 122-132.
107. Liu, N & Wang, H 2010, 'Ensemble based extreme learning machine', *IEEE Signal Processing Letters*, vol. 17, no. 8, pp. 754-757.
108. Liu, Y, Muftah, M, Das, T, Bai L, Robson K & Auer D 2012, 'Classification of MR Tumor images based on Gabor wavelet analysis', *Journal of Medical and Biological Engineering*, vol. 32, no. 1, pp. 22-28.
109. Lochmuller, EM, Jung, V, Weusten, A, Wehr, U, Wolf, E & Eckstein, F 2001, 'Precision of high-resolution dual energy X-ray absorptiometry measurements of bone mineral status and body composition in small animal models', *European Cells and Materials*, vol. 20, no. 1, pp. 43-51.
110. Luo, G, Kinney, J, Kaufman, J, Haupt, D, Chiabrera, A & Siffert, R 1999, 'Relationship between plain radiographic patterns and three dimensional trabecular architecture in the human calcaneus', *Osteoporosis International*, vol. 9, no. 4, pp. 339-345.

111. Magland, JF, Zhang, N, Rajapakse, CS & Wehrli, FW 2012, 'Computationally optimized bone mechanical modeling from high-resolution structural images', *Plos one*, vol. 7, no. 4, pp. 1-12.
112. Majumdar, S, Khotari, M, Augat, P, Newitt, DC, Link, TM, Lin, JC, Lang, T, Lu, Y & Genant, HK 1998, 'High-resolution magnetic resonance imaging: Three dimensional trabecular bone architecture and biochemical properties', *Bone*, vol. 22, no. 5, pp. 445-454.
113. Malhi, A, & Gao, RX 2004, 'PCA-based feature selection scheme for machine defect classification', *IEEE Transactions on Instrumentation and Measurement*, vol. 53, no. 6, pp. 1517-1525.
114. Mallat, S 1989 'A theory for multiresolution signal decomposition: The wavelet representation', *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 11, no. 7, pp. 674 - 693.
115. Manenti, G, Capuani, S, Fanucci, E, Assako, EP, Masala, S, Sorge, R & Simonetti, G 2013, 'Diffusion tensor imaging and magnetic resonance spectroscopy assessment of cancellous bone quality in femoral neck of healthy, osteopenic and osteoporotic subjects at 3T: Preliminary experience', vol. 55, no. 1, pp. 7-15
116. Manousaki, AG, Manios, AG, Tsompanaki, EI, & Tosca, AD 2006, 'Use of color texture in determining the nature of melanocytic skin lesions: a qualitative and quantitative approach', *Computers in Biology and Medicine*, vol. 36, no. 4, pp. 419-427.
117. Manske, SL, Macdonald, HM, Nishiyama, KK, Boyd, SK & McKay, HA 2010, 'Clinical tools to evaluate bone strength', *Clinical Reviews in Bone and Mineral Metabolism*, vol. 8, no. 3, pp. 122-134.
118. Marija Djuric, Petar Milovanovic, Danijela Djonic, Arsa Minic, Michael Hahn & Lek SAC 2012, 'Morphological Characteristics of the Developing Proximal Femur: A Biomechanical Perspective', vol. 140, pp. 738-745.
119. Marshall, D, Johnell, O & Wedel, H 1996, 'Meta-analysis of how well measures of bone Mineral density predict occurrence of osteoporotic fractures', *BMJ*, vol. 312, no. 7041, pp. 1254-1259.
120. Martin, RB 1991, 'Determinants of the mechanical properties of bones', *Journal of Biomechanics*, vol. 24, pp. 79-88.

121. Matthew, DB, Joseph, AF 2012, 'Examining brain microstructure using structure tensor analysis of histological sections', *NeuroImage*, vol. 63, pp. 1–10.
122. Mejia, T, Stavola, BD, Allen, DS , Perez-Gavilan, JJ, Ferreira, JM , Fentiman, IS & Dos, SI 2005, 'Mammographic features and subsequent risk of breast cancer: a comparison of qualitative and quantitative evaluations in the Guernsey prospective studies', *Cancer Epidemiol Biomarkers Prevention*, vol. 14, no. 5, pp. 1052-1059.
123. Melo 2007, 'Using Fractal Characteristics such as Fractal Dimension, Lacunarity and Succolarity to Characterize Texture Patterns on Images', Master's Thesis, Federal Fluminense University.
124. Melo, RHC & Conci, A 2008, 'Succolarity: Defining a Method to Calculate this Fractal Measure', *Proceedings of Systems, Signals and Image Processing*, pp.291-294.
125. Melo, RHCD, & Conci, A 2011, 'How Succolarity could be used as another fractal measure in image analysis', *Telecommunication Systems*, pp. 1-13.
126. Mendelsohn, R, Paschalis, E & Boskey, AL 1999, 'Infrared spectroscopy, microscopy, and microscopic imaging of mineralizing tissues. Spectra-structure correlations from human iliac crest biopsies', *Journal of Biomedical optics*, vol. 4, no. 1, pp. 14-21.
127. Miazgowski, T, Slawomir, P, Marzena, NZ, Barbara, KS & Robert, P 2007, "Bone mineral density and hip structural analysis in type 1 diabetic men", *European Journal of Endocrinology*, vol. 156, no.1, pp. 123-127.
128. Mini, MG, Tech, M, Devassia, VP, Tech, M & Thomas T 2004, 'Multiplexed wavelet transform technique for detection of microcalcification in digitized mammograms', *Journal of Digital Imaging*, vol. 17, no. 4, pp. 285–291.
129. Monedero, SJ, Ramirez, MC, Navarro, FF, Fernández, JC, Gutiérrez, PA, & Martínez, CH 2010, 'On the suitability of Extreme Learning Machine for gene classification using feature selection', *Proceedings of 10th International Conference on In Intelligent Systems Design and Applications*, pp. 507-512.

130. Morgan, FE, Harun, HB & Tony, MK 2003, 'Trabecular bone modulus–density relationships depend on anatomic site', *Journal of Biomechanics*, vol. 36, no. 7, pp. 897-904.
131. Mori, S & Zhang, J 2006, 'Principles of diffusion tensor imaging and its applications to basic neuroscience research', *Neuron*, vol. 51, no. 5, pp. 527-39.
132. Morimoto, M, Masako, U, Yoshiyuki, T, Setsuko, T, Yumi, M, Kazuya, S, Motohisa, Y, Kazuhiko, F, Yasuo, T & Yoshinori, T 2001, 'Age-related changes of bone mineral density in human calcaneus, talus, and scaphoid bone', *Biological Trace Element Research*, vol. 82, no. 1- 3, pp. 53-60.
133. Mosekilde, L, Ebbesen, EN, Tornvig, L & Thomsen, JS , 'Trabecular bone structure and strength-remodelling and repair', *Journal of Musculoskeletal Neuronal Interact*, vol. 1, no. 1, pp.25–30.
134. Mueen, A, Zainuddin, R & Baba, MS 2008, 'Automatic Multilevel Medical Image Annotation and Retrieval', *Journal of Digital Imaging*, vol. 21, no. 3, pp. 290-295.
135. Mulder, L, Koolstra, JH, Jaap, MJ, Toonder, D, Theo, MGJ & Eijden, V 2007, 'Intratrabecular distribution of tissue stiffness and mineralization in developing trabecular bone', *Bone*, vol. 41, no. 2, pp. 256-265.
136. Myint, SW, Lam, N, & Tyler J 2002, 'An Evaluation of Four Different Wavelet Decomposition Procedures for Spatial Feature Discrimination in Urban Areas', *Transactions in GIS*, vol. 6, no. 4, pp. 403-429.
137. Nagel, HH & Gehrke, A 1998, 'Spatiotemporally adaptive estimation and segmentation of OF-fields', *Lecture Notes in Computer Science*, ed. H. Burkhardt and B. Neumann, Berlin.
138. Nicolescu M, & Medioni G 2003, 'Motion Segmentation with Accurate Boundaries - A Tensor Voting Approach', *Proceedings of IEEE on Computer Vision and Pattern Recognition*, vol. 1, pp. 382-389.
139. Parfitt, AM, Mathews, CH, Villanueva, AR, Kleerekoper, M, Frame B & Rao, DS 1983, 'Relationships between surface, volume, and thickness of iliac trabecular bone in aging and in osteoporosis. Implications for the microanatomic and cellular mechanisms of bone loss', *Journal of Clinical Investigations*, vol. 72, pp. 1396-409.

140. Parkinson, I & Fazzalari, N 1994, 'Cancellous bone structure analysis using image analysis', *Australasian Physical and Engineering Sciences in Medicine*, vol.17, no. 2, pp. 64–70.
141. Paschalis , EP, DiCarlo, E, Betts, F, Sherman, P, Mendelsohn, R & Boskey, AL 1996, 'FTIR microspectroscopic analysis of human osteonal bone', *Calcified Tissue International*, vol. 59, no. 6, pp. 480-7.
142. Perona, P & Malik J 1990, 'Scale space and edge detection using anisotropic diffusion', *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 12, no. 7, pp. 629-639.
143. Phillips, A 2012, 'Structural optimisation: biomechanics of the femur', *Proceeding of Institution of Civil Engineers*.
144. Pioletti, DP 2010, 'Biomechanics in bone tissue engineering', *Computer Methods in Biomechanics and Biomedical Engineering*, vol. 13, no. 6, pp. 837-846.
145. Plotnick, RE, Gardner, RH, Hargrove, WW, Prestegard, K & Perlmutter M 1996, 'Lacunarity analysis: A general technique for the analysis of spatial patterns'. *Physical Review E*, vol. 53, no. 5, pp. 5461-5468.
146. Plotnik, RE, Gardner, RH & O'Neil, RV 1993, 'Lacuarity indices as measures of landscape texture', *Landscape Ecology*, vol. 8, no. 3, pp. 201-211.
147. Podsiadlo, P, Dahl, L, Englund, M, Lohmander, LS & Stachowiak, GW 2008, 'Differences in trabecular bone texture between knees with and without radiographic osteoarthritis detected by fractal methods', *Osteoarthritis Cartilage*, vol. 16, no. 3, pp. 323-329.
148. Pothuaud L, Carceller P & Hans D 2008, 'A Correlations between grey-level variations in 2D projection images (TBS) and 3D microarchitecture: Applications in the study of human trabecular bone microarchitecture', *Bone*, vol. 42, no. 4, pp.775-787.
149. Pramudito, S, Soegijoko, TR, Mengko, FI, Muchtadi, RG & Wachjudi 2007, 'Trabecular Pattern Analysis of Proximal Femur Radiographs for Osteoporosis Detection', *Journal of Biomedical & Pharmaceutial Engineering*, vol. 1, no. 1, pp. 45-51.
150. Qiao, LH, Guo, W, Yuan, W, Niu, W & Peng, L 2009, 'Texture analysis based on bidimensional empirical mode decomposition and quaternions', *Proceedings of the International Conference on Wavelet Analysis and Pattern Recognition*, pp. 84-90.

151. Randen T & Husoy, AH 1999, 'Texture Segmentation Using Filters with Optimized Energy Separation, IEEE Transactions on Image Processing, vol. 8, no. 4, pp. 571-582.
152. Rezakhaniha, R, Agianniotis, A, Schrauwen, JTC, Griffa, A, Sage, D, Bouten, CVC, Vosse, FN, Unser, M & Stergiopoulos, N 2012, 'Experimental investigation of collagen waviness and orientation in the arterial adventitia using confocal laser scanning microscopy', Biomechanics and Modelling in Mechanobiology, vol. 11, no. 3-4, pp. 461-473
153. Rong, HJ, Huang, GB, Sundararajan, N, & Saratchandran, P 2009, 'Online sequential fuzzy extreme learning machine for function approximation and classification problems', IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics, vol. 39, no. 4, pp. 1067-1072.
154. Roque, WL, Arcaro, K & Alberich-Bayarri, A 2013, 'Mechanical competence of bone: A new parameter to grade trabecular bone fragility from tortuosity and elasticity', IEEE Transactions on Biomedical Engineering, vol. 60, no. 5, pp. 1363-1370.
155. Rubin, C, & Rubin, J (2006), 'Biomechanics and mechanobiology of bone', Primer on the Metabolic Bone Diseases and Disorders of Mineral Metaboli
156. Saha, PK, Wald, MJ, Radin, A & Wehrli, FW 2005, 'Predicting Mechanical Competence of Trabecular Bone Using 3D Tensor-Scale Based Parameters', Proceedings of SPIE, vol. 5746.
157. Salaffi, F, Piva, S, Barreca, C, Cacace, E, Ciancio, G, Leardini, G, Mannoni, A, Minari, C, Occhi, P, Pianon, M, Punzi, L, Scarpa, R, Sulli, AW, Trois, W & Rioda 2000, 'Validation of an Italian version of the Arthritis Impact Measurement Scales 2 for patients with osteoarthritis of the knee', Rheumatology, vol. 39, no. 7, pp. 720-727.
158. Samanwoy, G & Hojjat, A 2008. 'Principal component analysis-enhanced cosine radial basis function neural network for robust epilepsy and seizure detection'. IEEE Transactions on Biomedical Engineering, vol. 55, no. 2, pp. 512-518.
159. Shahzad, F, Mahmood, SA & Gloaguen, R 2010, 'Nonlinear analysis of drainage systems to examine surface deformation: an example from Potwar Plateau (Northern Pakistan)', Nonlinear Processes in Geophysics, vol. 17, no. 2, pp. 137-147.



160. Sifuzzaman, MR, Islam & Ali, MZ 2009, 'Application of Wavelet Transform and its Advantages Compared to Fourier Transform', *Journal of Physical Sciences*, vol. 13, pp. 121-134.
161. Singh, M, Nagrath, A R & Maini, PS 1970, 'Changes in trabecular pattern of the upper end of the femur as an index of osteoporosis', *Journal of Bone and Joint Surgery*, vol. 52, no. 3, pp. 457-467.
162. Smyth, PP, Adams, JE, Whitehouse, RW & Taylor, CJ 1997, 'Application of computer texture analysis to the Singh index', *The British Journal of Radiology*, vol. 70, no. 831, pp. 242-247.
163. Sode, M, Burghardt, AJ, Kazakia, GJ, Link, TM & Majumdar, S 2010 'Regional variations of gender-specific and age-related differences in trabecular bone structure of the distal radius and tibia', vol. 46, no. 6 pp.1652-60.
164. Sode, M, Burghardt, AJ, Nissenon, RA & Majumdar, S 2008, 'Resolution dependence of the non-metric trabecular structure indices', *Bone*, vol. 42, no.4, pp. 728-736.
165. Soulard, R & Carre, P 2011, 'Quaternionic Wavelets for Texture Classification', *Pattern Recognition Letters* 32, vol.13, pp.1669-1678.
166. Stauber, M & Muller, R, 'Volumetric spatial decomposition of trabecular bone into rods and plates-a new method for local bone morphometry', *Bone*, vol. 38, no. 4, pp. 475-484.
167. Strickland, RN, Hahn, H 1996, 'Wavelet transforms for detecting microcalcifications in mammograms', *IEEE Transactions on Medical Imaging*, vol. 15, no. 2, pp. 218-229.
168. Su, A, Wallace, IJ & Nakatsukasa, M 2013, 'Trabecular bone anisotropy and orientation in an Early Pleistocene hominin talus from East Turkana, Kenya', *Journal of Human Evolution*, vol. 4, no. 6, pp. 667-77.
169. Subramani, P, Sahu R & Verma S 2006, 'Feature selection using Haar wavelet power spectrum', *BMC Bioinformatics*, vol. 7, no. 4, pp. 432.
170. Tabor, Z & Rokita, E 2007, 'Quantifying anisotropy of trabecular bone from gray-level images', *Bone*, vol. 40, pp. 966-972.

171. Tolle, CR, McJunkina, TR, Rohrbaugh, DT & LaViolette RA 2003, 'Lacunarity definition for ramified data sets based on optimal cover', *Physica D*, vol. 179, no. 3, pp. 129-152.
172. Tschumperle, D & Deriche, R 2002, 'Orthonormal vector sets regularization with PDE's and Applications', *International Journal of Computer Vision*, vol. 50, pp. 237-252.
173. Ueda, Y, Miyati, T, Ohno, N, Motono, Y, Hara, M, Shibamoto, Y, Kasai, H, Kawamitsu, H, & Matsubara, K 2010, 'Apparent diffusion coefficient and fractional anisotropy in the vertebral bone marrow'. *J Magnetic Resonance Imaging*, vol. 31, no. 3, pp. 632-5.
174. Unnanuntana, A, Rebolledo, BJ, Khair, MM, DiCarlo, EF & Lane, J M 'Diseases affecting bone quality: beyond osteoporosis', *Clinical Orthopaedics Related Research*, vol. 469, no. 8, pp. 2194-2206.
175. Vani, G, Savitha, R, & Sundararajan, N 2010, 'Classification of abnormalities in digitized mammograms using Extreme Learning Machine', *Proceedings of 11th International Conference on In Control Automation Robotics & Vision*, pp. 2114-2117.
176. Varga, P 2009, *Prediction of Distal Radius Fracture Load Using HR-pQCT-based Finite Element Analysis*, PhD Thesis, Vienna University of Technology.
177. Veenland, J, Link, T, Konermann, W, Meier, N, Grashuis, J & Gelsema, E 1997, 'Unraveling the role of structure and density in determining vertebral bone strength', *Calcified Tissue International*, vol. 61, pp. 474-479
178. Wakabayashi, S, Sukurai, T & Kashima, I 2004, 'Relationships between bone strength and bone quality: three-dimensional imaging analysis in ovariectomized mice', *Oral Radiology*, vol. 20, no.1, pp. 32-36.
179. Weickert 1998, 'Anisotropic Diffusion in Image Processing', Teubner, Stuttgart.
180. Weishampel, JF, Sloan, JH, Boutet, JC & Godin, JR 1998, 'Mesoscale changes in textural pattern of 'intact' Peruvian rainforests (1970s-1980s)', *International Journal of Remote Sensing*, vol. 19, pp.1007-14.

181. Xiang, Y, Vanessa, Y, Jonathan, S, Mitchell, B, Schaffler & Theodoe R 2003, 'Quantification of trabecular Bone Mass and Orientation Using gabor Wavelets', Proceeding of ACM Symposium on Applied Computing, pp. 183-188.
182. Xiang, Y, Yingling, VR, Malique, R, Li, CY, Schaffler, MB & Raphan, T 2007, 'Comparative assessment of bone mass and structure using texture-based and histomorphometric analyses', Bone, vol.40, no.2, pp. 544-552.
183. Xu, Y 2012, 'Quaternion-based discriminant analysis method for color face recognition', Plos One, vol. 7, no. 8, pp. 1-4.
184. Yin, M, Liu, W, Shui, J & Wu, J 2012, 'Quaternion Wavelet Analysis and Application in Image Denoising', Mathematical Problems in Engineering, vol. 20, pp.1-21.
185. Yingling, VR, Xiang, Y, Raphan, T, Schaffler, MB & Koser, K 2006, 'The effect of a short term delay of puberty on trabecular bone mass and structure in female rats: a texture-based and histomorphometric analysis', Bone, vol. 40, pp. 419-424
186. Young, HR, & Chopping, M 1996, 'Quantifying landscape structure: a review of landscape indices and their application to forested landscapes', Progress in Physical Geography, vol. 20, no. 4, pp. 418-445.
187. Yvonne, H, Skripitz, R, Lindner, T, Kockerling, M, Fritsche, Wolfram, A & Bader, R 2012, 'Bone Mineral density and mechanical properties of retrieved femoral bone samples in relation to bone mineral densities measured in the respective patients', The Scientific World Journal, vol. 2012, pp.1-7.
188. Zaia, 2006, 'MR imaging and osteoporosis: fractal lacunarity analysis of trabecular bone', IEEE Trans Information Technology in Biomedicine Engineering, vol.10, no. 3, pp.484-489.
189. Zaino, CJ, Leali, A & Fetto, JF 2010, 'Regional Variations of Bone Quantity and Quality Impact Femoral Head Collapse', Clinical Orthopaedics Related Research, vol. 468, no.1, pp. 276-282.
190. Zhang, R, Guang, BH, Sundararajan, N & Saratchandran, P 2007, 'Multicategory Classification Using An Extreme Learning Machine for Microarray Gene Expression Cancer Diagnosis', IEEE/ACM Transaction Computational Biology and Bioinformatics, vol. 4, no. 3, pp. 485-495.