Como $N_{\epsilon_1}^{d_A} = N_{\epsilon_1}^{d_B} = N_\epsilon$, tiene la forma $\frac{\infty}{\infty}$ aplicando L'Hôpital

$$dim_{f(B)} \leq lim_{\epsilon_1 \to 0} \left(\frac{\frac{1}{N_\epsilon} \frac{\partial N_\epsilon}{\partial \epsilon}}{-\epsilon} \right)$$

Lo que equivale por definición de dimensión y si $\epsilon \to 0$, también ocurre que $\epsilon_1 \to 0$ y viceversa.

$$dim_{f(B)} \leq lim_{\epsilon \to 0} \left(\frac{log(N_\epsilon)}{log(\epsilon^{-1})} \right) = dim_{f(A)}$$

Similarmente, usando (b) se obtiene $dim_f(B) \geq dim_f(A)$. Combinando estos resultados se tiene la igualdad.

Proposición

La dimensión fractal es invariante a traslaciones.
Demostración: Sean $A, C \subset \Re^2$ tal que C surge de trasladar A. Considere los rectángulos R y r que acoten a las regiones A y C respectivamente, como se observa en la Figura D.4 y note que tienen las misma dimensiones, así cualquier cubrimiento del uno si se traslada es un cubrimiento del otro y viceversa.

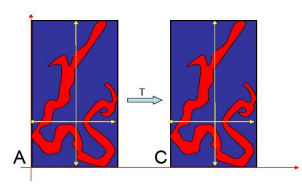

Figura D.4: Región A y región trasladada C acotadas por rectángulos R y r respectivamente.

Bibliografía

[1] *Dynamed powered by Ebsco host* get CME credits

[2] KUHN, A., BEIN, D., BONSMANN, G. 2009. *The 100th anniversary of lupus erythematosus tumidus*. Autoimmunity Reviews 8 (6) 441-448. Münster, Almania.

[3] SAAVEDRA, M. A., CARRILLO, S. M. 2006. *Fenómeno de Raynaud*. Reumatología Clínica (2) S10-S15. México DF, México.

[4] GAYRAUD, M. 2007. *Raynaud's phenomenon*. Joint Bone Spine (74) e1-e8. París, Francia.

[5] RESTREPO, J. F. 2003. *Dermatomiositis-polimiositis*. Revista Colombia de Reumatología 10 (2) 135-141. Colombia.

[6] GARCIA, M., JIMENEZ, M., ESCARCEGA, R., MENDOZA, C., PARDO, R., LEVY, R., GALARZA, C., PEREZ, G., CERVERA, R. 2008. *Treatment of Raynaud's phenomenon*. Autoimmunity Reviews 8 (1) 62-68. Puebla, México.

[7] CERVERA, R., and On behalf of the members of the European Working Party on Systemic Lupus Erythematosus. 2006. *Systemic lupus erythemato-*

sus in Europe at the change of the millennium: Lessons from the Euro-Lupus Project. Autoimmunity Reviews 5 (3) 180-186. Barcelona, España.

[8] CHANG, C. H., TSAI, R.K., WU, W. C., KUO, S. L., YU, H. S. 1997. *Use of Dynamic Capillaroscopy for Studying Cutaneous Microcirculation in Patients with Diabetes Mellitus*. Microvascular Research 53 (2) 121-127. Taiwan, República de China.

[9] CUTOLO, M., PIZZORNI, C., SECCHI, M., CALVIA, A., SULLI, A., MATUCCI, M. 2006. *Capillaroscopy: Which is Its Role in the Diagnosis of Connective Tissue Diseases?*. Handbook of Systemic Autoimmune Diseases (5) 221-231. Génova, Italia.

[10] HUTCHISON, J. 1991. *Raynaud's phenomena*. Med Press Cir (123) 403-405.

[11] HANSEN-SMITH, F. M., GREENE, A. S., COWLEY, A. W., LOMBARD, J. H. 1990. *Structural changes during microvascular rarefaction in chronic hypertension*. Hypertension (15) 922-928. Michigan, Estados Unidos.

[12] BROWN, G. E., O'LEARY, P. A. 1925. *Skin capillaries in scleroderma*. Arch Intern Med 36 (1) 73-88. Minnesota, Estados Unidos.

[13] LEROY, C., MARICQ, H. R., KAHALEH, B. M. 2005. *Undifferentiated connective tissue syndromes*. Arthritis and Rheumatism 23 (3) 341-343. Carolina del Sur, Estados Unidos.

[14] PANGRATIS, N. 1997. *Diagnostic investigation using vital capillary microscopy and dynamic capillaroscopy*. Clinical hemorheology and Microcirculation 17 (5) 371-383. Atenas, Grecia.

[15] CIMMINO, M. A., GRASSI, W., CUTOLO, M. 2008. *Modern imaging techniques: a revolution for rheumatology practice*. Best Practice and Research Clinical Rheumatology 22 (6) 951-959. Génova, Italia.

[16] CUTOLO, M., Sulli, A., SECCHI, M. E., OLIVIERI, M., PIZZORNI, C. 2007. *The contribution of capillaroscopy to the differential diagnosis of connective autoimmune diseases*. Best Practice and Research Clinical Rheumatology 21 (6) 1093-1108. Génova, Italia.

[17] OHTSUKA, T., SAITO, Y., HASEGAWA, M., TATSUNO, M., TAKITA, S., ARITA, M., OKUYAMA, K. 1995. *Central nervous system disease in a child with primary Sjögren syndrome*. The Journal of Pediatrics 127 (6) 961-963. Tokio, Japon.

[18] HERN, S., MORTIMER, P. S. 1999. *Visualization of dermal blood vessels-capillaroscopy*. Clinical and experimental dermatology 24 (6) 473-478. Londres, Inglaterra.

[19] OHTSUKA, T., YAMAKAGE, T., YAMAZAKI, S. 1999. *A case of prurijo and lichenified paques successfully treted with proton pump inhibitor*. J. Dermatol (26) 518-621.

[20] CHIFFLOT, H., FAUTREL, B., SORDET, C., CHATELUS, E., SIBILIA, J. 2008. *Incidence and Prevalence of Systemic Sclerosis: A Systematic Literature Review*. Seminars in Arthritis and Rheumatism 37 (4) 223-235. Estrasburgo, Francia.

[21] CUTOLO, M., PIZZORNI, C., SULLI, A. 2008. *Capillaroscopy*. Best Practice Research Clinical Rheumatology 22 (6) 1093-1108. Génova, Italia.

[22] TERRERI, M. T., ANDRADE, L. E., PUCCINELLI, M. L., HILARIO, M. O., GOLDENBERG, J. 1999. *Nailfold capillaroscopy: Normal findings in children and adolescents*. Seminars in Arthritis and Rheumatism 29 (1) 36-42. Sao Paulo, Brasil.

[23] DOLEZALOVA, P., YOUNG, S., BACON, P., SOUTHWOOD, T., 2003. *Nailfold capillaroscopy Microscopy in healthy children and in childhood rheumatic deseases*. Ann Rheum Dis. 62 (5) 444-449. Praga, República Checa.

[24] NAGY, Z., CZIRJAK, L. 2004. *Nailfold digital capillaroscopy in 447 patients with connective tissue disease and Raynaud s disease*. J Eur Acad Dermatol Venereol 18 (1) 62-68. Irgalmasok, Hungría.

[25] RICCIERI, V., GERMANO, V., ALESSANDRI, C., VASILE, M., CECCARELLI, F., SCIARRI, I. 2008. *More severe capillaroscopy findings and endothelial cell antibodies. Are they useful tools for prognostic use in systemic sclerosis*. Clin Exp Rheumatol 26 (6) 992-997. Roma, Italia.

[26] GRASSI, W., DE ANGELIS, R. 2007. *Capillaroscopy: questions and answers*. Clin Rheumatol 26 (12) 2009-2016. Ancona, Italia.

[27] BHUSHAN, M., MOORE, T., HERRICK, A. L., GRIFFITHS, C. E. M. 2000. *Nailfold video capillaroscopy in psoriasis*. British Journal of Dermatology 148 (6) 1171-1176. Manchester, Inglaterra.

[28] HALFOUN, V. L., PIRES, M. L., FERNANDES, T. J., VICTER, F., RODRIGUES, K. K., TAVARES, R. 2003. *Videocapillaroscopy and diabetes mellitus:area of transverse segment in nailfod capillar loops reflects vascular reactivity*. Diabetes research and Clinical Practice (61) 155-160.

[29] MARICQ, H., LEROY, E., D'ANGELO, W. 1980. *Diagnostic potential of in vivo capillary microscopy in scleroderma and related disorders*. Arthritis Rheum 23 (2) 183-189.

[30] SEGOVIA, J., DUARTE, M., RESTRPO, J. G., SAAVEDRA, C. E., ANDRADE, R. E. 2008. *Mieloma múltiple en el Hospital Universitario Fundación Santa Fe de Bogotá (1983-2006)*. Acta médica colombiana 33 (4) 276-281. Colombia. .

[31] CUTOLO, M., Sulli, A., PIZZORNI, C. 2005. *Capillaroscopy*. Best Practice and Research Clinical Rheumatology (19) 437-452.

[32] ARANGO, R., JARAMILLO, F., RIAÑO, J. C., PRIETO, F. A. 2007. *caracterización de Patrones del Tejido Ungueal en Personas sin Enfermedad Evidente mediante Técnicas de Inteligencia Artificial. Prueba Piloto*. Biosalud (6) 85-95.

[33] KONONENKO, I. 2001. *Machine learning for medical diagnosis history state of the art and perspective*. Artificial Intelligence in Medicine 23 (1) 89-109. Ljubljana, Eslovenia.

[34] PATRICK, E. A., HENRY, K., ALTMAN, J. 1972. *Computer controlled picture scanning with application to labeled biological cells*. Computers in Biology and Medicine 2 (1) 5-10, IN1-IN5, 11-14. Indiana, Estados Unidos.

[35] WAXMAN, A. D., COLEMAN, C., WRIGHT, J., BEEMAN, J., SIEMSEN, J. K. 1973. *Teleprocessing of nuclear medicine data: The use of a typewriter display system*. Computers and Biomedical Research 6 (3) 209-215. California, Estados Unidos.

[36] TSOTSOS, J. K. 1985. *Computer assessment of left ventricular wall motion: The ALVEN expert system*. Computers and Biomedical Research 18 (3) 254-277. Toronto, Canada.

[37] BUCKLEY, J. J., SILER, W., TUCKER, D. 1986. *A fuzzy expert system*. Fuzzy Sets and Systems 20 (1) 1-16. Alabama, Estados Unidos.

[38] HASMAN, A. 1987. *Medical applications of computers: An overview*. International Journal of Bio-Medical Computing 20 (4) 239-251. Limburgo, Holanda.

[39] SUETENS, P., BELLON, E., VANDERMEULEN, D., SMET, M., MARCHAL, G., NUYTS, J., MORTELMANS, L. 1993. *Image segmentation: methods and applications in diagnostic radiology and nuclear medicine*. European Journal of Radiology 17 (1) 14-21. Heverlee Leuven, Bélgica.

[40] HERMAN, G. T. 1993. *3D display: A survey from theory to applications*. Computerized Medical Imaging and Graphics 17 (4-5) 231-242. Filadelfia, Estados Unidos.

[41] WELLS, P. N. T. 1993. *The present status of ultrasonic imaging in medicine*. Ultrasonics 31 (5) 345-352. Bristol, Inglaterra.

[42] ROBB, R. A. 1999. *Visualization in biomedical computing*. Parallel Computing 25 (13-14) 2067-2110. Minnesota, Estados Unidos.

[43] HORSCH, A., BALBACH, T., MELNITZKI, S., KNAUTH, J. 2000. *Learning tumor diagnostics and medical image processing via the WWW – the case-based radiological textbook ODITEB*. International Journal of Medical Informatics (58-59) 39-50. Múnich, Alemania

[44] ROBB, R. A. 2000. *Virtual endoscopy: development and evaluation using the Visible Human Datasets*. Computerized Medical Imaging and Graphics 24 (3) 133-151. Minnesota, Estados Unidos.

[45] ERBERICH, S. G. 2003. *PACS-based functional Magnetic Resonance Imaging*. Computerized Medical Imaging and Graphics 27 (2-3) 229-240. California, Estados Unidos.

[46] NATTKEMPER, T. W. 2004. *Multivariate image analysis in biomedicine*. Journal of Biomedical Informatics 37 (5) 380-391. Bielefeld, Alemania.

[47] MATSOPOULOS, G. K., KOULOULIAS, V., ASVESTAS, P., MOURAVLIANSKY, N., DELIBASIS, K., DEMETRIADES, D. 2004. *MITIS: a WWW-based medical system for managing and processing gynecological-obstetrical-radiological data*. Comput methods programs biomed 76 (1) 53-71. Atenas, Grecia.

[48] PANG, B., ZHANG, D., WANG, K. 2005. *Tongue image analysis for appendicitis diagnosis*. Information Sciences 175 (3) 160-176. Harbin, República de China.

[49] CHRISTENSEN, J. D., DOGRA, V. S. 2007. *New Advances in Genitourinary Ultrasound*, Ultrasound Clinics 2 (1) 105-114.

[50] AVCI, E., AVCI, D. 2009. *An expert system based on fuzzy entropy for automatic threshold selection in image processing*. Expert Systems with Applications 36 (2) parte 2 3077-3085. Elazig, Turquía.

[51] JAIN, A. K., DUIN, R. P. W., MAO, J. 2000. *Statistical pattern recognition: A review*. IEEE Transaction on Pattern analysis and intelligence 22 (1) 4-37.

[52] LAVRAC, N. 1999. *Selected techniques for data mining in medicine*. Artificial Intelligence in Medicine 16 (1) 3-23. Ljubljana, Eslovenia.

[53] GHAZAVI, S. N., LIAO, T. W. 2008. *Medical data mining by fuzzy modeling with selected features*. Artificial Intelligence in Medicine 43 (3) 195-206. Luisiana, Estados Unidos.

[54] PENG, Y., WU, Z., JIANG, J. 2010. *A novel feature selection approach for biomedical data classification*. Journal of Biomedical Informatics 43 (1) 15-23. Bradford, Inglaterra.

[55] LI, J., ALLISON, N. M. 2008. *A comprehensive review of current local features for computer vision*. Neurocomputing 71 (10-12) 1771-1787. Sheffield, Inglaterra.

[56] FASS, L. 2008. *Imaging and cancer: A review*. Molecular Oncology 2 (2) 115-152. Londres, Inglaterra.

[57] SANCHEZ, L., MARTINEZ, F., CASTELLANOS, G., SALAZAR, A. 2007. *Feature Extraction of Weighted Data for Implicit Variable Selection*. Computer Analysis of Images and Patterns (4673) 840-847. Springer. Viena, Austria.

[58] WALTER, T., KLEIN, J. C., 2002. *Automatic Detection of Microaneurysms in Color Fundus Images of the Human Retina by Means of the Bounding Box Closing* Medical data analysis (2526) 210-220. Springer. Francia.

[59] CHENG, H. D., JIANG, X. H., SUN, Y., WANG, J. 2001. *Color image segmentation: advances and prospects*. Pattern recognition 34 (12) 2259-2281. ScienceDirect. Utah, Estados Unidos.

[60] SERRANO, C., ACHA, B., FONDON, I. *Calibracion de imágenes en color en condiciones de iluminacion no controladas*.

[61] WEI, M., ZHOU, Y., WAN, M. 2003. *A fast snake model based on nonlinear diffusion for medical images segmentation*. Computerized medical imaging and graphics 28 (3) 109-117. PubMed. Xian, República de China.

[62] CLAREIDGE, E., COTTON, S., HALL, P., MONCRIEFF, M. 2002. *From colour to tissue histology: Physics-based interpretation of images of pigmented skin lesions*. Medical image computing and computer - Assisted interventionn (2488) 730-738. Springer. Birmingham, Inglaterra.

[63] ANGULO, J., SERRA, J. 2005. *Segmentación de Imágenes en color utilizando histogramas Bivariables en espacios de colores polares Luminancia, saturación, matiz*. Computación y sistemas 8 (4) 1-10. SciELO. México.

[64] TORRES, W. J., Bello, R. J. *Procesamiento de imágenes a color utilizando morfología matemática*.

[65] RODRIGUEZ, R., CASTILLO, P. J., GUERRA, V., SUAREZ, A., IZQUIERDO, E. 2006. *Dos técnicas robustas para la segmentación de imágenes biomédicas*. Computación y sistemas 9 (4) 1-5. SciELO. México.

[66] BAEZ, J. J., GUERRERO, M. L., CONDE, J., PADILLA, A., SERRANO, G. U. 2004. *Segmentación de imágenes de Color*. Revista mexicana de física 50 (6) 579-587. México.

[67] JARAMILLO, F., BRIEVA, J., SANCHEZ, A. 1988. *Capilaroscopía. Observaciones en 65 pacientes con desórdenes del tejido conectivo*. Acta médica Cololombia 13 (3) 129-138. ADOLEC. Colombia.

[68] CUTOLO, M., PIZZORNI, C., SULLI, A. 2004. *Nailfold videocapillaroscopy in systemic sclerosis*. Zeitschrift für Rheumatologie 63 (6) 457-462. Springer. Génova, Italia.

[69] BUKHARI, M., HOLLIS, S., MOORE, T., JAYSON, M. I. V., HERRICK A. L. 2000. *Quantitative of microcirculatory abnormalities in patients with primary´s Raynaud and systemic sclerosis by video capillaroscopy*. Rheumatology 39 (5) 506-512. PubMed. Salford, Inglaterra.

[70] LEROUX, M. B., BARRAZA, S., ESTRELLA, V., RINALDI, M., FERNANDEZ B. R., LEIVA M., BOTTAI H. 2004. *Valor clínico de las imágenes de capilaroscopia convencional en pacientes con Psoriasis*. Medicina cutánea ibero-latino-americana 32 (2) 61-64.

[71] OLSHAUSEN, B. A., FIELD, D. J. 1996. *Emergence of simple-cell receptive field properties by learning a sparse code for natural images*. Nature (381) 607-609. New York, Estados Unidos.

[72] BISHOP, C. M. 2006. *Pattern recognition and machine learning*. 743P. 1ra, Springer. New York, Estados Unidos.

[73] TIPPING, M. E., BISHOP, C. M. 1998. *Mixtures of probabilistic principal component analyzers*. Neural Computation 11 (2) 443-482. The MIT Press. Cambridge, Inglaterra.

[74] SHARMA, A., PALIWAL, K. K., ONWUBOLU, G. C. 2005. *Pattern Classification: An Improvement Using Combination of VQ and PCA Based Techniques*. American Journal of Applied Sciences 2 (10) 1445-1455. Sciubp. Suecia.

[75] BURGES, J. C. 2005. *Geometric Methods for Feature Selection and Dimensional Reduction. In Data Mining and Knowledge Discovery Handbook: A Complete Guide for Practitioners and Researchers*. Eds. O. Maimon, L. Rokach. Springer.

[76] SAUL, L. K., WEINBERGER, K. Q., HAM, J., SHA, F., LEE, D. D. 2006. *Spectral methods for dimensionality reduction. In Semi supervised Learning*. Eds. O. Chapelle, B. Schölkopf, A. Zien. The MIT Press.

[77] VENNA. J. 2007. *Dimensionality reduction for visual exploration of similarity structures*. 81P. PhD thesis, Helsinki University of Technology. Espoo, Finlandia

[78] VAN DER MAATEN, L., POSTMA, E., VAN DEN HERIK. J. 2009. *Dimensionality Reduction: A Comparative Review*. Journal of Machine Learning Research (10) 1-41. Elsevier.

[79] WOLF, L., SHASHUA, A. 2005. *Feature Selection for Unsupervised and Supervised Inference: The Emergence of Sparsity in a Weight-Based Approach*. Journal of Machine Learning Research (6) 1855-1887. ACM Portal.

[80] BLUM, A., LANGLEY, P. 1997. *Selection of relevant features and examples in machine learning*. Artificial Intelligence 97 (1-2) 245-271. ACM Portal. Essex, Inglaterra.

[81] TURK, M. A., PENTLAND, A. P. 1991. *Face recognition using eigenfaces*. In Proc. of Computer Vision and Pattern Recognition 586-591. IEEEXplore. Estados Unidos.

[82] TIPPING, M., BISHOP, C. 1999. *Probabilistic principal component analysis*. Journal of the Royal Statistical Society Series B 61 (3) 611-622. JSTOR. Cambridge, Inglaterra.

[83] FRIEDMAN, J. H. 1989. *Regularized discriminant analysis*. Journal of the American Statistical Association 84 (405) 165-175. JSTOR. California, Estados Unidos.

[84] WEBB, A. R. 2002. *Statistical Pattern Recognition*. 500p. 2da, John Willey and Sons Ltd. Londres, Inglaterra.

[85] SHI, Z. J., SHEN, J. 2004. *Convergence of line search methods for unconstrained optimization*. In Applied Mathematics and Computation 157 (2) 393-405. ScienceDirect. Shandong, República de China.

[86] *URF:http://ict.ewi.tudelft.nl/ davidt/occ/index.html*. Consultado en julio 1 de 2009.

[87] FILZMOSER, P., MARONNA, R., WERNER, M. 2008. *Outlier identification in high dimensions*. Computational Statistics Data Analysis 52 (3) 1694-1711. ScienceDirect. La Plata, Argentina.

[88] ZUO, W., ZHANG, D. and WANG, K. 2006. *An assembled matrix distance metric for 2DPCA based image recognition*. Pattern Recognition Letters 27 (3) 210-216. ScienceDirect. Hong Kong, República de China.

[89] XU, R., CHEN, Y. W. 2009. *Generalized N-dimensional principal component analysis (GND-PCA) and its application on construction of statistical appearance models for medical volumes with fewer samples*. Neurocomputing 72 (10-12) 2276-2287. ACM Portal. Amsterdam, Holanda.

[90] MARTINEZ, F. 2009. *Selección y extracción de variables utilizando métodos kernel*. Tesis de Maestría, Universidad Nacional de Colombia sede Manizales.

[91] COHEN, P. 1995. *Empirical Methods for artificial Intelligence*. 400p. Massachusetts institute of Technology. The MIT Press. Massachusetts, Estados Unidos.

[92] HASTIE, T., TIBSHIRANI, R., FRIEDMAN, J. 2009. *The elements of statistical learning*. 746p. 2da, Springer Series in Statistical. California, Estados Unidos.

[93] DUDA, R., HART, P., STORK, D. 2001. *Pattern classification*. 655p. 2da, John Wiley And Sons. Canada.

[94] WEBB, A. 2002. *Statistical pattern recognition*. 505p. 2da, John Wiley Ansd Sons. Chichester, Inglaterra.

[95] PEÑA, D. 2002. *Análisis de datos multivariantes*. 515p. 1ra, Mc Graw Hill.

[96] ALPAYDIN, E., 2004. *Introduction to Machine Learning*. 415p. 2da, Massachusetts institute of Technology the MIT Press. Cambridge, Estados Unidos.

[97] GONZALES, R. C., WOODS, R. E., EDDINS, S. L. 2004. *Digital Image Processing using Matlab*. 624p. 1ra, Pearson Prentice Hall.

[98] PAJARES, G., DE LA CRUZ, J. M. 2002. *Visión por computador Imágenes digitales y aplicaciones*. 800p. 1ra, Alfaomega Ra-Ma.

[99] RIAÑO, J. C., PRIETO, F. A., SANCHEZ, E., JARAMILLO, F. 2007. *Segmentation and Extraction of Morphologic Features from Capillary Images*. MICAI 148-159. ACM Portal. Guadalajara, México.

[100] Base de señales de voz que pertenecen al grupo de Control y Procesamiento Digital de Señales de la Universidad Nacional de Colombia sede Manizales.

[101] SHI, Z. J., SHEN, J. 2006. *Convergence of nonmonotone line search method*. Journal of Computational and Applied Mathematics 193 (2) 397-412. ACM Portal. Amsterdam, Holanda.

[102] SHI, Z. J., SHEN, J. 2005. *Convergence of descent method without line search*. Applied Mathematics and Computation 167 (1) 94-107. ScienceDirect. Michigan, Estados Unidos.

[103] YUAN, G., WEI, Z. 2009. *New line search methods for unconstrained optimization*. Journal of the Korean Statistical Society 38 (1) 29-39. ScienceDirect. Guangxi, República de China.

[104] SHI, Z. J. 2006. *Convergence of quasi-Newton method with new inexact line search*. Journal of Mathematical Analysis and Applications 315 (1) 120-131. ScienceDirect. Shandong, República de China.

[105] SHI, Z. J., SHEN, J. 2006. *On step-size estimation of line search methods*. Applied Mathematics and Computation 173 (1) 360-371. ScienceDirect. Michigan, Estados Unidos.

[106] SHI, Z. J., SHEN, J. 2007. *Memory gradient method with Goldstein line search*. Computers and Mathematics with Applications 53 (1) 28-40. ScienceDirect. Michigan, Estados Unidos.

[107] SHIN, J. P. 2002. *Optimal stroke-correspondence search method for on-line character recognition*. Pattern Recognition Letters. 23 (5) 601-608. ACM Portal. New York, Estados Unidos.

[108] BORWEIN, J. M., LEWIS, A. S. 2000. *Convex analysis and nonlineal optimization*. 273p. 1ra, Springer Verlag, in press. Canada.

[109] BORWEIN, J., GUIRAO, A. J., HAJEK, P., VANDERWERFF, J. 2009. *Uniformily convex function in banach spaces*.Proceedings of the American Mathematical Society 137 (3) 1081-1091.

[110] CHIM, Y. C., KASSIM, A. A., IBRAHIM, Y. 1999. *Character recognition using statical moments*. Images and vision computing 17 (3) 299-307.