METODOS DE ANÁLISIS DEL RONQUIDO.

13-Liu ZS, Luo XY, Lee HP, Lu C. Snoring source identification and snoring noise

prediction. J Biomech. 2007;40:861–70.

16-Miyazaki S, Itasaka Y, Ishikawa K, Togawa K. Acoustic analysis of snoring and

the site of airway obstruction in sleep related respiratory disorders. Acta

Otolaryngol (Stockh). 1998;537:47–51.

21-Wilson K, Stoohs RA, Mulrooney TF, Johnson LJ, Guilleminault CH, Huang Z. The

snoring spectrum. Acoustic assessment of snoring sound intensity in 1139

individuals undergoing polysomnography. Chest. 1999;115:762–70.

34- Fiz JA, Abad J, Jane´ R, Riera M, Man˜anas MA, Caminal P, et al. Acoustic analysis of

snoring sound in patients with simple snoring and obstructive sleep apnoea.

Eur Respir J. 1996;11:2365–70.

35- Pe´ rez-Padilla JR, Slawinski E, Difrancesco LM, Feige RR, Remmers JE, Whitelaw

WA. Characteristics of the snoring noise in patients with and without occlusive

sleep apnea. Am Rev Respir Dis. 1993;147:635–44.

36- Beck R, Odeh M, Oliven A, Gavriely N. The acoustic properties of snores. Eur

Respir J. 1995;8:2120–8.

37- Gavriely N, Jensen O. Theory and measurements of snores. J Appl Physiol.

1993;74:2828–37.

38- Meslier N, Auregan Y, Badatcheff A, Depollier C, Racineux JL. Spectral analysis of

snores in patients with obstructive sleep apnea syndrome. Am Rev Respir Dis.

1990;141:A857.

39- Herzog M, Schieb E, Bremert TH, Herzog B, Hosemann W, Kaftan H, et al.

Frequency analysis of snoring sounds during simulated and nocturnal snoring.

Eur Arch Otorhinolaryngol. 2008;265:1553–62.

40- Hill PD, Loc BWV, Osborne JE, Osman EZ. Palatal snoring identified by acoustic

crest factor analysis. Physiol Meas. 1999;20:167–74.

41- Sola` -Soler J, Jane´ R, Fiz JA, Morera J. Towards automatic pitch detection in

snoring signals. Proc 22th Annual Int Conf IEEE Eng Med Biol Soc. 2000; A327:

04

42- Sola` -Soler J, Jane´ R, Fiz JA, Morera J. Pitch analysis in snoring signals from simple

snorers and patients with obstructive sleep apnea. Proc 24nd Annual Int Conf

IEEE Eng Med Biol Soc. 2002; 2: 1527–8

43- Sola` -Soler J, Jane´ R, Fiz JA, Morera J. Spectral envelope analysis in snoring signals

from simple snorers and patients with obstructive sleep apnea. Proc of the 25th

Intl Conf of the IEEE EMBS. 2003;3:2527–30

44- Sola` -Soler J, Jane R, Fiz JA, Morera J. Formant frequencies of normal breath

sounds of snorers may indicate the risk of obstructive sleep apnea syndrome.

Conf Proc IEEE Eng Med Biol Soc. 2008;1:3500–3.

The acoustics of snoring

10-Liistro G, Stanescu D, Veriter C. Pattern of simulated snoring is different

through mouth and nose. J Appl Physiol 1991;70(6):2736–41.

11-Quinn SJ, Daly N, Ellis PD. Observation of the mechanism of snoring using

sleep nasendoscopy. Clin Otolaryngol 1995;20(4):360–4.

12-Nakano H, Ikeda T, Hayashi M, Ohshima E, Onizuka A. Effects of body

position on snoring in apneic and nonapneic snorers. Sleep

2003;26(2):169–72.

13-Jones TM, Ho MS, Earis JE, Swift AC, Charters P. Acoustic parameters of

snoring sound to compare natural snores with snores during ‘steady-state’

propofol sedation. Clin Otolaryngol 2006;31(1):46–52.

14-Perez Padilla JR, Slawinski E, Difrancesco LM, Feige RR, Remmers JE,

Whitelaw WA. Characteristics of the snoring noise in patients with

and without occlusive sleep apnea. Am Rev Respir Dis 1993;147(3):

635–44.

16-Counter P, Wilson JA. The management of simple snoring. Sleep Med Rev

2004;8(6):433–41.

36-Osborne JE, Osman EZ, Hill PD, Lee BV, Sparkes C. A new acoustic method of

differentiating palatal from non-palatal snoring. Clin Otolaryngol

1999;24(2):130–3.

44-Hara H, Murakami N, Miyauchi Y, Yamashita H. Acoustic analysis of snoring

sounds by a multidimensional voice program. Laryngoscope 2006;116(3):

379–81.

45-Beck R, Odeh M, Oliven A, Gavriely N. The acoustic properties of snores. Eur

Respir J 1995;8(12):2120–8.

46-Ng AK, Koh TS, Baey E, Lee TH, Abeyratne UR, Puvanendran K. Could

formant frequencies of snore signals be an alternative means for the

diagnosis of obstructive sleep apnea? Sleep Med 2008;9(8):894–8.

52-

55-Herzog M, Ku¨ hnel T, Bremert T, Herzog B, Hosemann W, Kaftan H. The

impact of the microphone position on the frequency analysis of snoring

sounds. Eur Arch Otorhinolaryngol 2009;266(8):1315–22.

57-57. Gold B, Morgan N. Speech and audio signal processing: processing and

perception of speech and music. J. Wiley; 2000.

64-Sola-Soler J, Jane R, Fiz JA, Morera J. Spectral envelope analysis in snoring

signals from simple snorers and patients with obstructive sleep apnea.

Proceedings of the 25th Annual International Conference of the IEEE

Engineering in Medicine and Biology Society, vols. 1–4. A New Beginning

for Human Health 2003;25:2527–30.

65-Rabiner LR, Gold B. Theory and application of digital signal processing.

Englewood Cliffs, NJ: Prentice-Hall; 1975.

66-Fiz JA, Abad J, Jane R, Riera M, Mananas MA, Caminal P, et al. Acoustic

analysis of snoring sound in patients with simple snoring and obstructive

sleep apnoea. Eur Respir J 1996;9(11):2365–70.

68-Matsiki D, Deligianni X, Vlachogianni-Daskalopoulou E, Hadjileontiadis LJ.

Wavelet-based analysis of nocturnal snoring in apneic patients undergoing

polysomnography. In: . Annual International Conference of the IEEE Engineering

in Medicine and Biology Society 2007;vols. 1–16. p. 1912–5.

69-Ng AK, San Koh T, Puvanendran K, Ranjith AU. Snore signal enhancement

and activity detection via translation-invariant wavelet transform. IEEE

Trans Biomed Eng 2008;55(10):2332–42.

70-Duckitt WD, Tuomi SK, Niesler TR. Automatic detection, segmentation and

assessment of snoring from ambient acoustic data. Physiol Meas

2006;27(10):1047–56.

71-Cavusoglu M, Kamasak M, Erogul O, Ciloglu T, Serinagaoglu Y, Akcam T. An

efficient method for snore/nonsnore classification of sleep sounds. Physiol

Meas 2007;28(8):841–53.

73-Sola-Soler J, Jane R, Fiz JA, Morera J. Towards automatic pitch detection in

snoring signals. In: 22th Annual International Conference of the IEEE.

Engineering in Medicine and Biology Society 2000;vol. 4. p. 2974–6.

74-Abeyratne UR, Patabandi CKK, Puvanendran K. Pitch-jitter analysis of

snoring sounds for the diagnosis of sleep apnea. In: 23rd Annual International

Conference of the IEEE 2001. Engineering in Medicine and Biology

Society 2001;vol. 2. p. 2072–5.

83- Cavusoglu M, Ciloglu T, Serinagaoglu Y, Kamasak M, Erogul O, Akcam T.

Investigation of sequential properties of snoring episodes for obstructive

sleep apnoea identification. Physiol Meas 2008;29(8):879–98.

Snoring sounds variability as a signature of obstructive sleep apnea

12-Abeyratne U, Wakwella A, Hukins C. Pitch jump probability measures for the

analysis of snoring sounds in apnea. Physiol Meas 2005;26:779–98.

13-Sola-Soler J, Jane R, Fiz J, Morera J. Pitch analysis in snoring signals from simple

snorers and patients with obstructive sleep apnea. Houston, TX; 2002.

14- Abeyratne U, Karunajeewa A, Hukins C. Mixed-phase modeling in snore sound

analysis. Med Bio Eng Comput 2007;45:791–806.

15-Ng AK, Wong KY, Tan CH, Koh TS. Bispectral analysis of snore signals for obstructive

sleep apnea detection; 2007, p. 6195–98.

16-Ng AK, Koh TS, Baey E, Puvanendran K. Diagnosis of obstructive sleep apnea

using formant features of snore signals, vol. 14, no. 2. Berlin, Heidelberg:

Springer; 2007. p. 967–970.

17-Michael H, Andreas S, Thomas B, Beatrice H, Werner H, Holger K. Analysed

snoring sounds correlate to obstructive sleep disordered breathing. Eur Arch

Otorhinolaryngol 2008;265:105–13.

18-Ng A, Koh T, Abeyratne U, Puvanendran K. Investigation of obstructive sleep

apnea using nonlinear mode interactions in nonstationary snore signals. Ann

Biomed Eng 2009;37:1796–806.

Automatic and Unsupervised Snore Sound Extraction

From Respiratory Sound Signals

13-A. Yadollahi and Z. Moussavi, “Formant analysis of breath and snore

sounds,” in *Proc. IEEE EMBS*, Minneapolis, MN, 2009, pp. 2563–2566.

16-J. Sola-Soler, R. Jane, J. Fiz, and J. Morera, “Spectral envelope analysis

in snoring signals from simple snorers and patients with obstructive sleep

apnea,” in *Proc. IEEE-EMBS*, Cancun, Mexico, 2003, pp. 2527–2530.

17-U. R. Abeyratne, A. S.Wakwella, and C. Hukins, “Pitch jump probability

measure for the analysis of snoring sound in apnea,” *Physiol. Meas.*,

vol. 26, pp. 779–798, 2005.

18-W. D. Duckitt, S. K. Tuomi, and T. R. Niesler, “Automatic detection,

segmentation and assessment of snoring from ambient acoustic data,”

*Physiol. Meas.*, vol. 27, pp. 1047–1056, 2006.

19-M. Cavusoglu, M. Kamasak, O. Erogul, T. Ciloglu, Y. Serinagaoglu, and

T. Akcam, “An efficient method for snore/nonsnore classification of sleep

sounds,” *Physiol. Meas.*, vol. 28, no. 8, pp. 841–853, 2007.

20-A. S. Karunajeewa, U. R. Abeyratne, and C. Hukins, “Silence—

breathing—snore classification from snore-related sounds,” *Physiol.*

*Meas.*, vol. 29, pp. 227–243, 2008.

21-E. Rafajłowicz, M. Pawlak, and A. Steland, “Nonparametric sequential

change-point detection by a vertically trimmed box method,” *IEEE Trans.*

*Inf. Theory*, vol. 56, no. 7, pp. 3621–3634, Jul. 2010.

22-L. T. Jolliffe, *Principal Component Analysis*, 2nd ed. New York:

Springer-Verlag, 2002.

23-J. C. Bezdek, *Pattern Recognition with Fuzzy Objective Function Algorithms*.

New York: Plenum Press, 1981.

24-J. C. Bezdek, R. Ehrlich, and W. Full, “FCM: The Fuzzy c-Means clustering

algorithm,” *Comput. Geosci.*, vol. 10, pp. 191–203, 1984.

26-J. C. Dunn, “A fuzzy relative of the ISODATA process and its use in

detecting compact well-separated clusters,” *J. Cybern.*, vol. 3, pp. 32–57,

1973.

Snore Signal Enhancement and Activity Detection

via Translation-Invariant Wavelet Transform

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