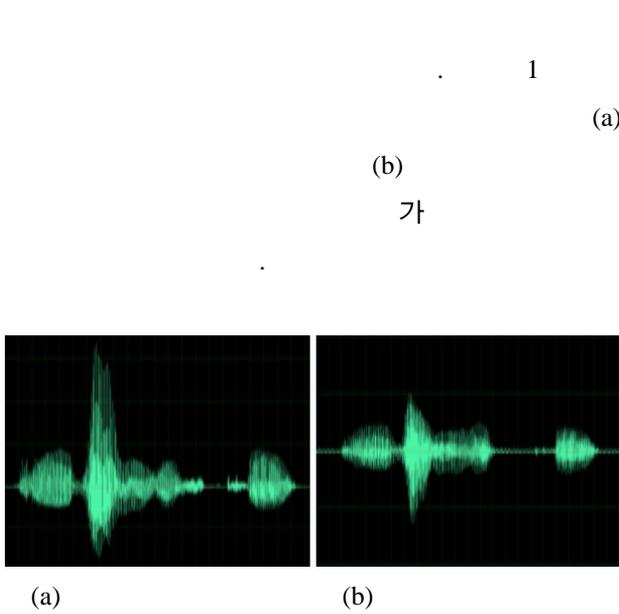


2-2.



1.

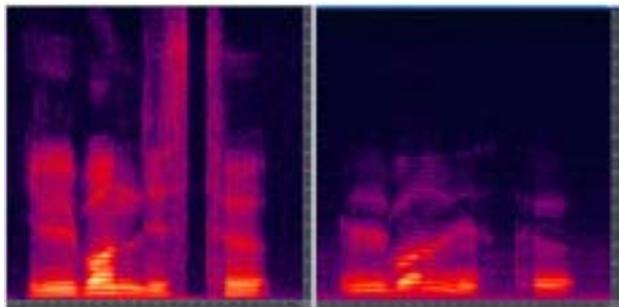
100 가 MFCC

30% 가
 가
 critical band pass filter
 MFCC 가 가,
 가

1

2

1



(a)
2.

(b)

가
 1
 (a) 가
 (b) 가
 2.b
 가

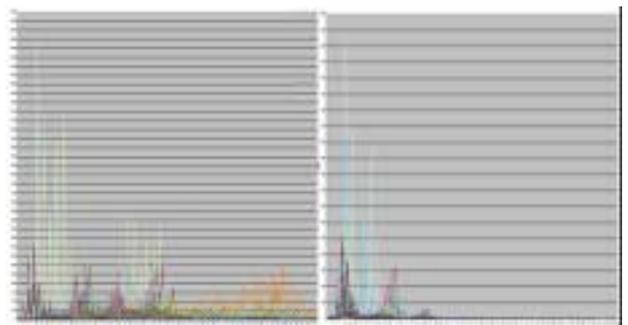
4Khz

가

MFCC(Mel-Frequency Cepstral Coefficient)
 FFT(Fast Fourier Transform)

3 16K, 16bit wave
 Pre-emphasis, Hamming-Windowing

FFT



(a)

(b)

3.

3 가

256

2Khz

가

2Khz

4Khz

가
4Khz

[8].

가 /

MFCC

[9]

critical band filter

가 MFCC /

EIH

가 ZCPA(Zero-Crossings with Peak

가 Amplitudes)[10]

2-3.

가 /

3.

가 2

가 2

MFCC /

가 ZCPA

FFT

가 MFCC

가 Mel-

cepstrum critical band filters

가

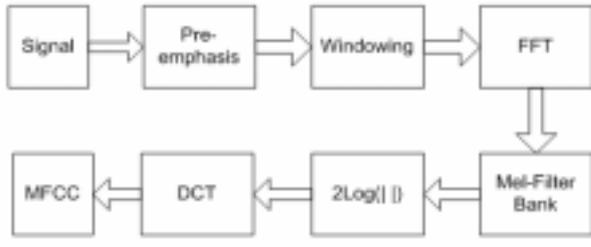
Ghitza Ensemble Interval

Histogram(EIH)[7] band pass

cochlear bank 1KHz filter

log

가 / 4 Mel-cepsturm MFCC



4. MFCC

Nonlinear stages band pass cochlear bank
 ZCPA ZERO-CROSSING
 PEAK amplitude

EIH

ZCPA zero-crossing
 , peak

intensity 1 t
 ZCPA

$$y(t:i) = \sum_{channel} \sum_{k=1} \delta_{ij_k} f(A_k), 1 \leq i \leq N \quad (1)$$

K channel upward zero-crossing
 , N frequency bin j_k k
 (k+1) zero crossing
 frequency bin A_k peak amplitude

δ_{ij} Kronecker delta

4. 가

100 50
 25 50

TDNN

2.

	MFCC	ZCPA
(%)	97.14	98.86

critical band filter
 MFCC 가 2

5Khz
 Mel-filer 5K
 24 Mel-filer bank filter
 Rectangle
 1KHz 1KHz
 shift 3

3. MFCC

	(%)
MFCC	67.8
MFCC+CMS	74.95
5KHz 24 filter(MFCC+CMS)	68.49
Rectangle Filter(MFCC+CMS)	71.547
Filter (MFCC+CMS)	70~73

5KHz 24
 Mel-filer MFCC CMS

가 5KHz

가

Rectangle filter
 triangle filter 2~3%
 [11]

1KHz
 1KHz shift

가
 band pass filter

2

4

Peak zero-crossing MFCC ZCPA

4. MFCC ZCPA

	(%)
ZCPA	83.63
MFCC	67.8

4 ZCPA
가 MFCC 16%
2

5.

Ubiquitous computing, wearable computing

가

가

가 /

가

band

peak zero-crossing ZCPA

MFCC CMS ZCPA

가 16%

83.63%

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