Singer Identification

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Outline

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Singer Identification is to be (has been) applied on **pop music** mainly

- Automatically label data for which no/or not much information is available $\Rightarrow$ recognize the singer
- Distinguish between original version of a song and cover songs
- Copyright enforcement: recording companies could scan bootleg sites on the internet to check if there are any unauthorized recorded versions of a concert [Kim, 2002 and Tsai and Wang, 2006]
- Music recommendation systems could use singer identification to group singers with same voice characteristics.

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- Singing Voice $=$ hybrid btw **speech** and **musical instrument** $\Rightarrow$ create specific methods of analysis.
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- As seen in the previous diagrams: need to extract some features from the sounds.
- Features used:
  - MFCC (Mel-Frequency Cepstral Coefficient)
  - MDCT (Modified Discrete Cosine Transform)
  - LPCC (Linear Predictive Coding Coefficients)
  - WLPCC (Warped ...)
  - Cepstral Coefficients of the LPC spectrum
  - LPMFCC (MFCC of the LPC spectrum)

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Principle

- Difference in spectrum between voiced regions and accompaniement-only: **hamonicity** of the voice.

Voice/Accompaniement Spectra

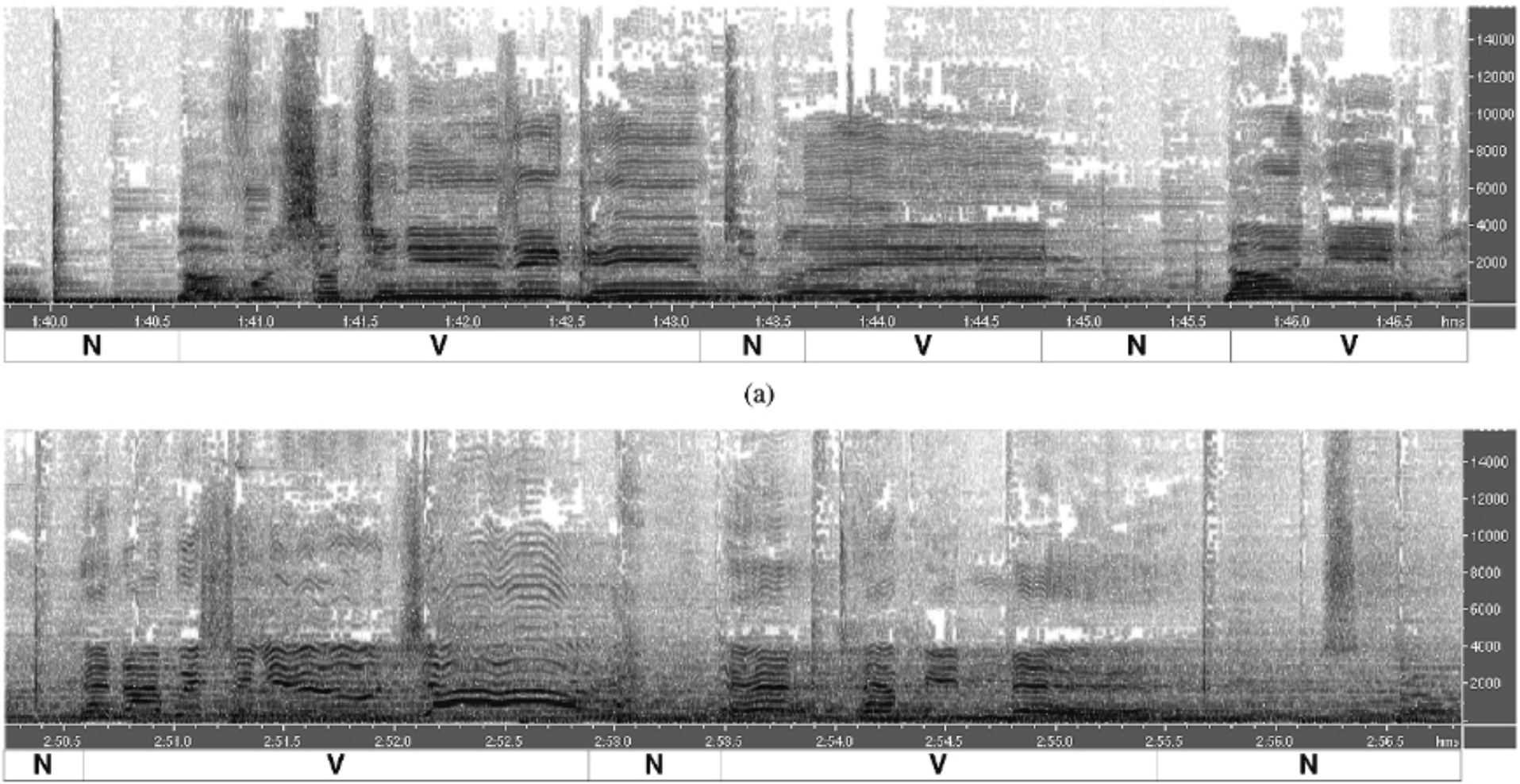


Fig.1 [Tsai and Wang, 2006]

Tsai's Approach

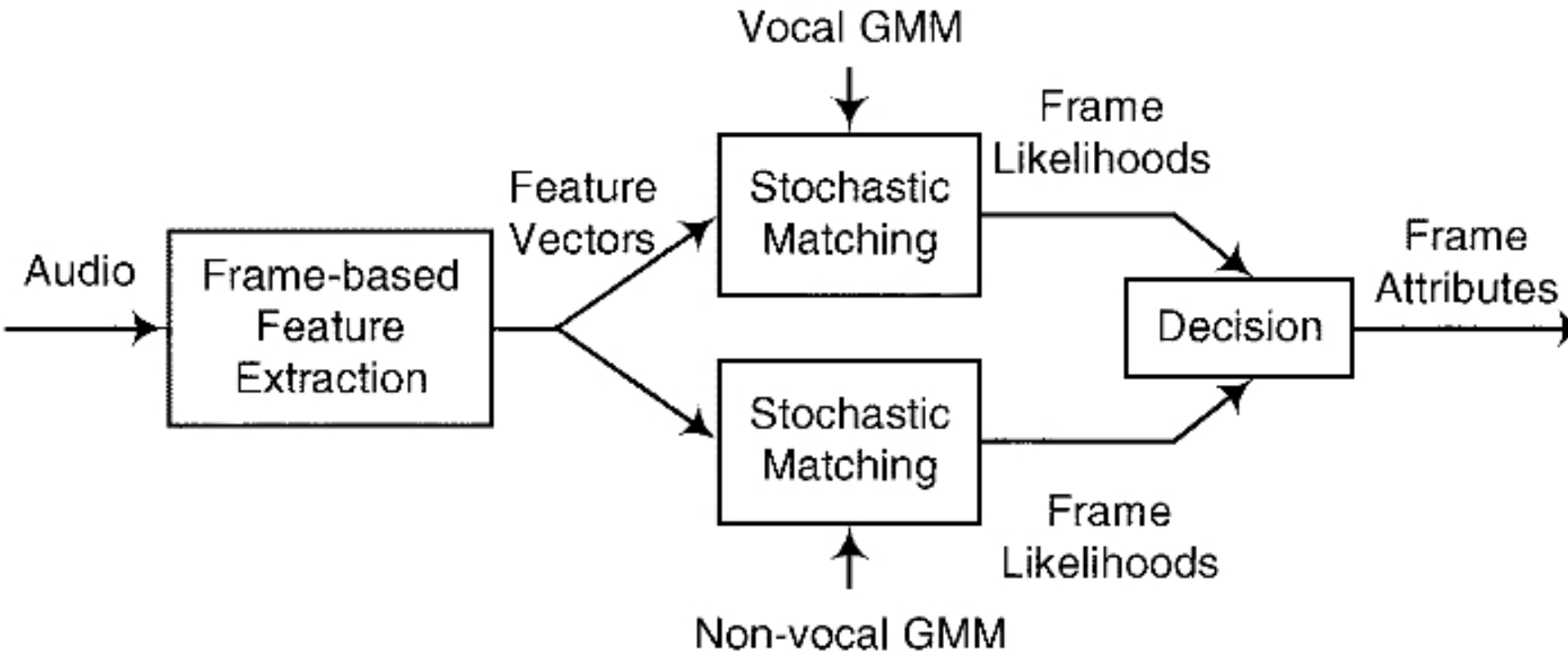
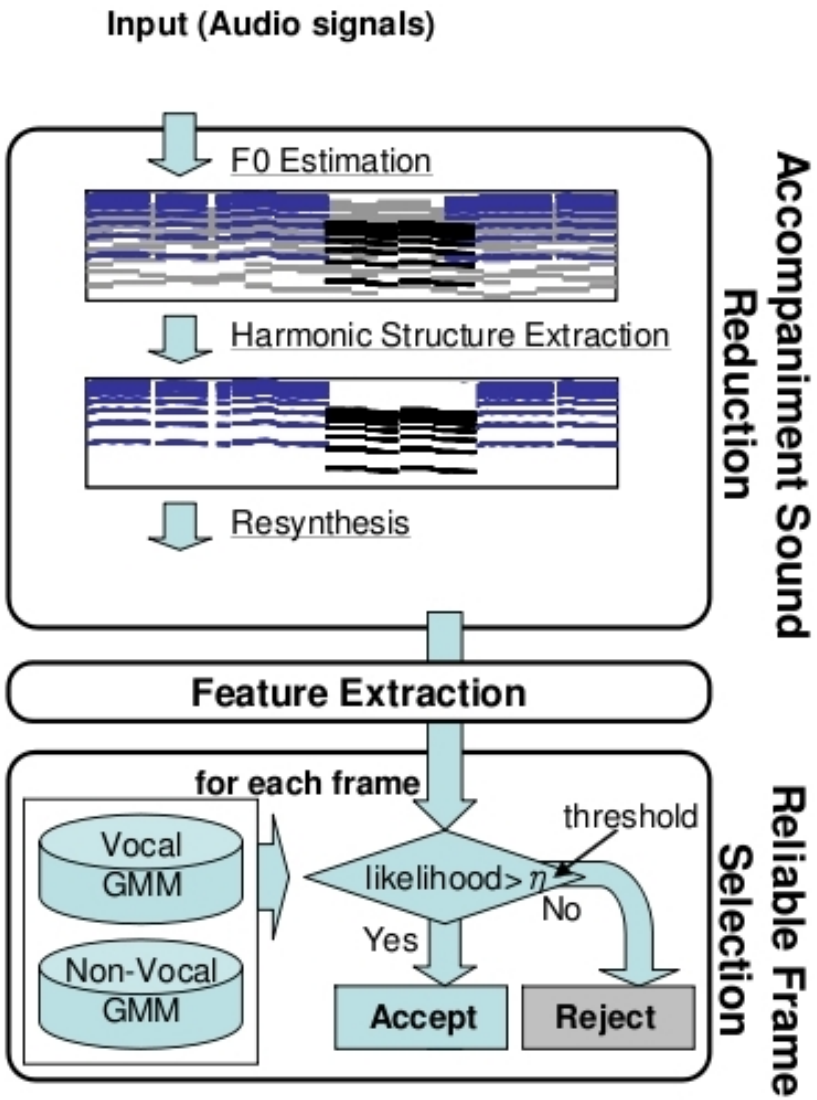


Fig.1 [Tsai, 2004]

Tsai's Approach

- This method is supposed to yield 82.3% accuracy [Tsai and Wang, 2006]

Fujihara's Approach



from Fig.1 [Fujihara 2005]

- The GMM classification between Vocal and Non Vocal is done on the resynthesized signal.

Outline

3 main strategies

- GMM
- SVM
- k-NN

GMM Method with Solo Voice Modeling

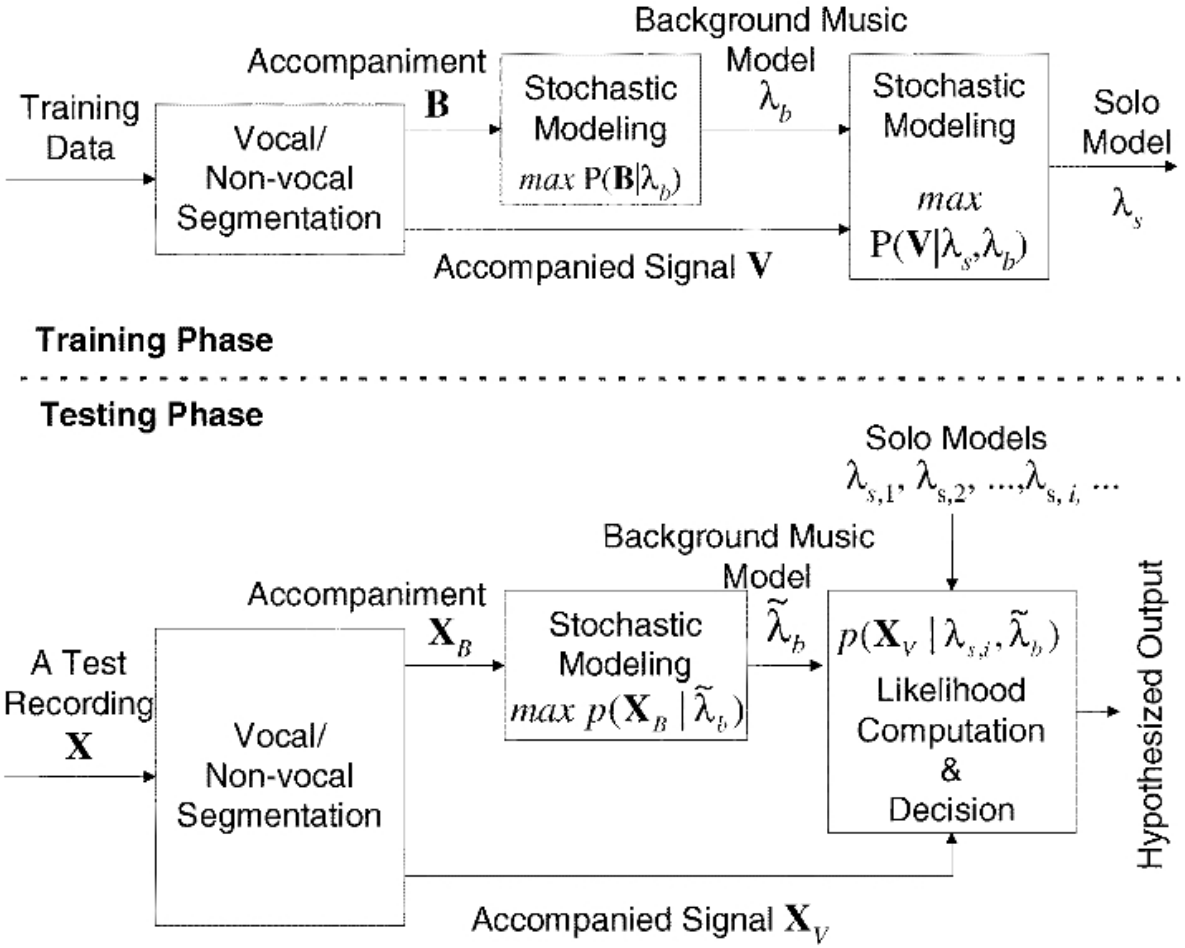


Fig.3 [Tsai and Wang, 2006]

Outline

Performance

- Kim and Whitman 2002 $\Rightarrow$ 45%
- Liu and Huang, 2002 $\Rightarrow$ 80 %
- Tsai and Wang, 2006, Fujihara et al., 2005 $\Rightarrow$ 95%

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Good

- Singer identification yields satisfactory results.

But ...

- Only one article tackles Target Singer Detection or Target Singer Tracking: [Tsai and Wang 2006]. $\Rightarrow$ results are not perfect for duet but are better than doing GMM without solo modeling.
- Specific to pop music $\Rightarrow$ what happens with **a cappela** singer**s**?
- Specific to on geographical area (Asia) $\Rightarrow$ important because of voice mix

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Questions ?