

# Speech Synthesis and Pronunciation Dictionaries

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- ▶ Pronunciation dictionary consists of words.
- ▶ Word are transcribed into a sequence of syllables.
- ▶ Syllables are transcribed to phones.

# Issues in pronunciation dictionary design: Hindi and Telugu I

- ▶ Syllabification based on acoustics:
- ▶ Hindi:schwa deletion:

- ▶ Example 1: Syllabification of:

कामकर  
काम् कर

- ▶ Example 2: Syllabification of:

वातावरण  
वा ता व रण  
or  
वा ताव् रण

- ▶ Telugu:
- ▶ Example: Syllabification of:

కామకర

# Issues in pronunciation dictionary design: Hindi and Telugu II

తీ రు  
or  
తీర్ పు  
or  
తీర్ డ

- ▶ Other issues: బల్బ almost always pronounced as బల్బా

# Issues in pronunciation dictionary design: Bengali and Malayalam I

- ▶ Bengali: Issues with color of vowels in context.
  - ▶ the “a” becomes an “o”.
  - ▶ Kalyan pronounced as khullaan.
- ▶ Malayalam – some issues – rules for grapheme to syllable
  - ▶ Alveolar dental gemination.
  - ▶ Foreign words (fan, zoo, bank).
  - ▶ Allophonic variants of of 'n', 'tp', 'ts', 'tph', 'tbh'.
  - ▶ Example: “utsavam” becomes “ulsavam”.
  - ▶ These are currently handled using a dictionary.

# Issues in pronunciation dictionary design: Tamil I

Tamil:

- ▶ Syllabification of geminates:

அக்கா

- ▶ Rules for syllabification:

அ க்கா

or

அக் கா

or

அக் ஆ

# Issues in pronunciation dictionary design: Tamil II

- ▶ Tamil has issues in terms of pronunciation

பாவம்

*baa vam*

*paa vam*

Both are nouns – meaning depends on context.

- ▶ DOCUMENTATION of rules for converting from voiced to unvoiced
  - ▶ Unvoiced vs voiced
    - ▶ First consonant unvoiced and the second voiced

தந்தான்

*tan daan*

மங்களம்

*maN`ga Lam*

- ▶ Need additional qualifiers in the pronunciation dictionary V, UV

- ▶ DOCUMENTATION of rules when the 'u' vowel modifier changes color as in:

அதுகள்  
*a dheu gaL*

# Pronunciation features required for Text to Speech Synthesis I

- ▶ Well-designed pronunciation dictionary for ALL Indian languages – mostly C\*VC, CVC\* C\*V, VC\*, V
- ▶ Details of prosody for pronunciation
  - ▶ Intonation (pitch contour – signal processing)
  - ▶ Stress (energy contour – signal processing)
  - ▶ Relationship between linguistic stress, and stress as defined in terms energy, pitch, duration or all syllables.
- ▶ Tones and break indices:
  - ▶ Example: राम दुकान चला पुसतक खरीदने
  - ▶ Pause: राम दुकान चला | पुसतक खरीदने
  - ▶ Tones: राम and पुसतक  
pitch contour movement: L to H, H to L, L to L, ...

# Pronunciation features required for Text to Speech Synthesis II

- ▶ Since Indian languages seldom have punctuation marks, rules for phrasing are ABSOLUTELY necessary
- ▶ Currently derived using statistics on manually marked phrases from training data.
- ▶ Pronunciation of English words using a native tongue:
  - ▶ Reading webpages requires the reading of multilingual text – especially English and native language.
  - ▶ Pronunciation of English words in terms of Indian language syllables.
  - ▶ Letter to sound rules for reading English text in terms of Indian languages syllables.
- ▶ Pronunciation of foreign words in a language – borrowing of *sanskrit* in almost all Indian languages.

# Partial pronunciation dictionaries

Tamil:

(computer nil (((க-v ம்ப்-uv)0) ((ய)0) ((L-uvr)0)))

(google nil (((கூ-v)0) ((க-v ல்)0)))

(அகத்தியனாரின் nil (((அ)0) ((க-v த்)0) ((தி-uv)0) ((ய )0) ((னா )0) ((ரின் )0)))

(அகம்பாவம் nil (((அ)0) ((க-vம் )0) ((பா-v)0) ((வம்)0)))

Hindi:

(ocean nil (((ओ)0) ((शन् )0)))

(poetic nil (((पो)0) ((ए)0) ((टिक )0)))

(गुलजार nil (((गुल्)0) ((जार् )0)))

(बिलकुल nil (((बिल्)0) ((कुल् )0)))