Visualization tools & demos and the ICSI Realization group

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Outline

1. **Visualization: Goals and philosophy**
2. **Tour of existing tools**
3. **Using `recogviz`**
4. **Future developments & demos**

1 Visualization: Goals and philosophy

Why work on visualization tools?

- **Visual representations give insights**
  - able to scan large amounts of data
  - a perspective different from other analyses
- **Interactive exploration gives insights**
  - 'chasing down' anomalous phenomena
- **Graphical, interactive demonstrations are accessible & appealing**
  - for giving demos to visitors
  - for communicating to colleagues

BUT

- **Visualization is often non-critical**
  $\rightarrow$tools must be prefabricated, easy to use

Goals of visualization tool development

- **“A demo on every desk”**
  - facilitate understanding/insight & diagnose problems/anomalies
  - support presentations & provide figures
  - promote ‘demo culture’

  $\rightarrow$minimize barrier?
- **Tomorrows demos...**

  ...can’t be predicted, so
  - establish framework
  - provide modules
- **UI coding is tedious & short-lived**
  - prefer high-level, portable solution
- **Flexibility to twist to new ends?**

Choosing an infrastructure

xwaves, lyre

- **Special purpose vs. scripting language**
  - need expandability
  - want to be able to modify
- **Choice of scripting language:**

	sh	**perl**	**Tcl/Tk**	**java**	**matlab**
graphics		?	√	√	√
command shell	√		√		√
run programs	√	√	√		
sig.proc. support					√
user extensions		√	√	√	√
‘nice’ syntax		√	√?	√?	
local expertise	√	√	?	?	√

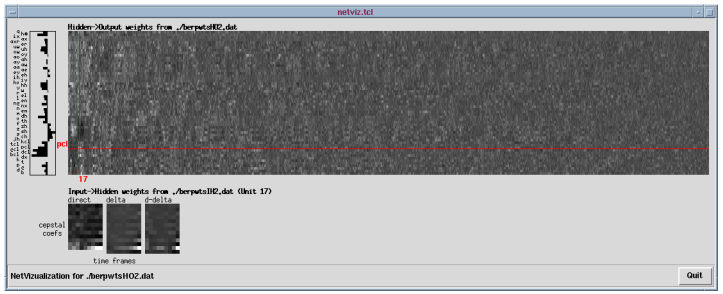
→ **Tcl/Tk + extensions framework**

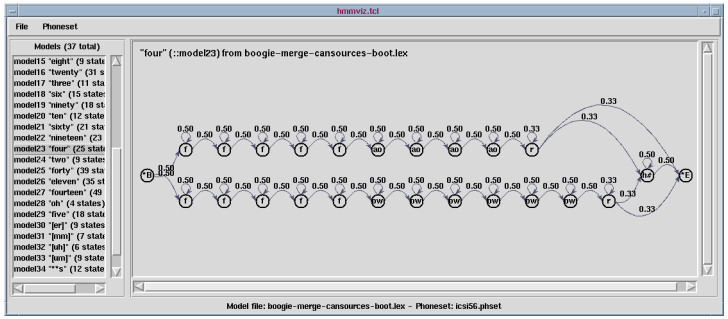
2 Tour of existing tools

- **Early experiments**
  - **`netviz`** - neural-net weights display
  - **`hmmviz`** - HMM model display
- **Old but useful**
  - **`sgramImg`** - on-demand web spectrograms
  - **`pfview`** - pfile inspection
  - **`simpleui`** - basic interactive recognition
- **The current generation**
  - **`berpdemo98`** - interactive speech application
  - **`recogviz`** - recognizer display & comparison

netviz & hmmviz

- **Early experiments**



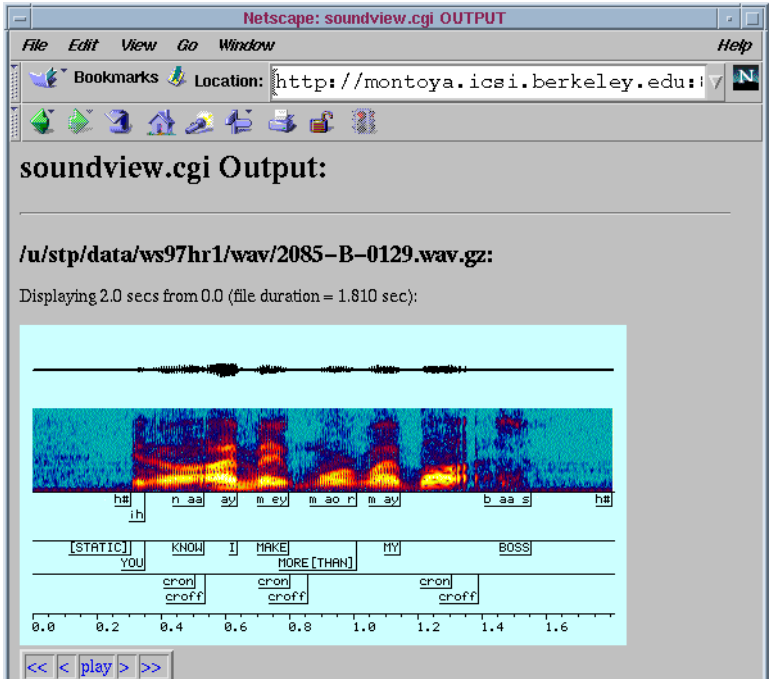


- **Advantages of Tcl**
  - netviz is 300 lines (+ floatArray extension)
  - clean postscript generated by hmmviz

sgramImg.cgi

- **CGI script: spectrogram GIF on-demand**

<img src="http://montoya.icsi.berkeley.edu:8080/~dpwe/cgi-bin/sgramImg.cgi?filename=/u/stp/data/ws97hr1/wav/2085-B-0128.wav.gz">

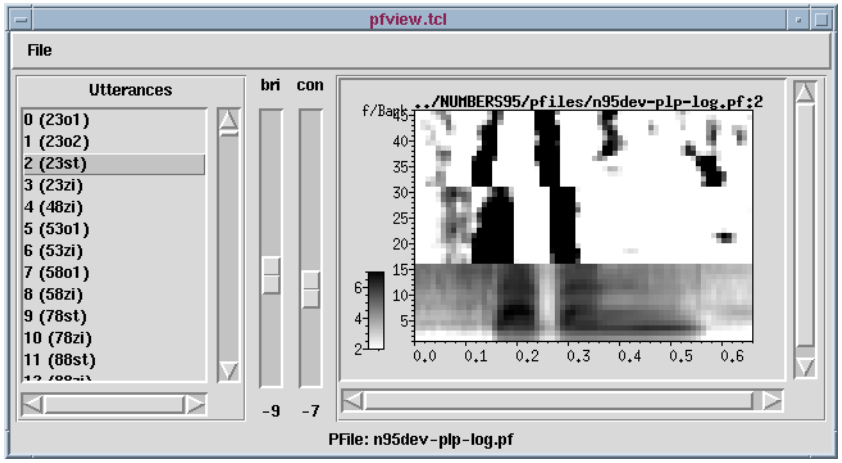


- **Automatically includes xlabel annotation**
- **Try it:**

http://montoya.icsi.berkeley.edu:8080/~dpwe/cgi-bin/soundview.cgi

pfview

- **Display contents of pfiles as images**

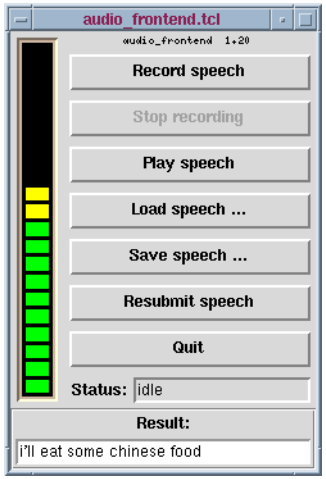


- **Provision for multiple panels, labels, PS output**
- **Try it:**

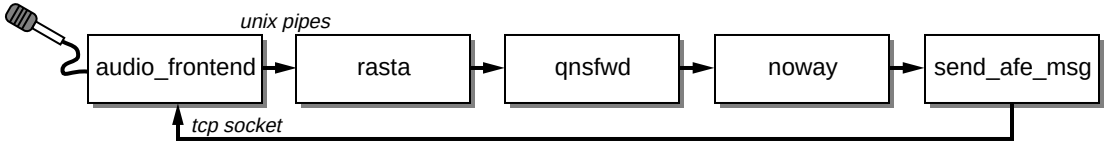
  > ~dpwe/projects/pfview/pfview.tcl pfile=<pfile>
  [idlist=<utid file>]

simpleui

- **Minimal interactive demo of recognizer**
- **Just connects audio_frontend to a recognizer**
  - easy to modify for other grammars, features



- **Simple structure:**



- **Try it:**

  > /u/drspeech/share/bin/simpleui

berpdemo98

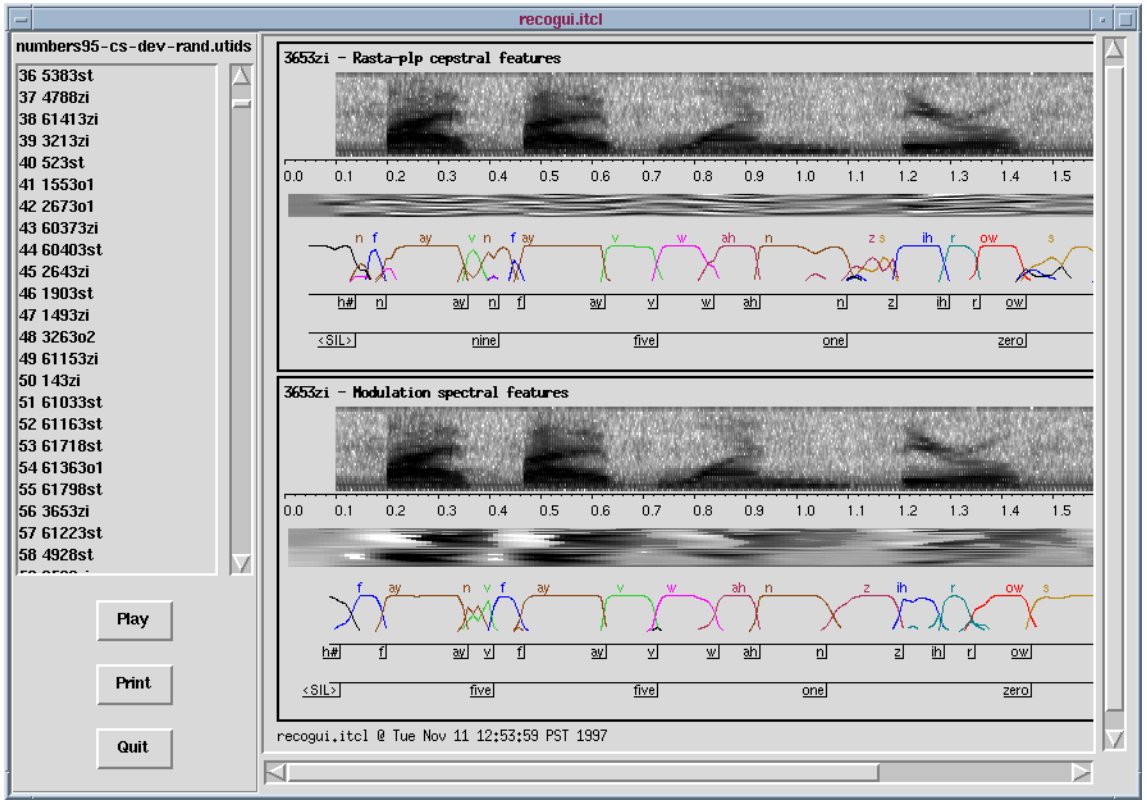
- **Our 'old' application plus recogviz modules**

- **Try it:**

  > /u/drspeech/share/bin/berpdemo98

recogviz

- **Motivation: compare recognition techniques**
  - at each stage in process (signal, features, probs)

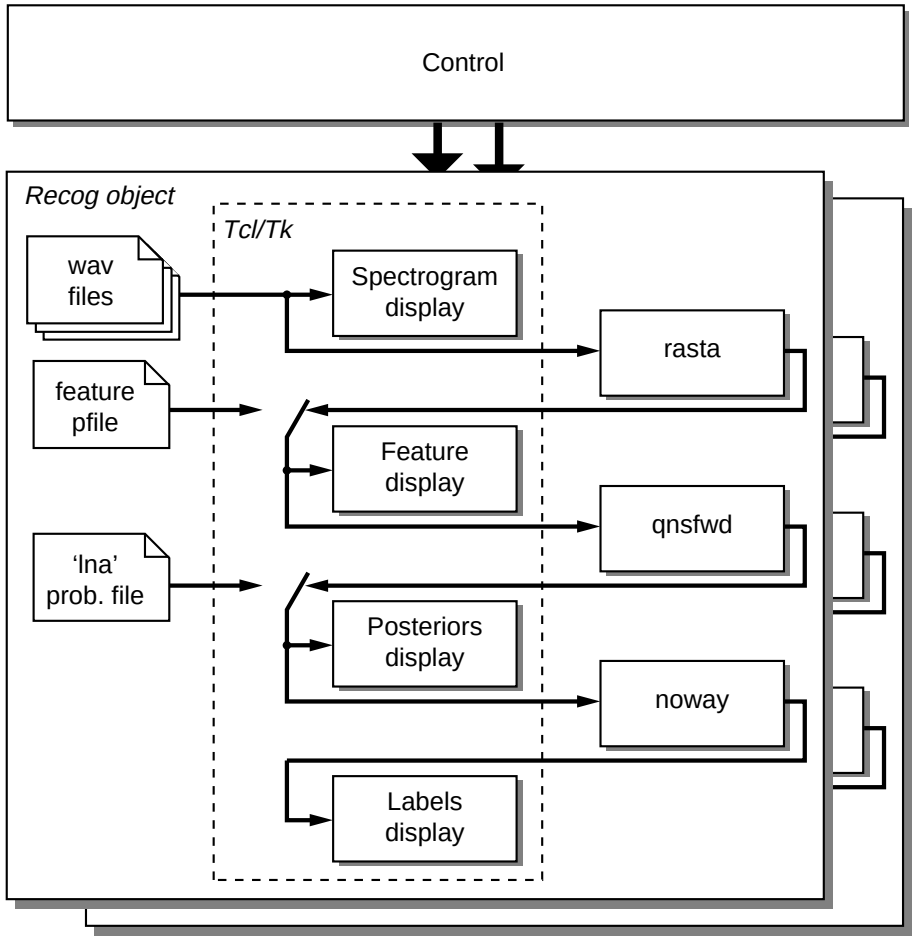


- **Try it:**

  > /u/dpwe/projects/recogviz/recogviz

3 Using `recogviz`

- **System structure**



Using recogviz (cont.)

- **Configuration files: (Tcl syntax)**
  - defaults=./defaults.def - common definitions

```
set NUMBERSDIR   "/u/drspeech/data/NUMBERS95"
set listfile     "$NUMBERSDIR/list/numbers95-cs-dev.utids"
set wavfilecmd     "numbers95_findfile prefix=$NUMBERSDIR/ utid=%u"
set samplerate   8000
set frametime    0.010
# Standard network geometry/type
set mlp3_hidden_size  500
set mlp3_output_size  56
# Other common values
set ftr_start         0
...
```

  - recog1=./recog1.def

```
set title     "Rasta-plp cepstra"
set DPWE      "/u/dpwe/projects/NUMBERS95"
set ftr_file  "$DPWE/pfiles/n95dev-lras-plp-cep.pf"
set ftr_width 27
set norm_file "$DPWE/pfiles/n95tr-lras-plp-cep.norm"
set weights   "$DPWE/results/1997sep17/n95tr-embed+iter2.weights"
...
```

  + recog2=./recog2.def

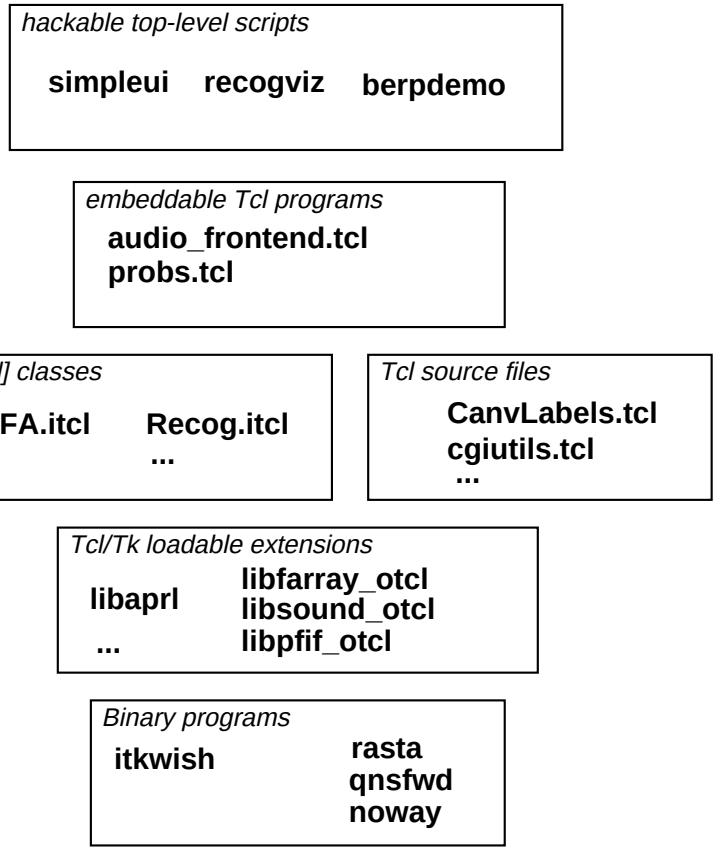
- **Use dr_recog params files? (y0/noway)**

4 Future developments & demos

- **“A demo on every desk”**
  - but demos are more than graphics: message
- **Illustrations for research advances**
  - feature domains
  - recognizer combinations
- **Application-scale demos**
  - grandson of BeRP
  - ?

Creating new demos

- **Available pieces:**



- **Get bits via Tcl package system**

  see also: http://www.tcltk.com, ...

Future work

- **Improving the existing bits**
  - cleaning up modules
  - better example shells
  - documentation
- **Generating new demos**
  - .. within existing tools (recogviz)
  - .. employing existing pieces
- **Collaborative applications**
  - ThisL
  - Daedelus
- **Wider questions:**
  - distributable demos?
  - cross-platform demos?
  - applications vs. basic research?