



## Evaluation of Speech Detection Algorithm



Project 1b

Due: February 23



## Overview

- Experiments to evaluate performance of your Speech Detection project (Project 1)
- Focus not only on how the algorithm performs, but also
  - the formulation of hypotheses
  - design, implementation and analysis of experiments to test the hypotheses
  - Writeup
- Can be done in groups of 2



## Measures of Performance

- User perception.** Some possibilities are:
  - User opinion (rating) on quality
  - Understandability
  - Errors in listening ...
- System impact.** Some possibilities are:
  - CPU load
  - Size (in bytes) of sound recorded (without silence)
  - Processing time
  - Memory use...
- Decide on how each is to be measured
  - Example: *Scale 1-10* for perception
  - Example: *Time* for CPU



## Independent Variables

- Must choose at least **two**.
- Possibilities:
  - Speaking tests: counting, vocabulary,...
  - Other languages: Hindi, Chinese, Pig-Latin, ...
  - Personal characteristics: Gender, Age, Shoe size ...
  - Background noise: quiet, noisy, Patriot's game, ...
  - Systems: OS version, CPU, sound card...
  - Other hardware: cheap microphone, sound card
  - Other audio quality parameters: rate, size, ...
  - ...


## Algorithm Modifications

- Must choose at least **1**.
- Possibilities include:
  - Thresholds.
  - Sound chunk size.
  - Endpoint detection length.
  - Other modifications specific to your implementation.
  - ...
- Formulate hypotheses
  - About how a change in the independent variables affects your measures of performance


## Results and Analysis

- Details on results and analysis
- Results are numeric measures
  - graphs, charts or tables
- Analysis manipulates data
  - understand relationships
  - interpreting the results
- Consider if data supports or rejects the hypotheses



## Report

- Introduction
  - hypotheses and motivation for them
  - (not on silence detection, in general)
- Background on your algorithm
- Design of your experiments
  - details on all of above
- Analysis
- Conclusions
  - summarize findings
- Abstract
  - 1 paragraph that abstracts whole report
  - Write last, goes first



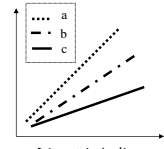
## Guidelines for Good Graphs (1 of 5)

- “Art” not “rules”. Learn with experience. Recognize good/bad when see it. Many trials

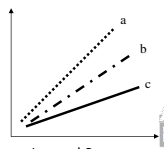
*Require minimum effort from reader*

- Perhaps *most* important metric
- Given two, can pick one that takes less reader effort


Ex:



Direct Labeling




Legend Box



## Guidelines for Good Graphs (2 of 5)

*Maximize Information*

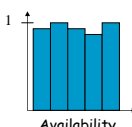
- Make self-sufficient
- Key words in place of symbols
  - Ex: “PIII, 850 MHz” and not “System A”
  - Ex: “Daily CPU Usage” not “CPU Usage”
- Axis labels as informative as possible
  - Ex: “Response Time in seconds” not “Response Time”
- Can help by using captions, too
  - Ex: “Transaction response time in seconds versus offered load in transactions per second.”



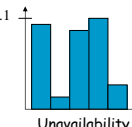
## Guidelines for Good Graphs (3 of 5)

*Minimize Ink*

- Maximize information-to-ink ratio
- Too much unnecessary ink makes chart cluttered, hard to read
  - Ex: no gridlines unless needed to help read
- Chart that gives easier-to-read for same data is preferred




Availability



Unavailability


• Same data  
• Unavail = 1 – avail  
• Right better



## Guidelines for Good Graphs (4 of 5)

*Use commonly accepted practices*


- Present what people expect
- Ex: origin at (0,0)
- Ex: independent (cause) on x-axis, dependent (effect) on y-axis
- Ex: x-axis scale is linear
- Ex: increase left to right, bottom to top
- Ex: scale divisions equal
- Departures are permitted, but require extra effort from reader so use sparingly



## Guidelines for Good Graphs (5 of 5)

*Avoid ambiguity*

- Show coordinate axes
- Show origin
- Identify individual curves and bars
- Do not plot multiple variables on same chart



## Hand In

- Hardcopy!
- Online turnin (see Web page)
- Turn in:
  - Any testing Code/Scripts used/modified
  - Makefile/Project file

