

Improving fluency in sign language to text systems



Photo courtesy Gary AK

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Presentation outline

- ◆ Introduction
- ◆ Previous work
- ◆ Data capture
- ◆ Hidden Markov Models
- ◆ Implementation
- ◆ Conclusions

Aims of the Project

- ◆ Build a system to translate British Sign Language (BSL) to text
- ◆ Run in real time
- ◆ Utilise commodity hardware

Research and previous work

- ◆ Most systems use HMMs
- ◆ Translate single letters only
- ◆ Few fluent sentence based systems
- ◆ Image capture instead of motion tracking

Defining the setting

- ◆ Corpus based on using Information Points
- ◆ “Where is the Gisbert Kapp building?”
- ◆ Reduces complexity
- ◆ Increases overall accuracy

Sign Language Data Capture

- ◆ Use of motion tracking equipment
- ◆ Accurate 3D positional data
- ◆ Controlled environment
- ◆ Low noise system

Motion tracking system

User signing



Motion tracking system



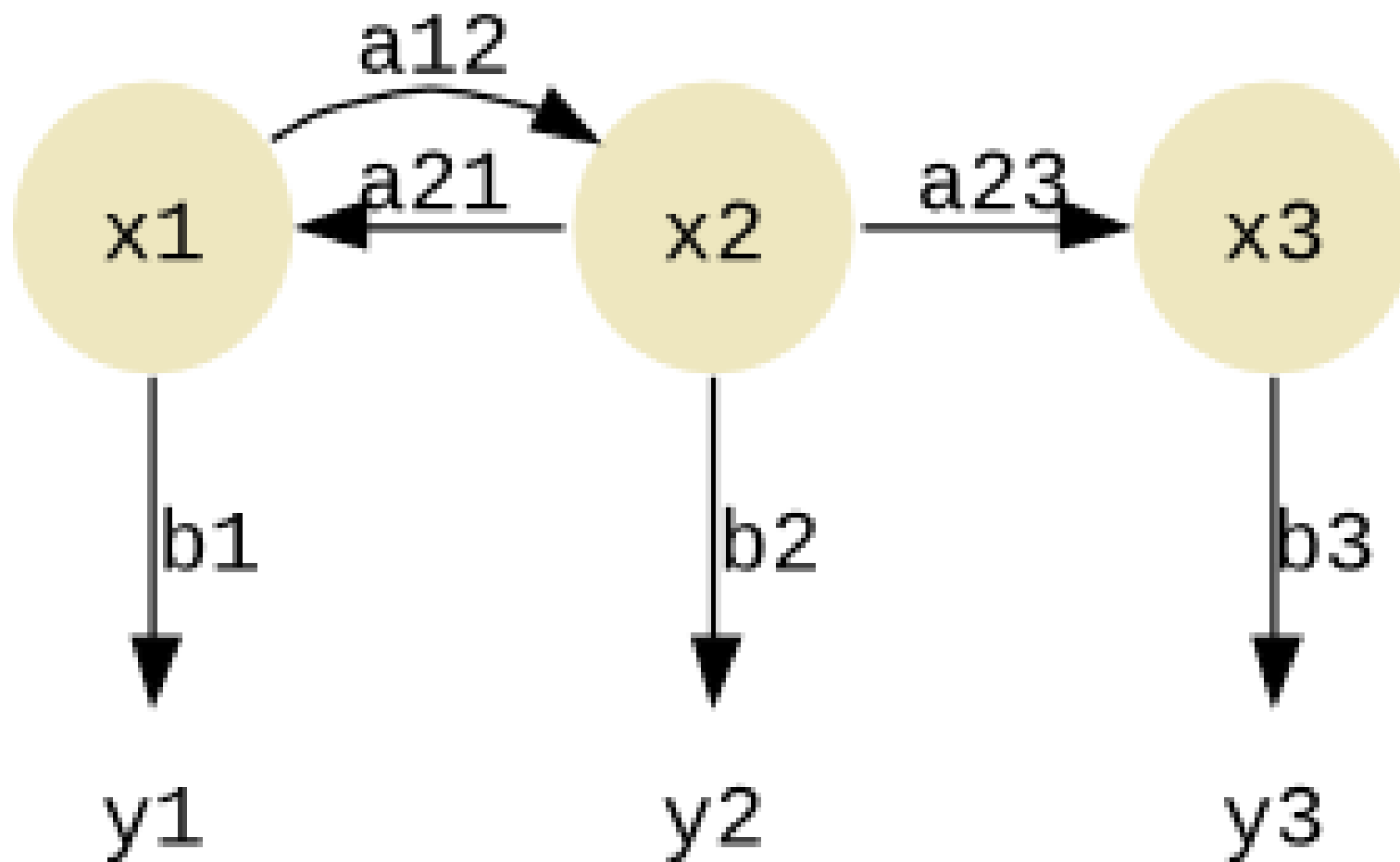
Data collected

- ◆ Two beginner signers participated
- ◆ 75 sets of data collected
- ◆ 49 words used in 40 sentences
- ◆ 28 body markers used

Hidden Markov Models

- ◆ Statistical model
- ◆ Probability of state transitions
- ◆ Probability of outcome from states
- ◆ Current state is unknown

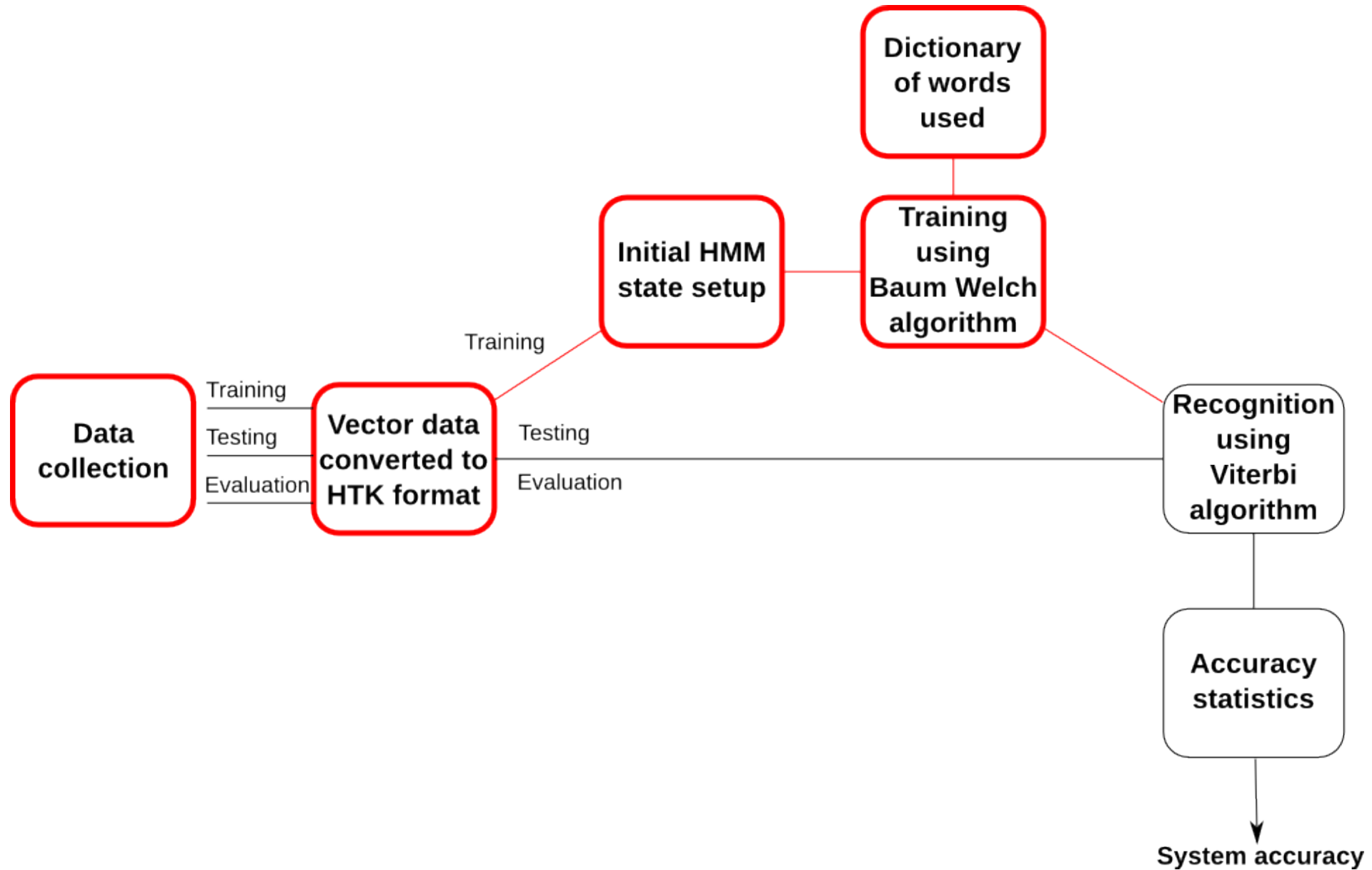
HMM Structure



HMM Training and Testing

- ◆ Word dictionary
- ◆ Initial state and outcome probabilities
- ◆ Annotated training data
- ◆ Training data includes 8 or more examples of each word
- ◆ “Clean” testing data
- ◆ Accuracy of system obtained

Implementation



Implementation

- ◆ QTM file format to HTK file format
- ◆ QTM system not suited to detailed work
- ◆ HMMs are for whole words
- ◆ System similar to first voice recognition attempts

Conclusions

- ◆ Software to create and use HMMs written and tested
- ◆ Converting motion tracking data for use took more time than planned
- ◆ On completing motion tracking data, system would work

Any Questions?