Improving fluency in sign language to text systems

Photo courtesy Gary AK

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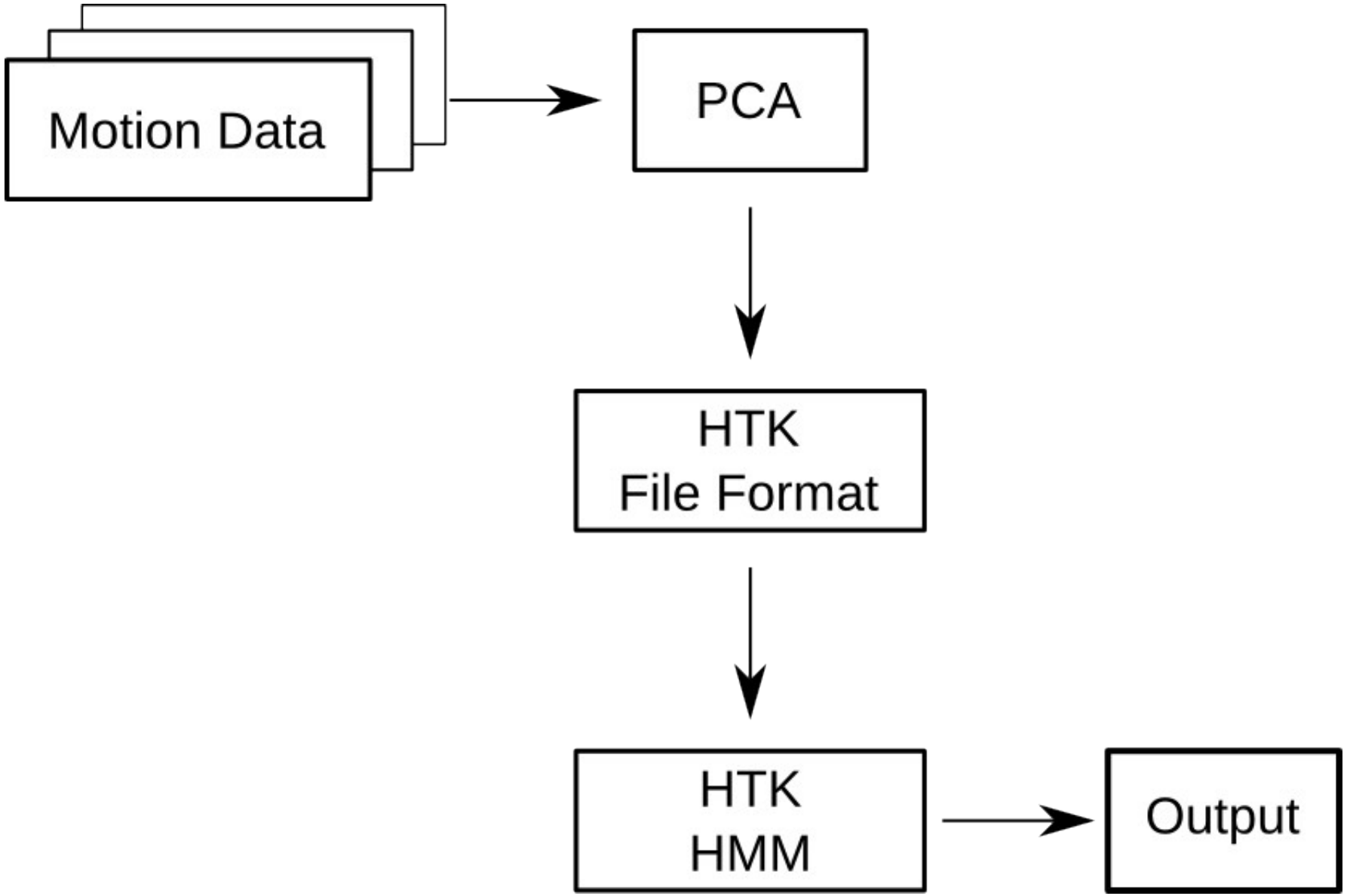
Presentation outline

- Introduction
- System outline
- Implementation
- Current status
- Further work

Aims of the Project

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

System Outline



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

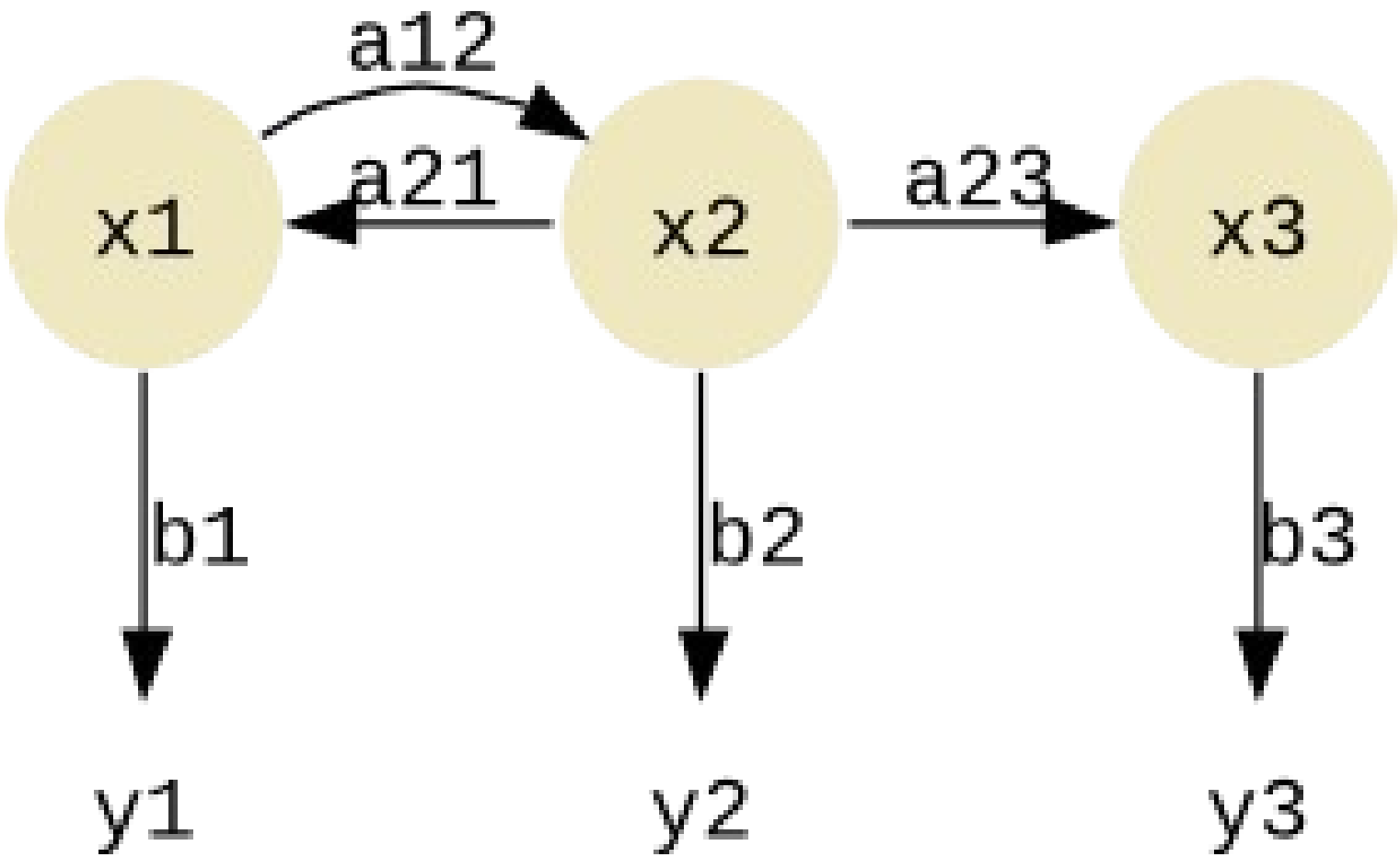
Principle Component Analysis

- 30 3D vectors from motion tracking
- 900 dimension dataset per second
- Reduction using PCA to less than 50
- Faster to run PCA

Hidden Markov Models

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

HMM Structure



HMM Training

- Word dictionary
- Initial state and outcome probabilities
- Annotated training data
- Training data should include 10 or more examples of each word

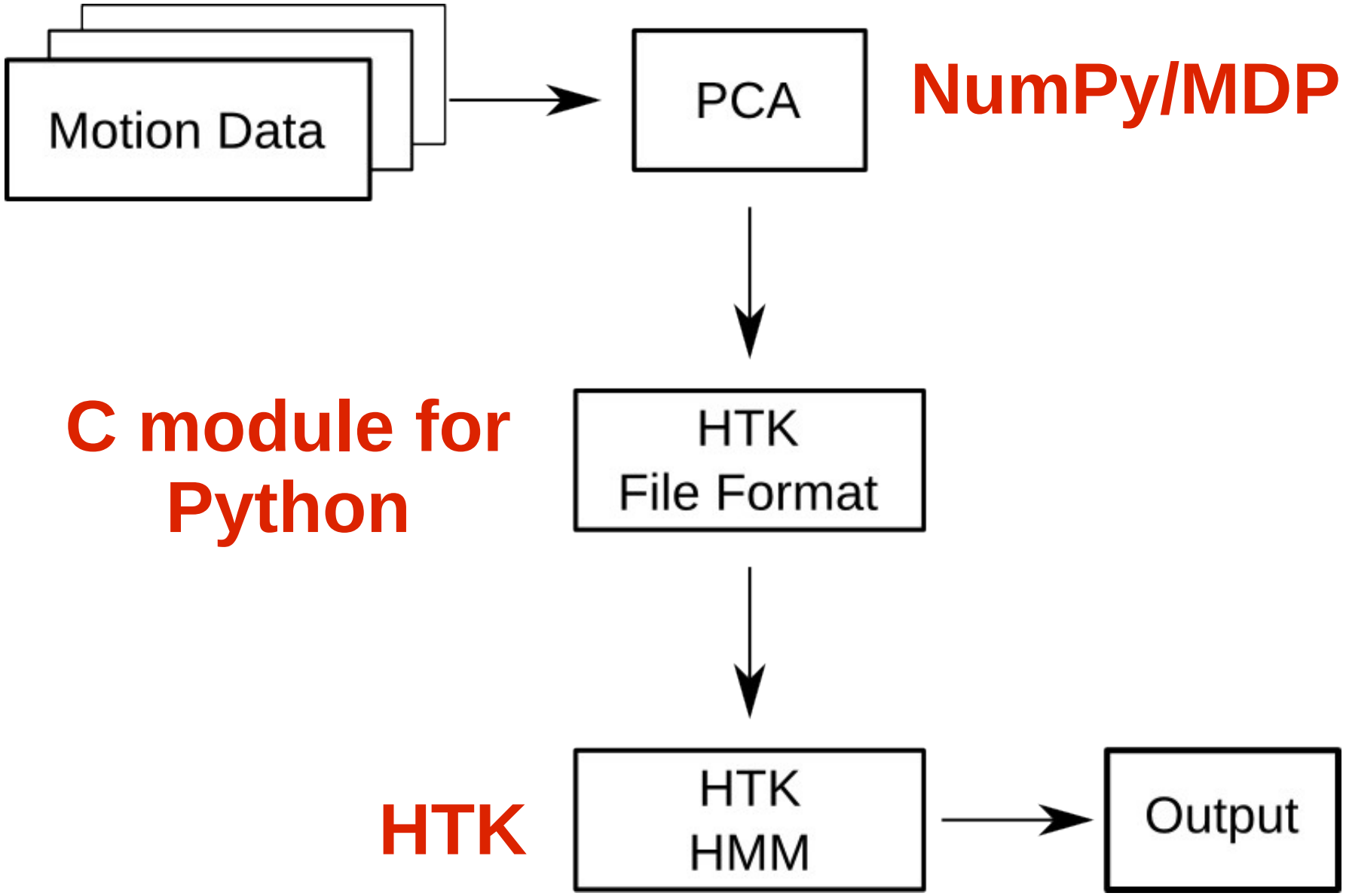
HMM Testing

- Grammar
- “Clean” testing data
- Accurracy of system obtained

Implementation

- Python wrappers
- NumPy and Modular Data Processing for PCA
- HMM Tool Kit

System Outline



Current Status

- Currently non-real time
- HTK wrappers complete
- PCA code implemented
- Motion tracker data to be recorded on Friday

Future work

- Thread program for real time processing
- Research computer vision based gesture recognition
- Extract features from video
- Use webcam or similar as input device

Conclusions

- Wide scope for further work
- Useful in the real world
- Accurracy is important
- Running about two weeks late

Any Questions?