CS2310 Exercise 4:

Lei Jiang (lej16@pitt.edu)

The purpose of this exercise is to apply multimedia functional dependency to multimedia applications design. Given an application (its requirements), design the multimedia database using multimedia functional dependency theory. Then specify the patterns (IC cards) associated with the multimedia database. The application is the personal health care system that allows the user (a senior citizen) to access related multimedia documents using gestures. A new classification scheme based upon the gestures associated with the multimedia documents is to be introduced. This would allow users to search for multimedia titles similar to a known audio search key (such as the voice of a certain author). Your task is to design the multimedia database and associate patterns (IC cards), which can in turn be transformed into IC index and finally an implementation. (Note: Exercise 4 is similar to previous Exercise 4, except the application was changed from distance learning to personal healthcare in 2011)

Multimedia Functional Dependency

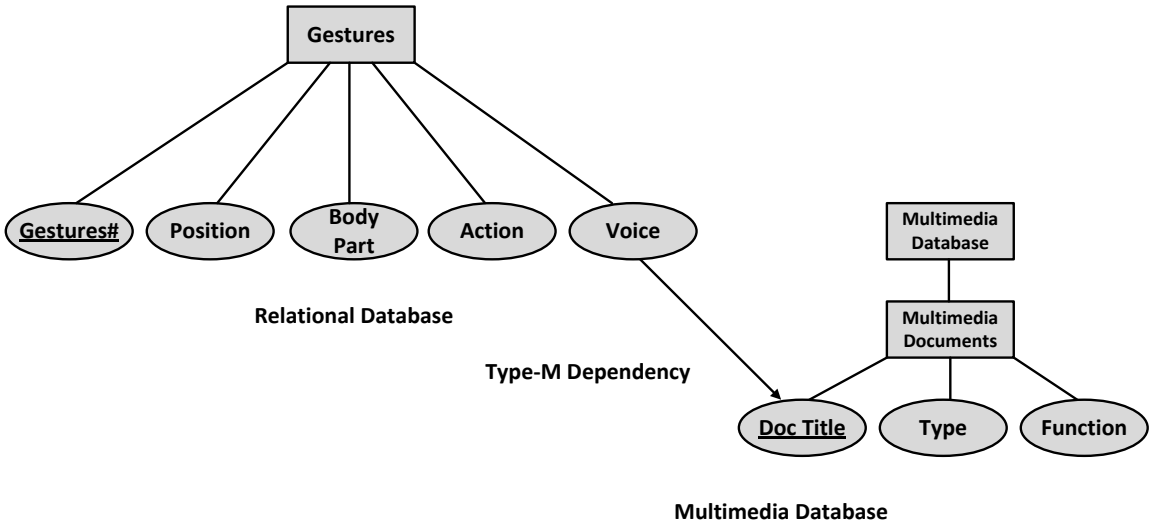

Figure 1. Type-M Dependency

Figure 1 shows the Type-M dependency. The main function dependency can be seen as:

$$Gestures_{ExtractVoice(t1)} \rightarrow MultimediaDocuments_{doc\_title(t2)}$$

There are two relationships in this multimedia database:

1. Gestures Recognizer identifies senior's gestures by Position, Body Part, Action and Gestures Number. And then, Gestures Recognizer can lookup traditional relational database, and get Voice. R_0 = {Gestures#, Position, Body Part, Action, Voice}
   $\{Gestures\#, Position, BodyPart, Action\}_{ExtractVoice(t1)} \rightarrow \{Voice\}_{g1(t1)}$
2. By voice, multimedia database can find corresponding multimedia documents. R_1 = {Voice, Doc Title, Type, Function}

$$\{Voice\}_{g2(t1)} \rightarrow \{Doc\ Title, Type, Function\}_{doc\_title(t1)}$$

IC Card Design

IC Card IC Name: Senior

Description: Send a gesture
Interaction Pattern:

Mixed

My Task: Make and send a gesture to Gestures Recognizer
Time Critical Condition: None
Name of Other IC: Gestures Recognizer
Message to Other IC: Gestures
Other IC's Task: Recognize and convent gestures to voice signature
Card 1of 1 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Gestures Recognizer

Description: Convent gestures into voice signature
Interaction Pattern:

Quiet State

My Task: Convent gestures into voice signature
Time Critical Condition: None
Name of Other IC: Multimedia Database
Message to Other IC: Voice signature
Other IC's Task: Search multimedia documents by voice signature
Card 2of 2 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Gestures Recognizer

Description: Recognize the gestures from Senior
Interaction Pattern:

Mixed

My Task: Recognize the gestures from Senior
Time Critical Condition: None
Name of Other IC: None
Message to Other IC: None
Other IC's Task: None
Card 1of 2 (If necessary please use several IC cards to describe an IC)

IC Card IC Name: Multimedia Database

Description: Search corresponding multimedia documents by voice signature
Interaction Pattern:

Mixed

My Task: Find relevant multimedia documents based on voice signature
Time Critical Condition: None
Name of Other IC: Senior
Message to Other IC: Multimedia documents or no
Other IC's Task: None
Card 1of 1 (If necessary please use several IC cards to describe an IC)

Figure 2. IC Card

IC Index

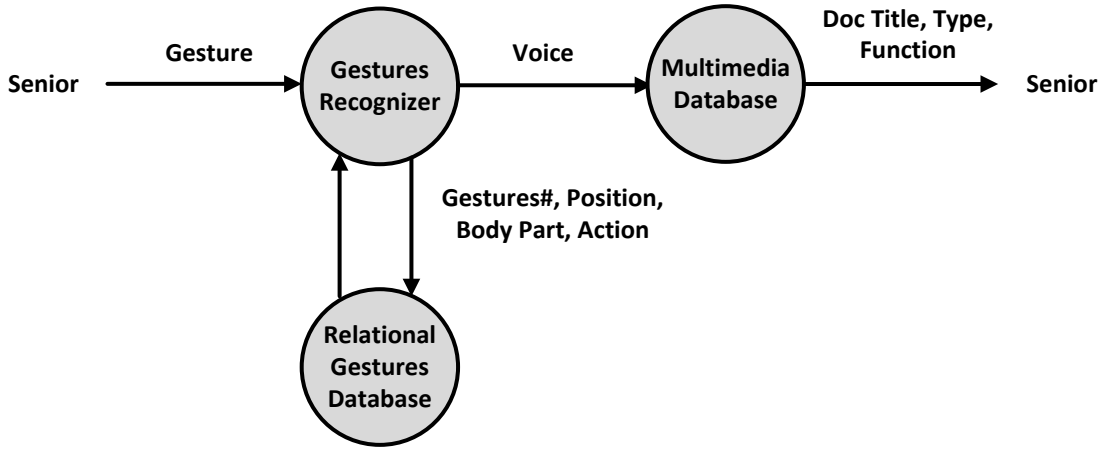

Figure 3. Dataflow Diagram

Gestures Recognizer Index

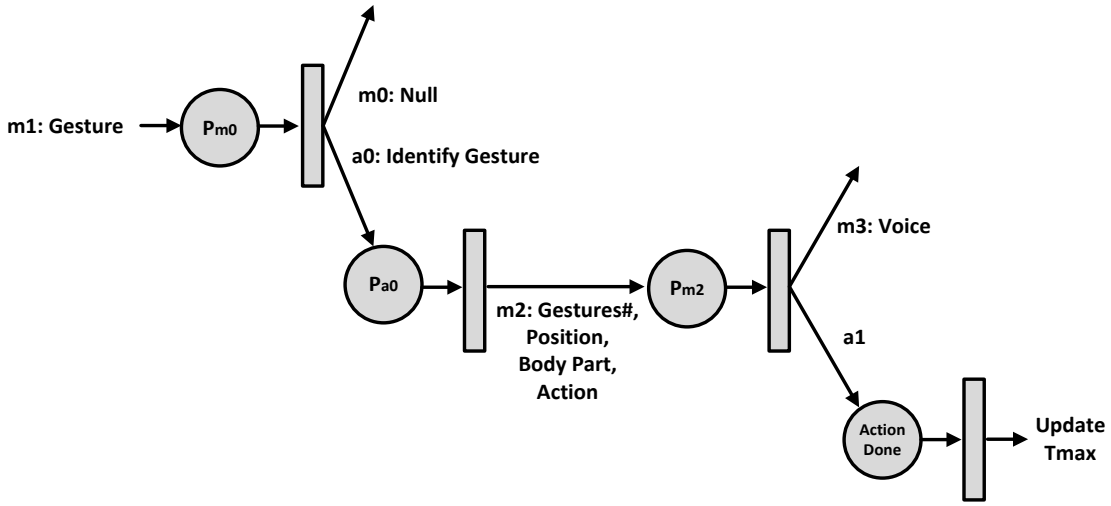

Figure 4. Gestures Recognizer Active Index

Multimedia Database Index

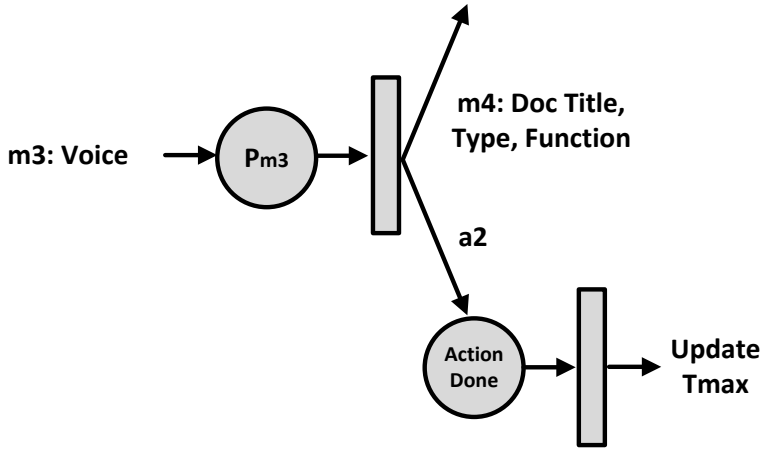

Figure 5. Multimedia Database Active Index