Universal home appliances controller with memory, timing, knowledge and intelligence

Draw me a cat

I want to go to Seoul, sweetie...

Must be well done, better than last time!

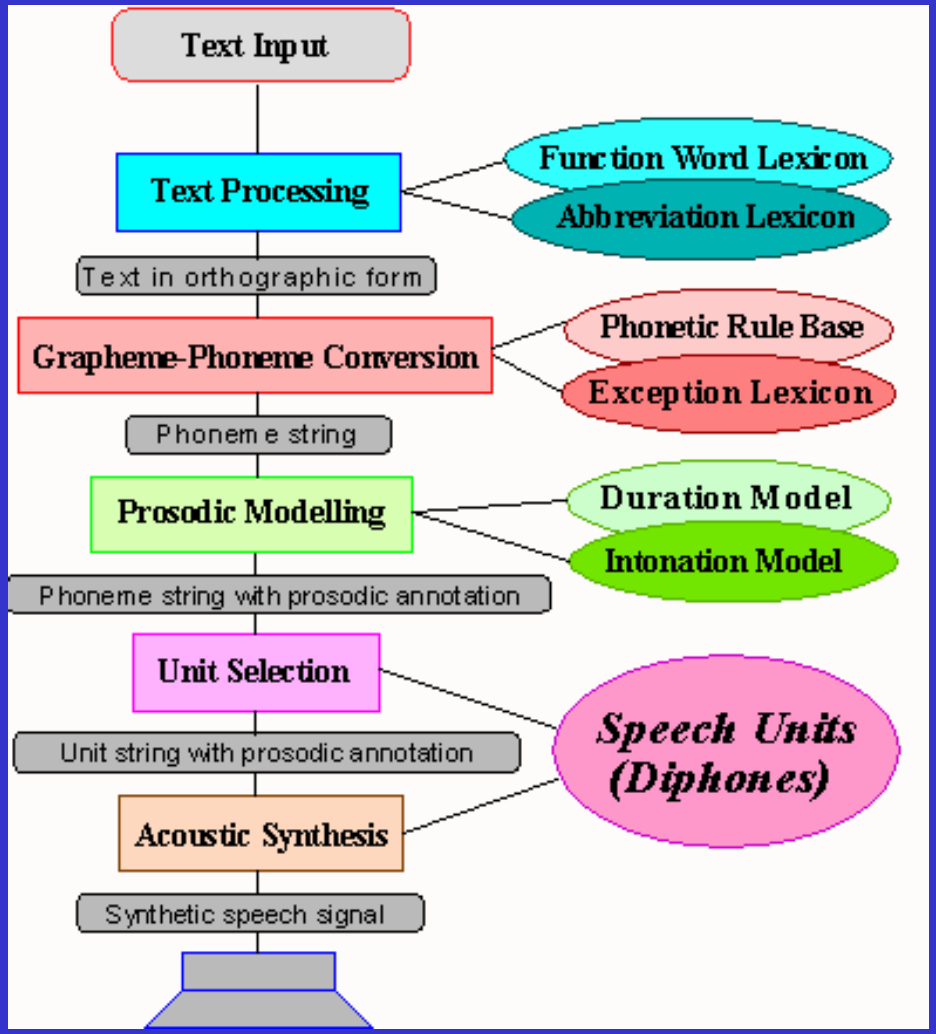
Speech recognition

Speech interpretation

Dialog manager

Text generation

Speech synthesis



Intelligent Learning Robot will:

- Answer in Japanese questions asked in Korean
- Answer in English questions asked in Korean
- Answer in Korean questions asked in English
- Answer in English questions asked in English
- Create traditional Confucian poetry and create nonsensical speeches
- Recognize faces and react to them accordingly
- Learn facial movements and emotions by examples
- Communicate with human and other robot by voice and image processing (gestures)

Intelligent Learning Robot will:

- Learn behaviors that link sensor to actuator data
- React with behaviors to sentences, images and sensor information
- Be completely reprogrammable by the user.
- It cannot be confused, it will always do something, and in most cases it will be unexpected.
- Combining logic and probabilistic approaches to robot design is not used in robot toys yet.

Is it possible?

Yes!

How?

By using a general-purpose logic learning architectures based on Data Mining methods that we developed recently at PSU

Examples

- 1. Face Recognition
- 2. Behavior control
- 3. Question answering
- 4. Learning Gaits

Example 1: Face Recognition

John

Mark

Dave

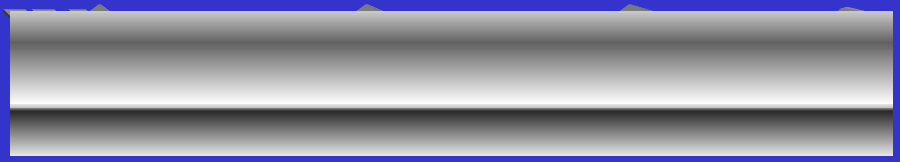
Jim

Alan

Mate

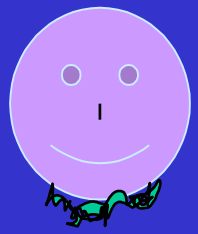
Nick

Robert



John

Mark



Dave

Jim

Good guys

Alan

Mate

Nick

Robert

Bad guys

A - size of hair

B - size of nose

C - size of beard

D - color of eyes

John

A′ BCD

Mark

A′ BCD′

Dave

A′ B′CD

Jim

A′ B′CD

Good guys

A - size of hair

B - size of nose

C - size of beard

D - color of eyes

AB \ CD	00	01	11	10
00	-	-	1	-
01	—	-	1	1
11	-	—	-	-
10	-	-	-	-

Alan

Mate

Nick

Robert

Bad guys

A′ BC′D′ AB′C′D ABCD A′ B′C′D

A - size of hair

B - size of nose

C - size of beard

D - color of eyes

AB \ CD	00	01	11	10
00	-	-	1	-
01	0	0	1	1
11	-	—	0	-
10	-	0	-	-

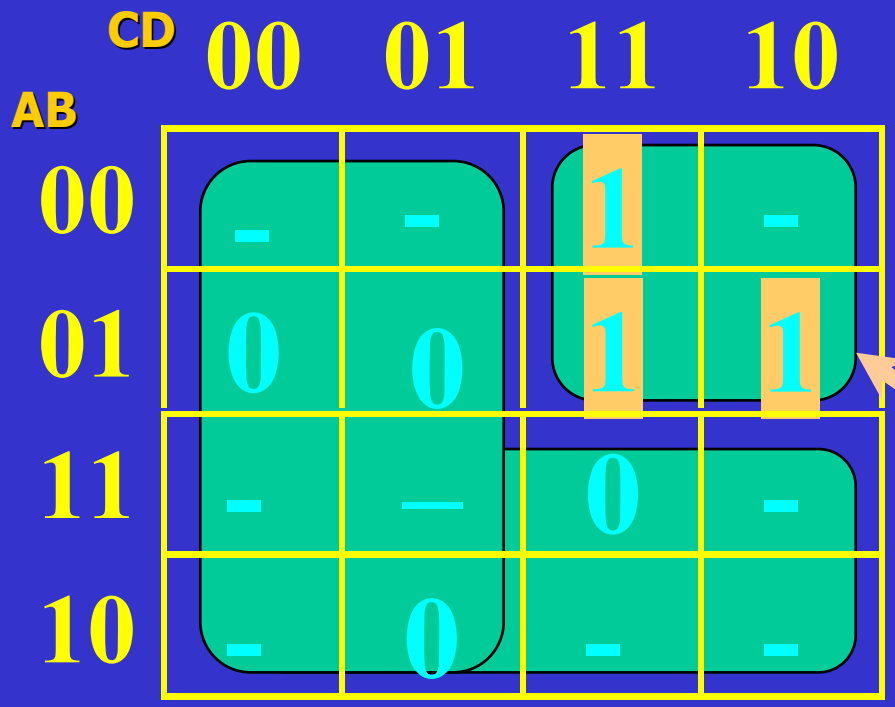
A′C

Generalization 1:

Bald guys with beards are good

Generalization 2:

All other guys are no good



This kind of input-output problem description appears in many applications

A	B	C	D	X
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	1	1
0	1	1	0	1
1	1	1	1	0
1	0	0	1	0