

MI-Memo: Multi-modal Input for Interactive Memo

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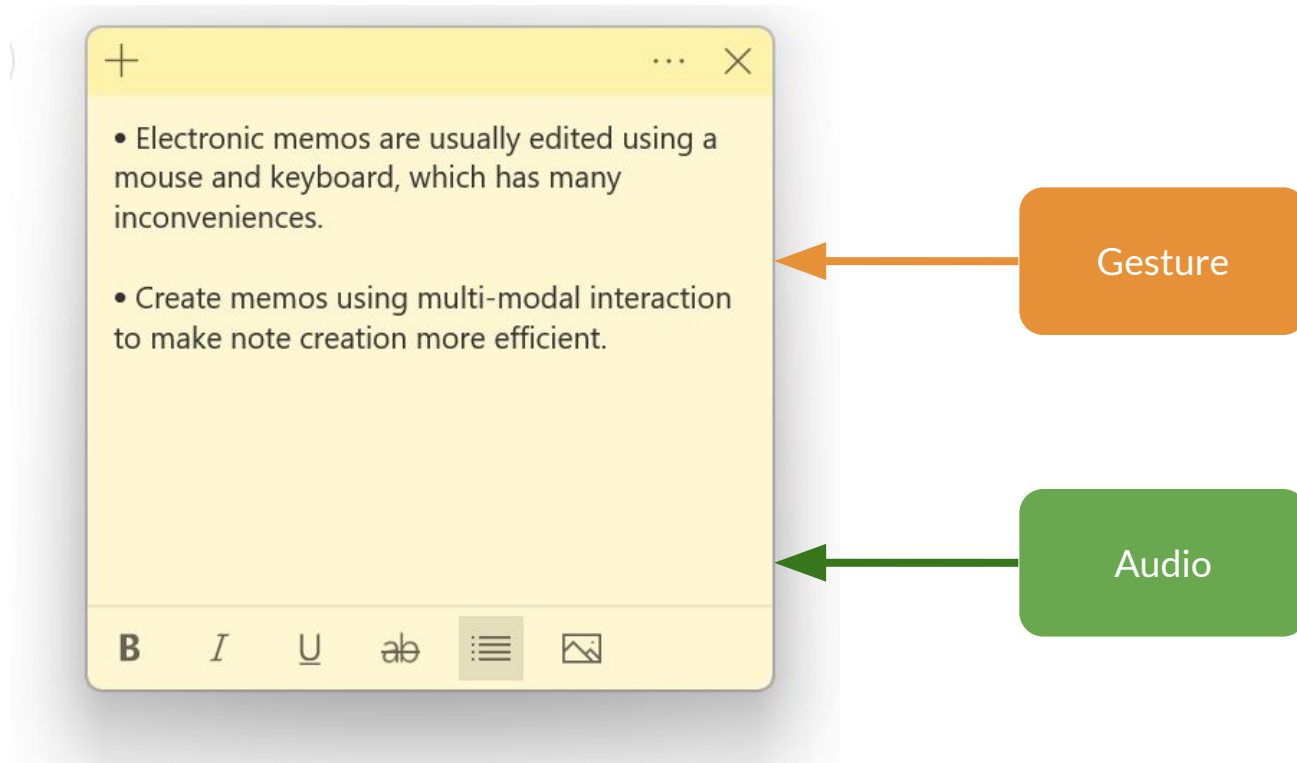
Denis Lalanne[†]

University of Fribourg

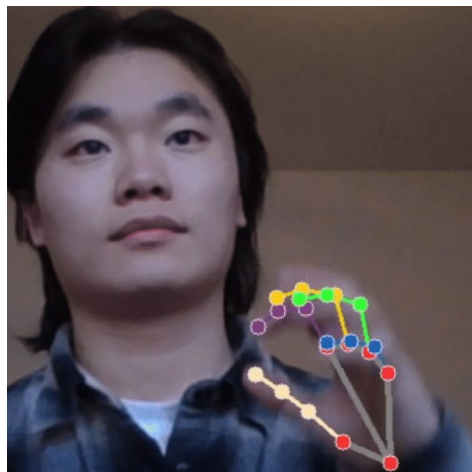
Fribourg, Switzerland

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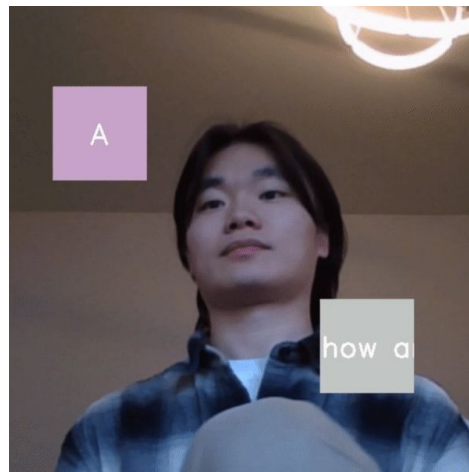
An interactive memo?



Previous features

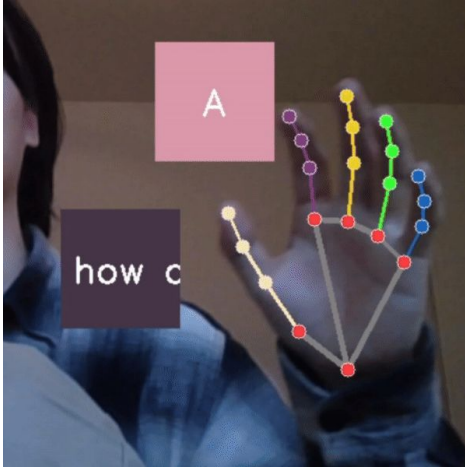


create

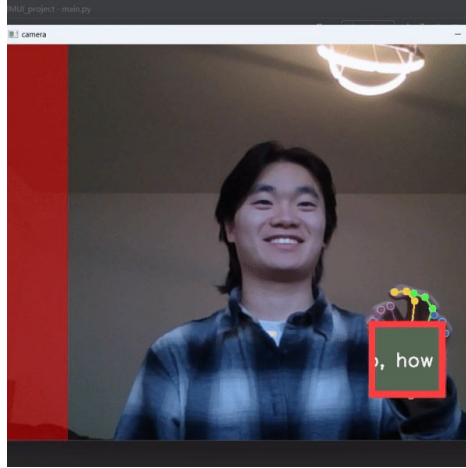


merge

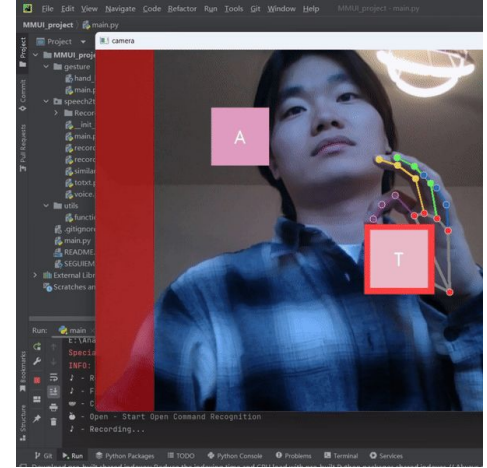
New features



merge



delete



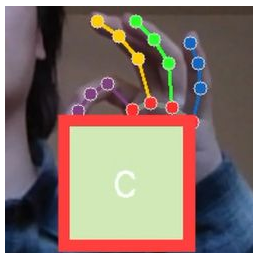
add content

New features

- Status feedback



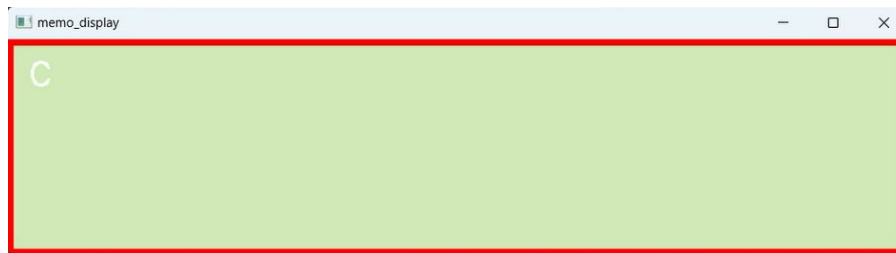
touch memo



pinch memo



system status



content recording

Technical improvements

Speech Command Recognition

- Combine volume and audio similarity

Gesture Recognition

- Consider the information of the previous frame

Parallel Multimodality

- Limit the number of threads in the same temporal window

Process Parallel

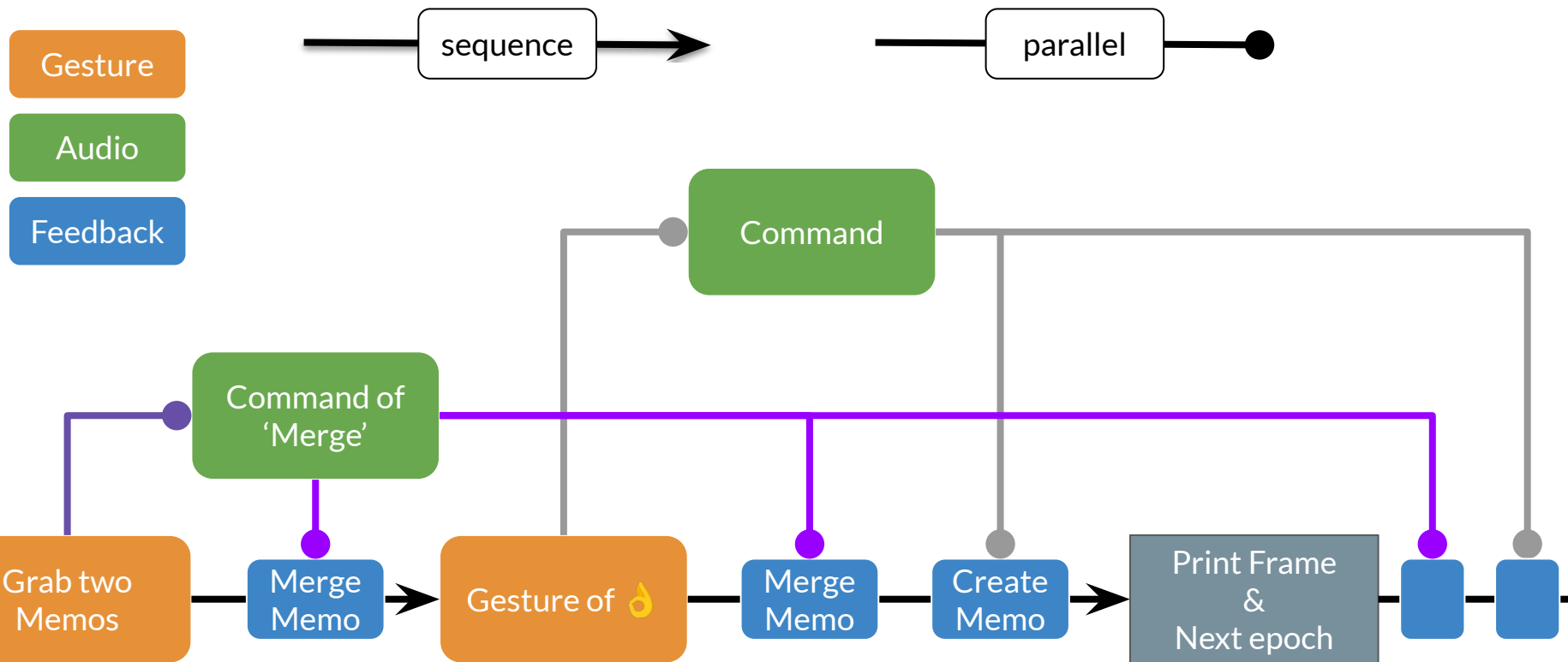


Diagram CASE/CARE

CASE (Machine-side)

- Synergistic

CARE (Human-side)

- Complementarity
 - << Create a memo >> (command)
 - and <gesture of << create >>> (position)
- Equivalence
 - << merge >> and <touch both memos>
 - or <grab one memo and put it onto another>

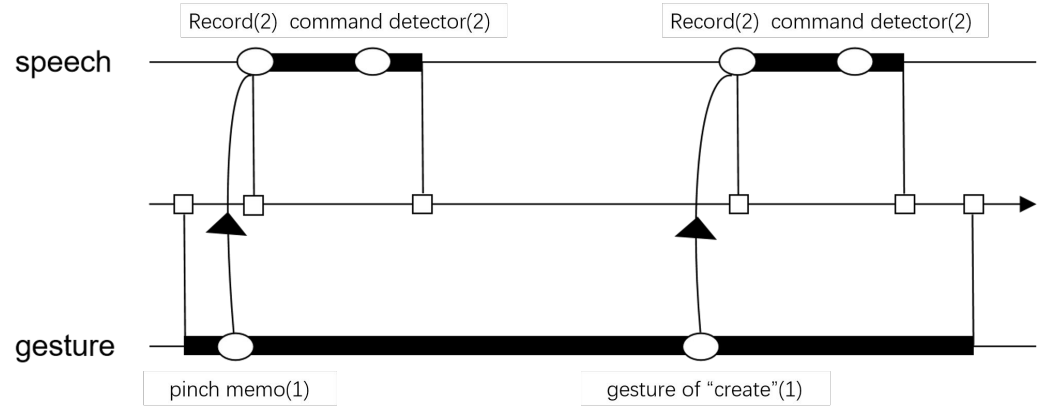


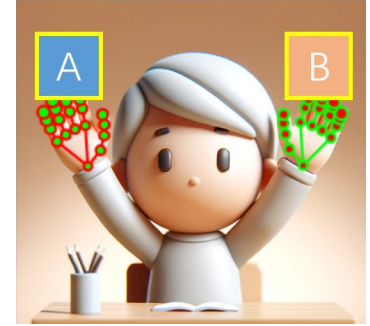
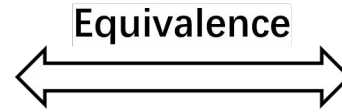
Diagram CASE/CARE

CASE (Machine-side)

- Synergistic

CARE (Human-side)

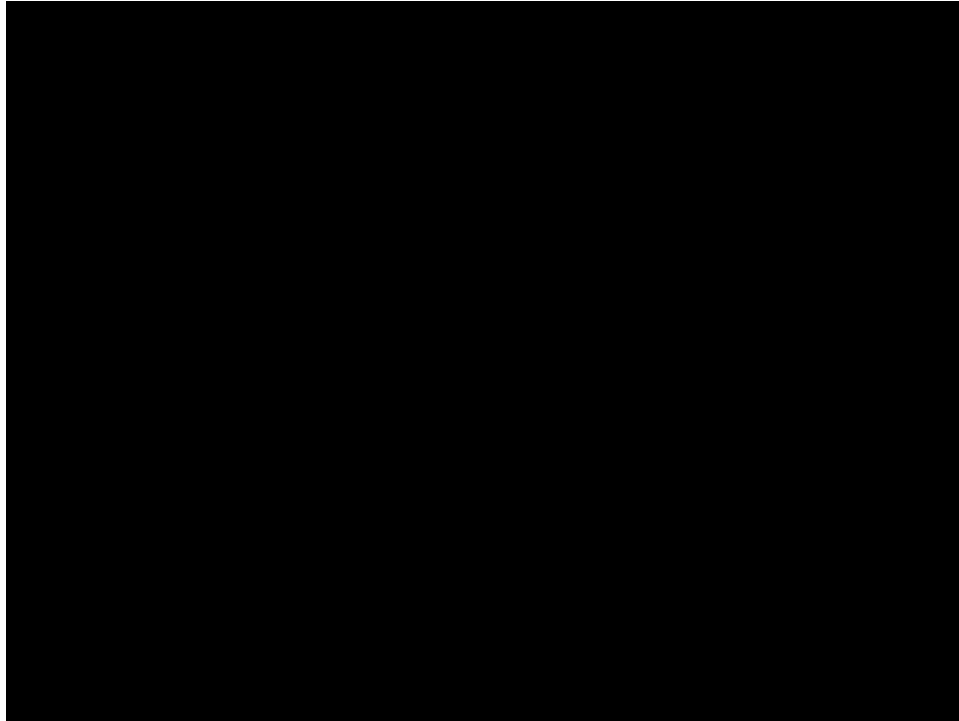
- Complementarity
 - << Create a memo >> (command)
 - and <gesture of << create >>> (position)
- Equivalence
 - << merge >> and <touch both memos>
 - or <grab one memo and put it onto another>



Multi-modal Fusion

Operation	Gesture	Speech	Memo State		
			is_pinched	is_opened	is_catched
Create memo	Pinch	Create	FALSE	FALSE	FALSE
Open memo	Pinch	Open	TRUE	FALSE	FALSE
Add content	Pinch	Add	TRUE	TRUE	FALSE
Close memo	Pinch	Close	TRUE	TRUE	FALSE
Merge memos	Touch both	Merge	FALSE	T/F	TRUE
	Grab and drop.	None	FALSE	T/F	TRUE

Video Demonstration



User Evaluation

- 6 different participants
- Quantitative method used: Task Completion Time
- Qualitative method used: Survey
 - 6 questions with a range of values between 1 to 7
 - 1 equals “Strongly Disagree”
 - 7 equals “Strongly Agree”

User Evaluation

Independent variable:

- Create a memo
- Merge (multimodal)
- Open a memo
- Write “Hello, how are you” by speech
- Close a memo
- Merge (only gesture)

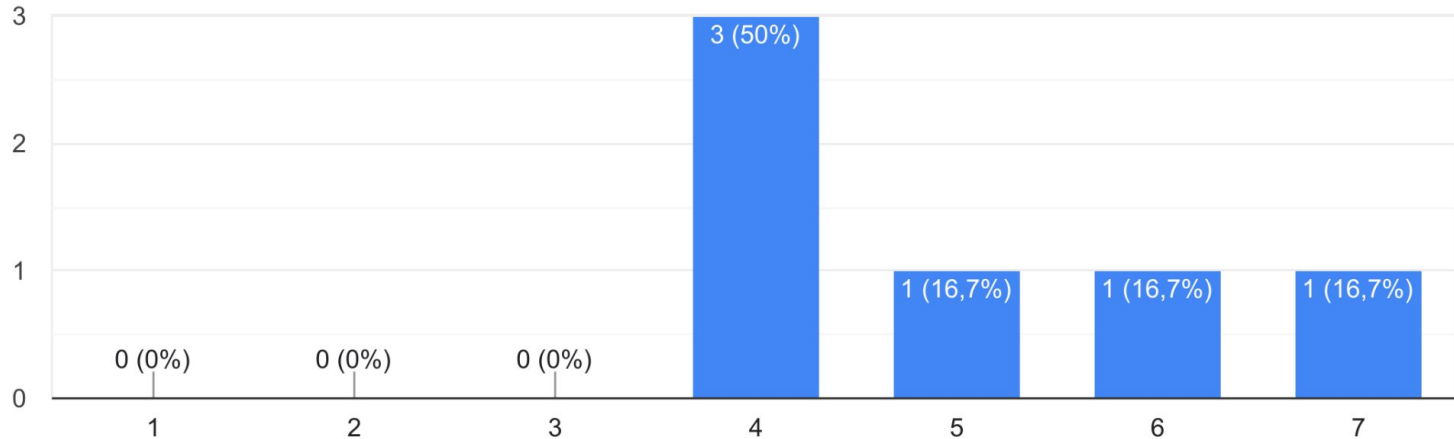
Dependent variable

- Time to complete assigned tasks
- Satisfaction score

User Evaluation: UMUX-Lite

This system's capabilities meet my requirements.

6 risposte

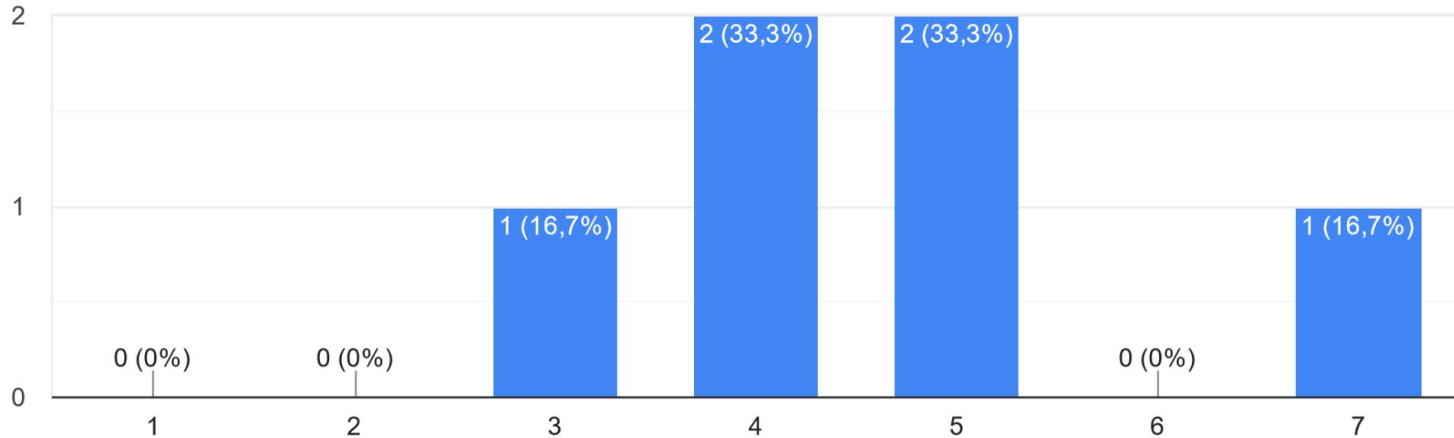


UMUX-Lite	User 1	User 2	User 3	User 4	User 5	User 6
Satisfaction Score	41	83.33	58.33	75	50	75

User Evaluation: UMUX-Lite

This system is easy to use.

6 risposte

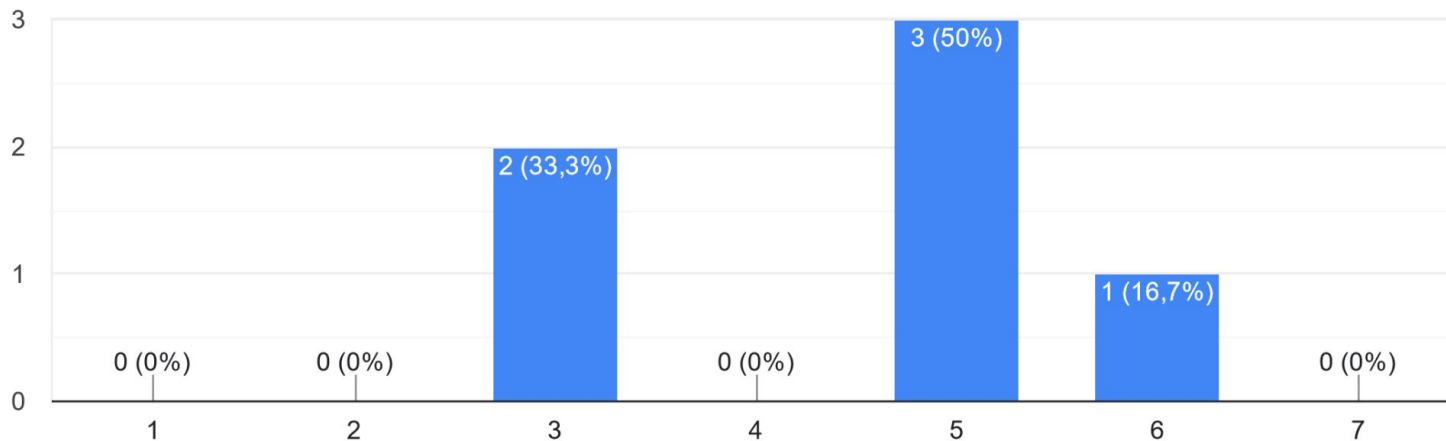


UMUX-Lite	User 1	User 2	User 3	User 4	User 5	User 6
Satisfaction Score	41	83.33	58.33	75	50	75

User Evaluation

The system had some problem to recognize my voice.

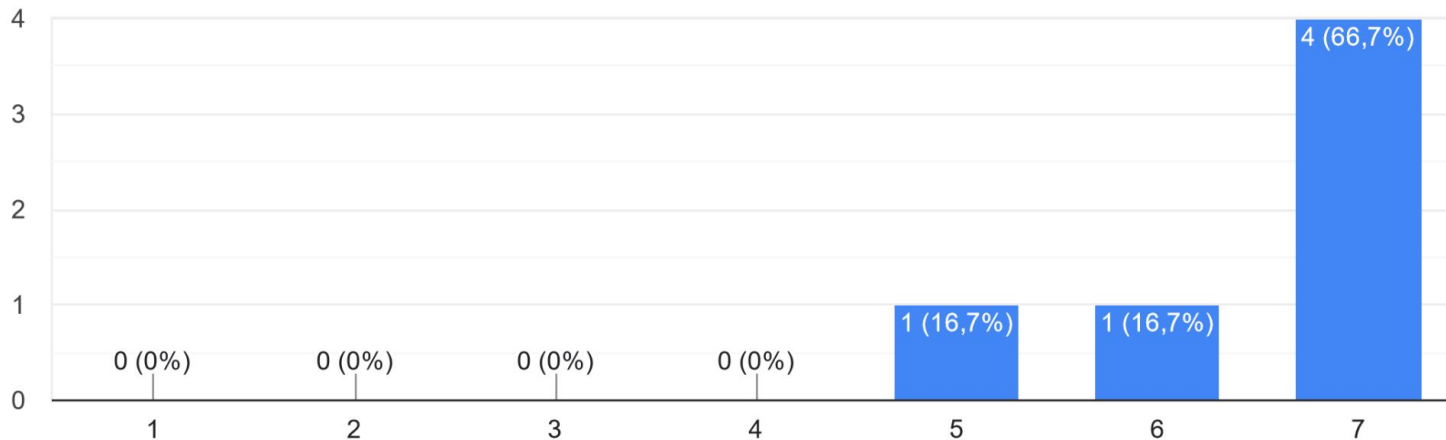
6 risposte



User Evaluation

The system handles well the recognition of my hands

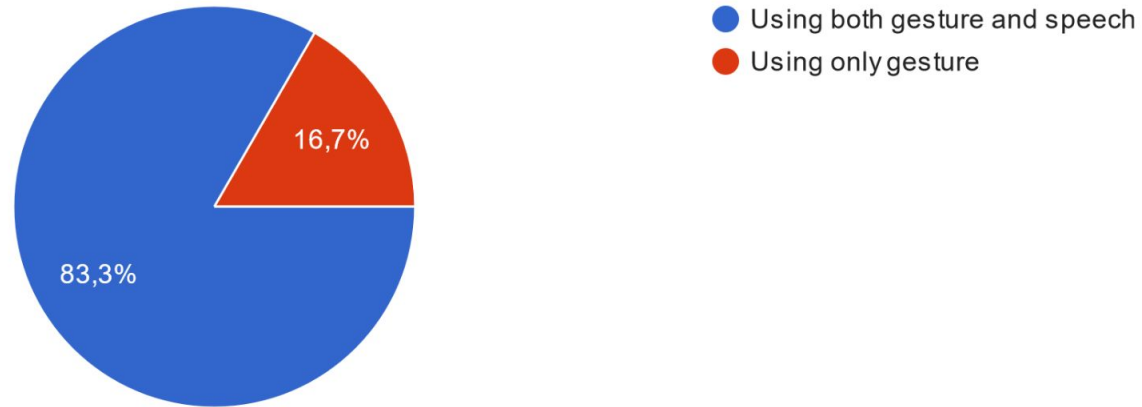
6 risposte



User Evaluation

Do you prefer the "merge" function by using both vocal command (speech) and touching the 2 intended memos (gesture) or by "catching" the 2 memos and placing them together (only gesture)?

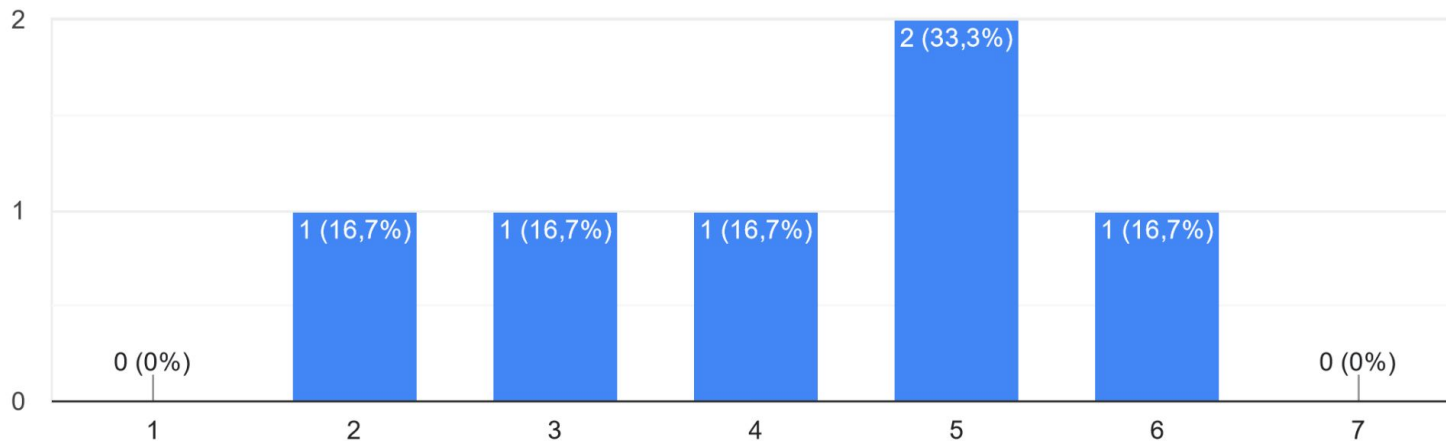
6 risposte



User Evaluation

I would use this Virtual Memo System instead of typing the letters on the keyboard by hands.

6 risposte



User Evaluation

