

Awareness Communication Based on Functionally Layered Coding

Masahiro Iwahashi^a, Takayuki Suzuki^a,
Suriyon Tansuriyavong^a, Somchart Chokchaitam^b

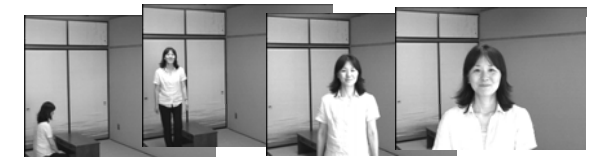
^a Nagaoka University of Technology, Nagaoka, Niigata, 940-2188, Japan

^b Thammasat University, Rangsit, Pathum-Thani, 12121, Thailand

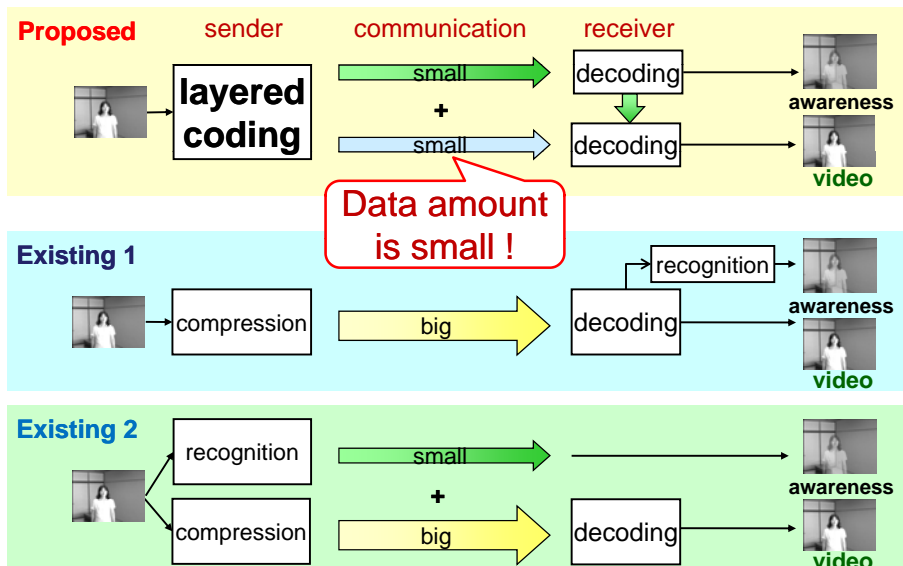
Purpose of this research



Conventional system always displays details



What is new?

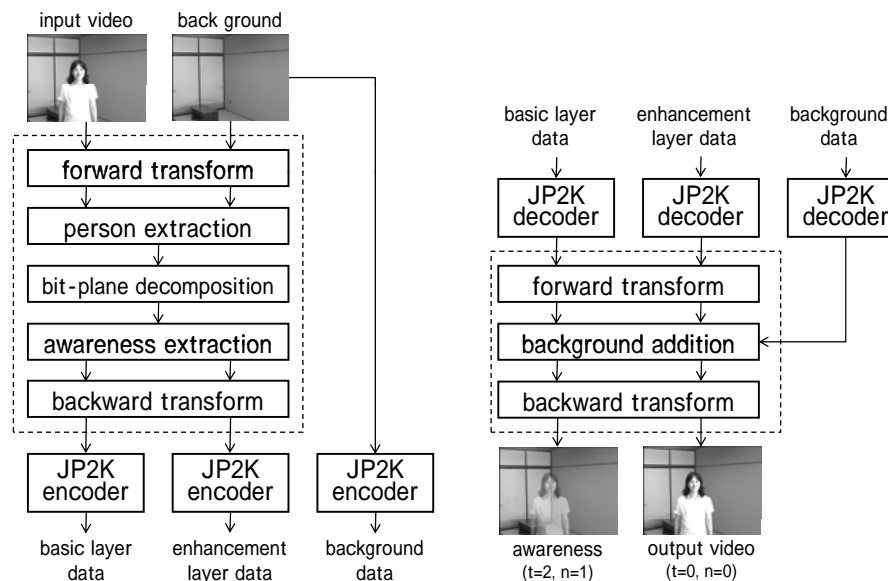


Why data amount is reduced?

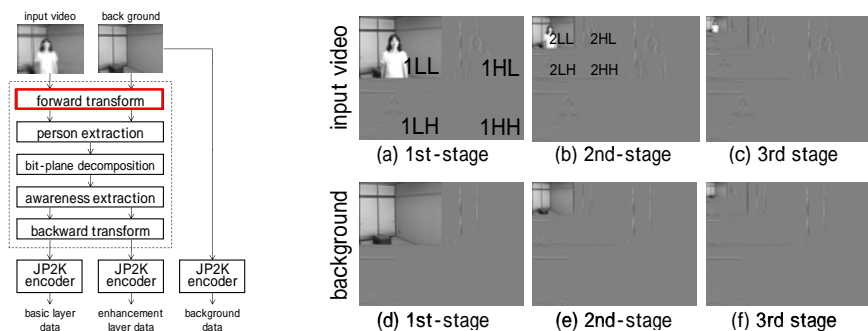
- only **Person Region**
{current frame - background image} is transmitted.
- only **Low Band Signal**
"blurred" awareness = {low band signal} is transmitted.
where {person region} = {low band signal} + {high band}
- only **Higher Bit Planes**
"semi transparent" awareness
= {person region}/2 + {background image}/2
only {person region}/2 is transmitted.

Signal Processing

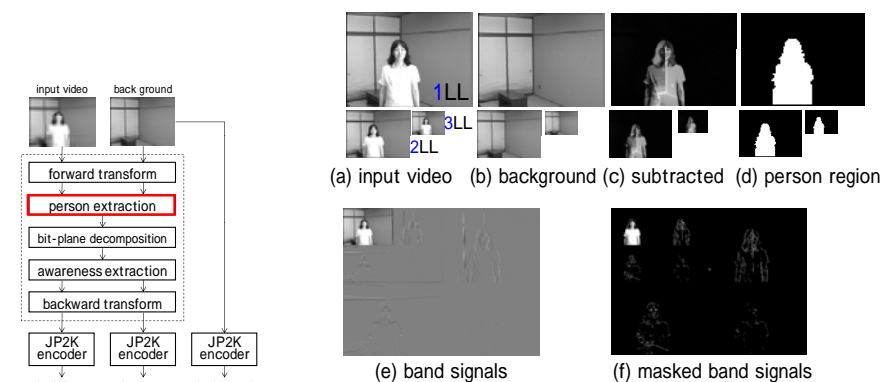
Sender and Receiver



Sender in Detail 1/2



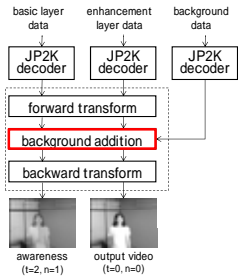
Sender in Detail 2/2



Only n_{LL} band signal is transmitted in the basic layer as the awareness.

blurriness "n"

Receiver in Detail



$$\{\text{output}\} = \{\text{person}\} \times 2^{-t} + \{\text{background}\} \times (1 - 2^{-t})$$

conventional video mode...

$$t=0 \rightarrow \{\text{output}\} = \{\text{person}\}$$

awareness mode...

$$t=1 \rightarrow \{\text{output}\} = \{\text{person}\}/2 + \{\text{back}\}/2$$

= **semi transparent**

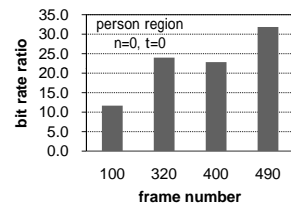
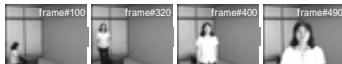
$$t=2 \rightarrow \{\text{output}\} = \{\text{person}\}/4 + 3\{\text{back}\}/4$$

= **quarter transparent**

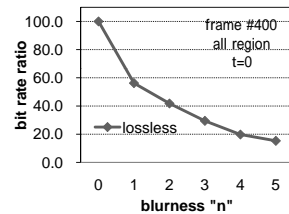
transparency "t"

Experimental Results

Person region only / Low band only

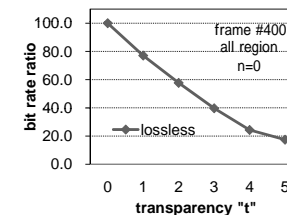


Bit rate is reduced
to 10 ~ 30 %.

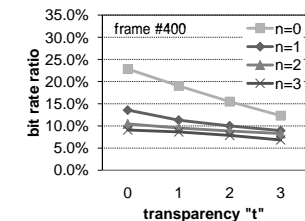


Bit rate is reduced
depending on **blurriness "n"**.

Higher bit plane only / Combination of all

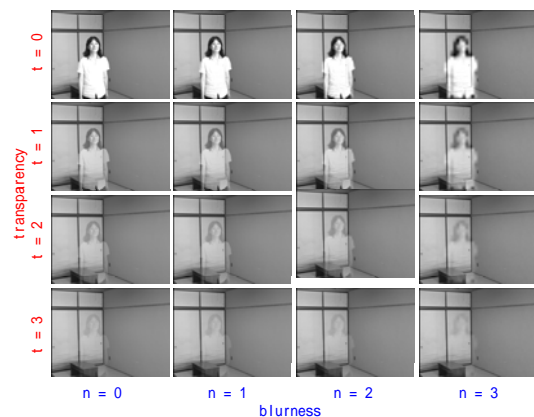


Bit rate is reduced
depending on **transparency "t"**.



Bit rate is reduced
to 6 ~ 14 % for n>0.

Example of Awareness



Conclusions

1. Awareness video communication system based on JP2K core technology is proposed.
2. It generates functionally layered data for displaying awareness and normal video.
3. It is confirmed that it can reduce the bit rate for awareness to 10 [%] .
4. by sending the minimum components composed of higher bit-planes and low band signal.