

Lifelog-Style Experience Recording and Analysis for Group Activities

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Lifelog and Grouplog for Experience Integration



camera in glasses
captures First
Person Vision

entering room



leaving



personal memory

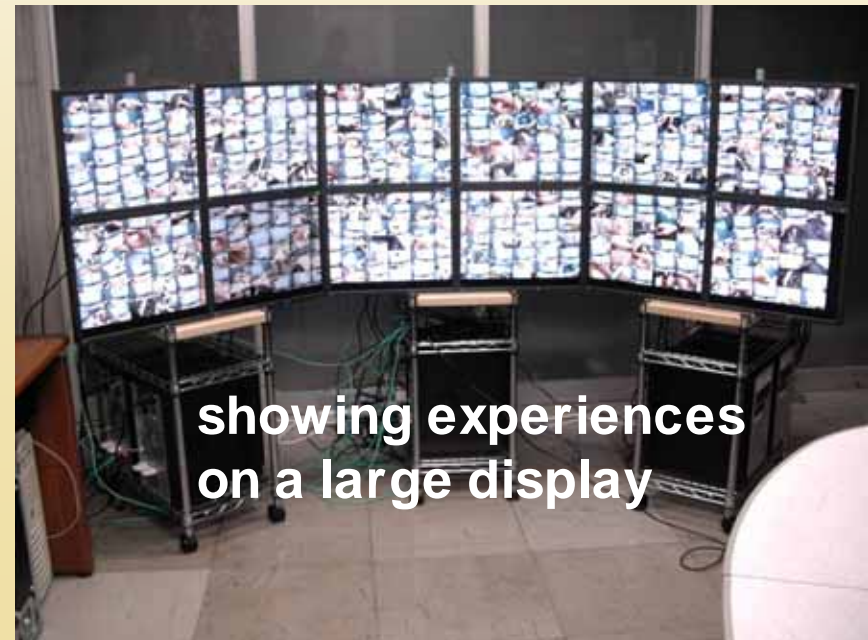
take something



working



integrating life logs of many people

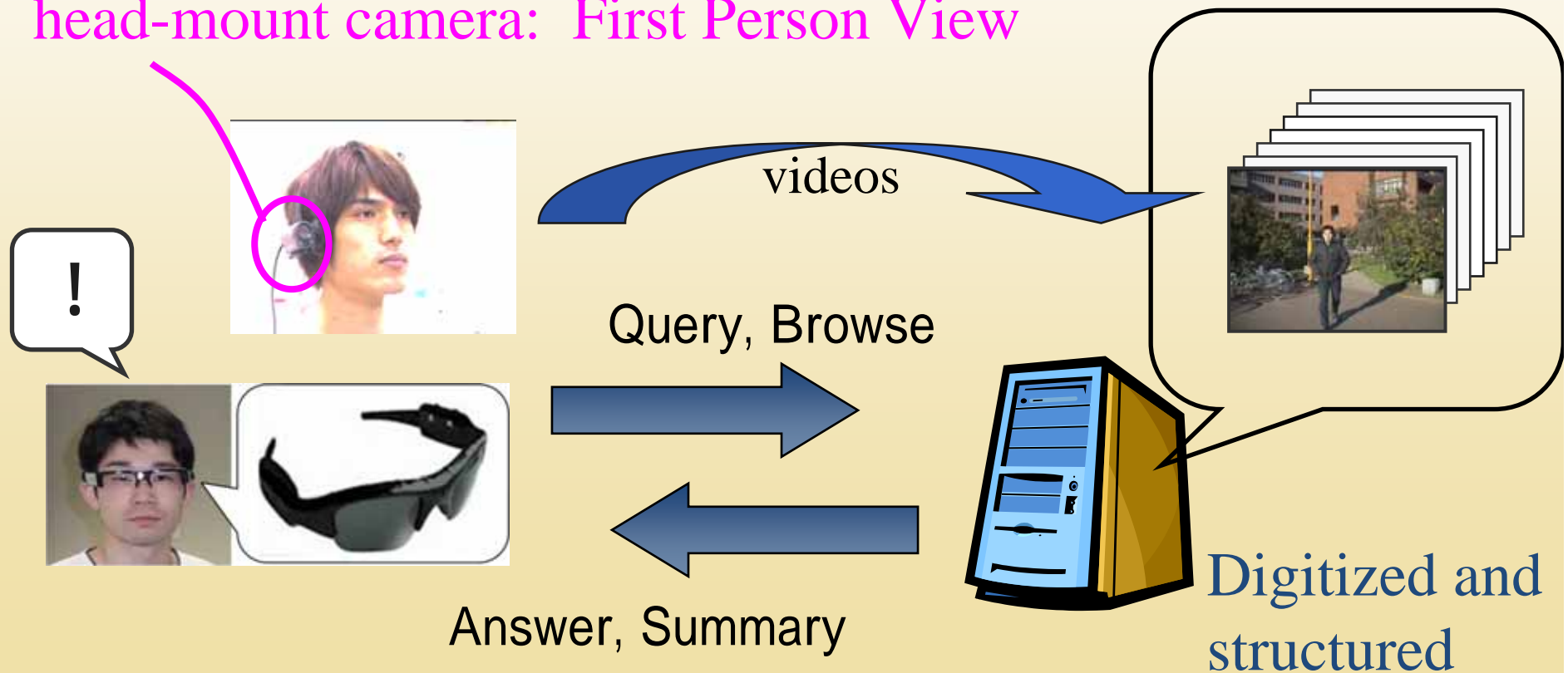


showing experiences
on a large display

LifeLog through FPV

RECORDING AND RECALLING
PERSONAL EXPERIENCE

head-mount camera: First Person View



Grouplog: capturing activities through First-person Vision

- Objective
 - Browsing group experiences
 - Support for group activities
- Target
 - Easy Browsing
 - event detection
 - view reconstruction
 - Analysis support
 - behavior analysis
 - gaze, attention, communication
- Applications
 - field work, training, workshop
 - training for teacher, curator, etc.



First Person Vision Videos

The personal view records

Advantages



Rich information (compared to texts, audio, or photos)



Record what the user sees (good trigger of memory)

Disadvantages



long and redundant data

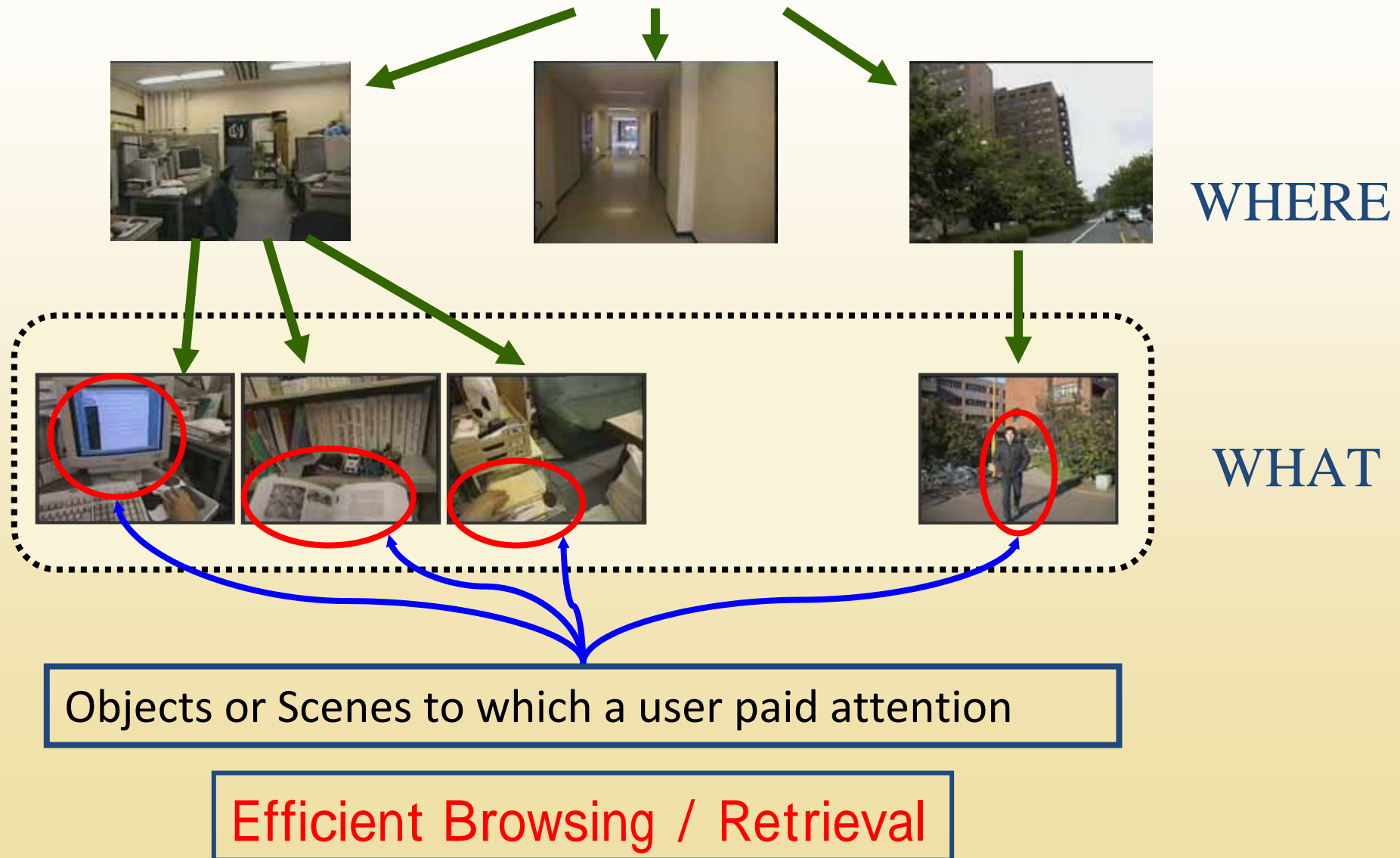


bad quality (shaky, etc.)





Summary of Personal View Records



Example of Summary (1)

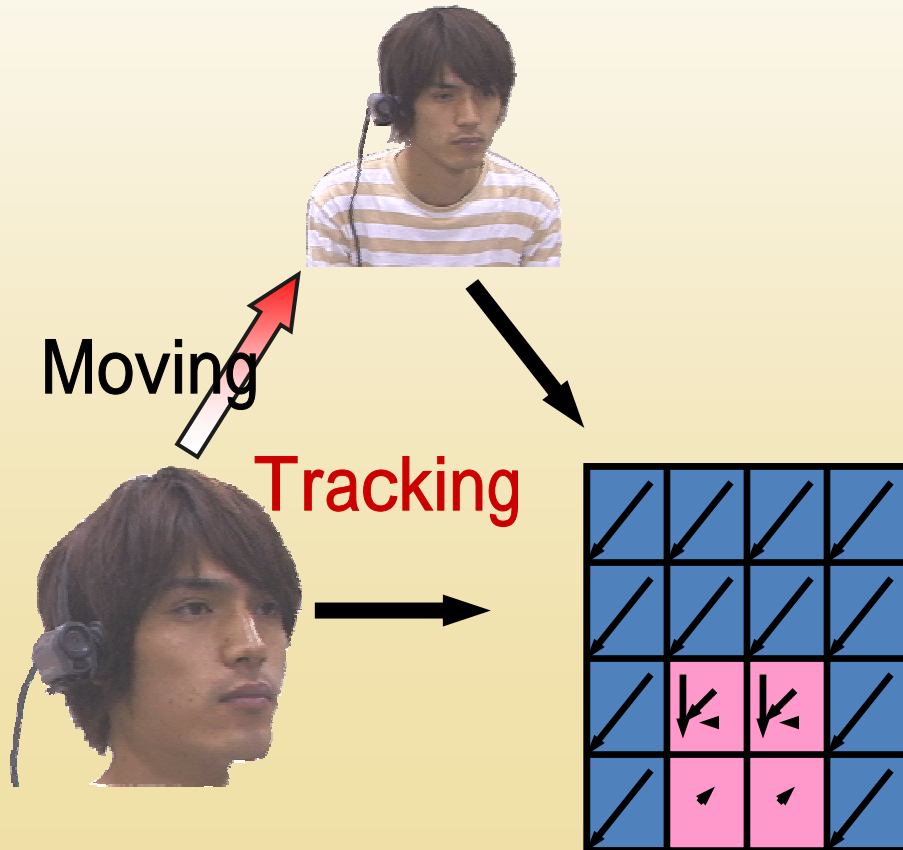


Scenes of Attention

—indices for personal view records

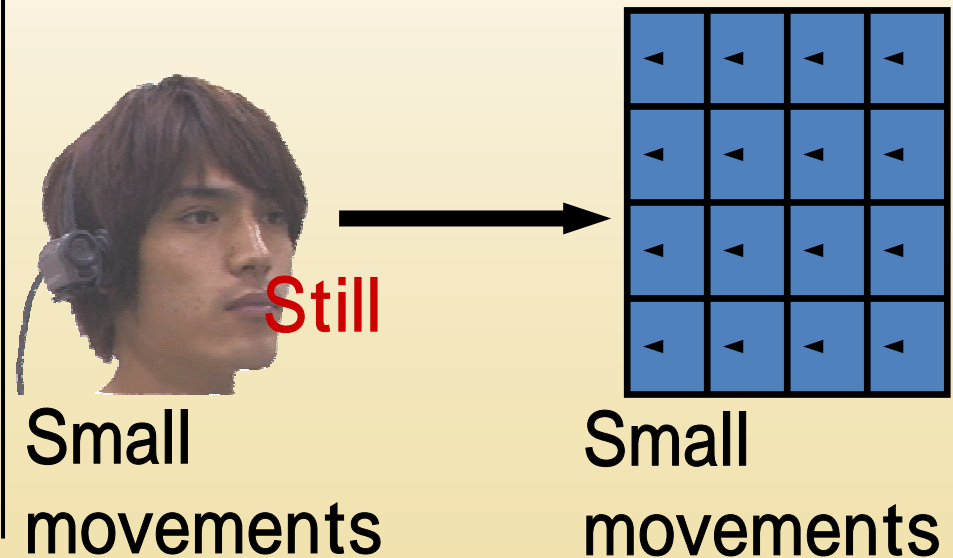
Active motion for gazing at

Active Attention



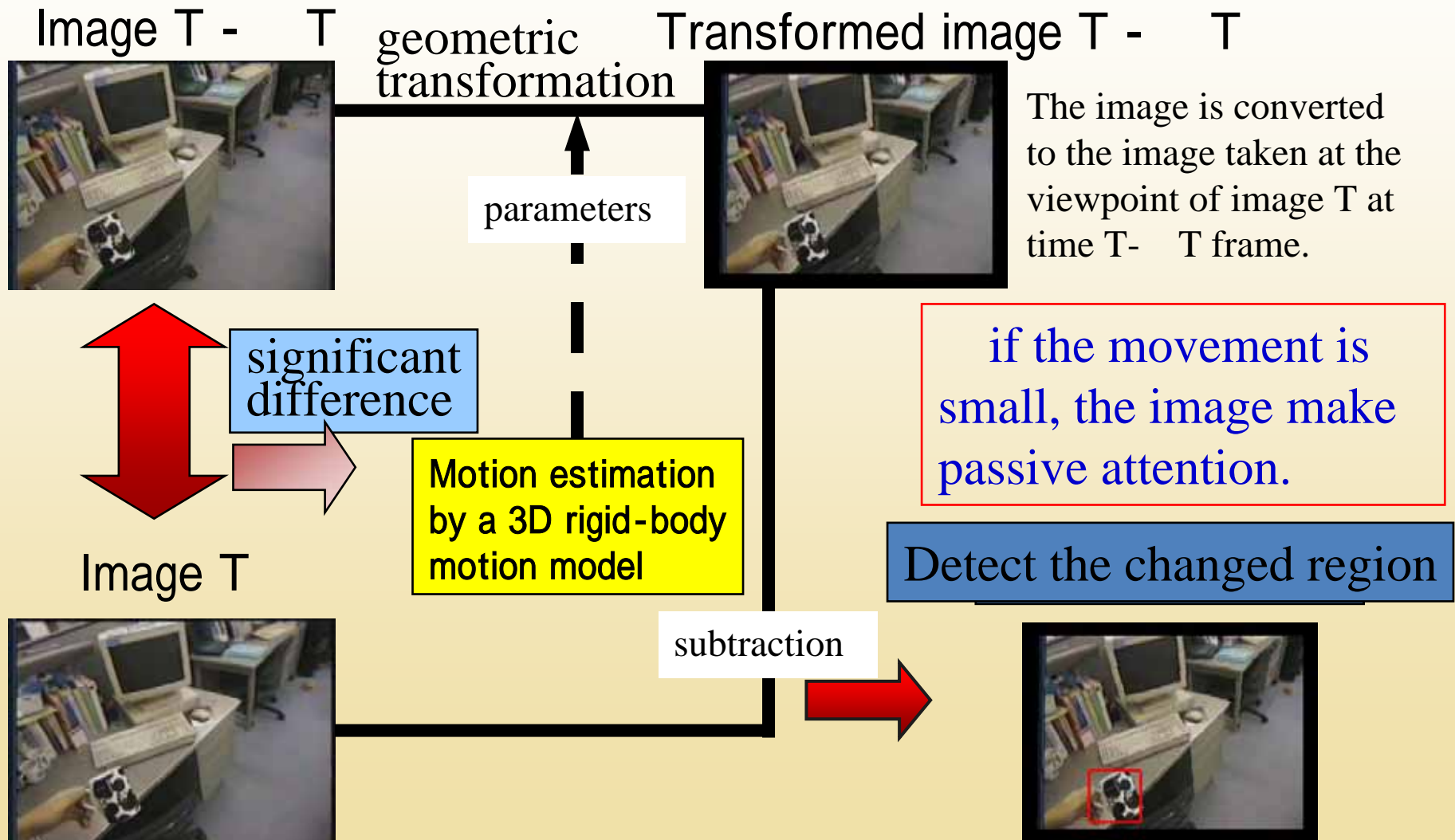
Stay looking at

Passive Attention

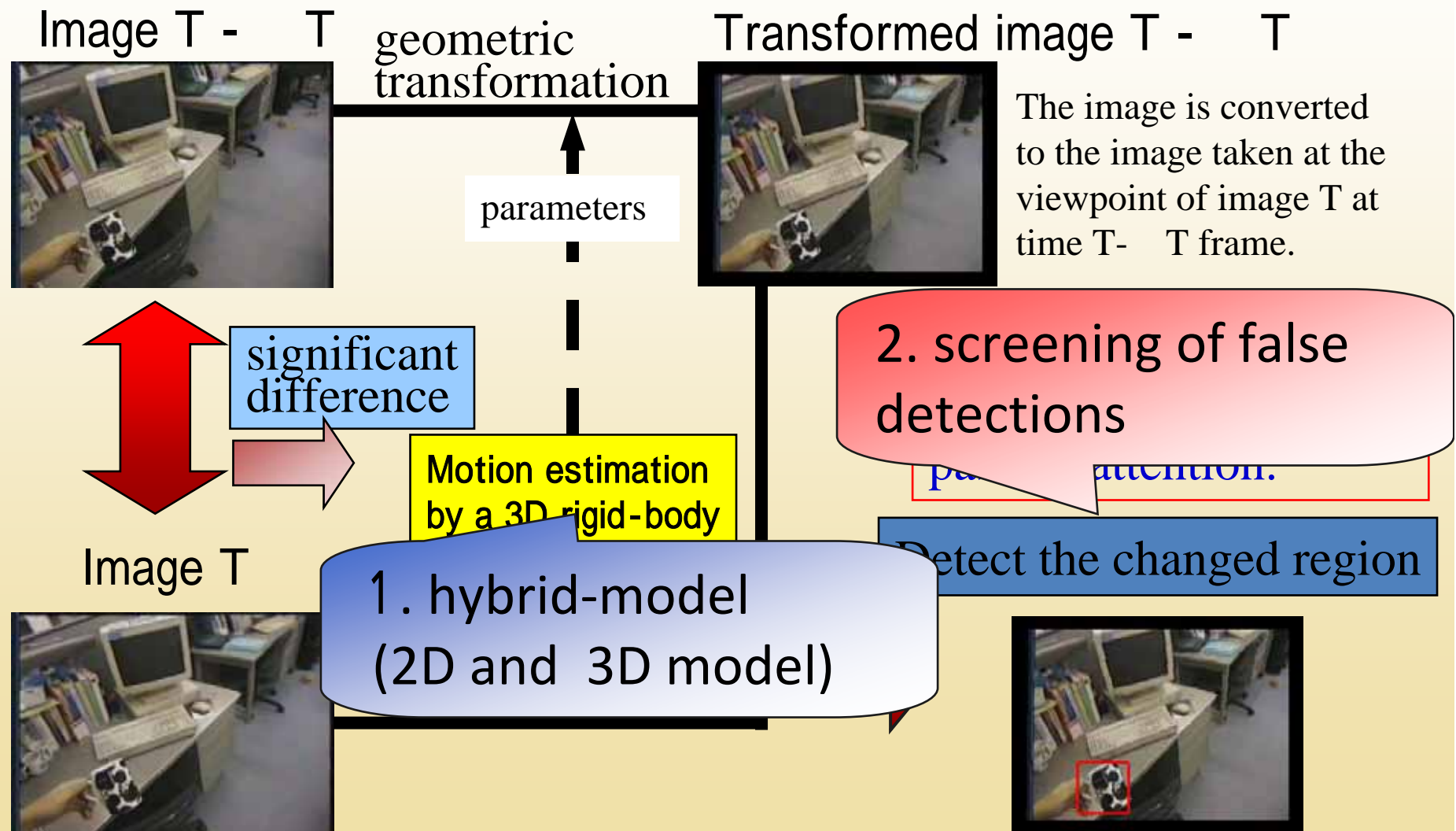


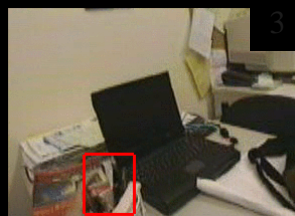
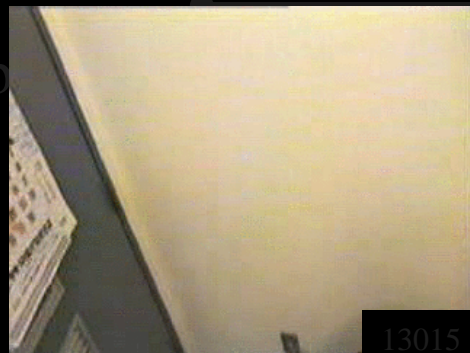
Detecting Scenes of Attention

-- our previous method



Detect Scenes of Attention





e



3769



12



13



14



15



16



17



18



19



20



21



22



23



24

f



4558



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26



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28



29



30

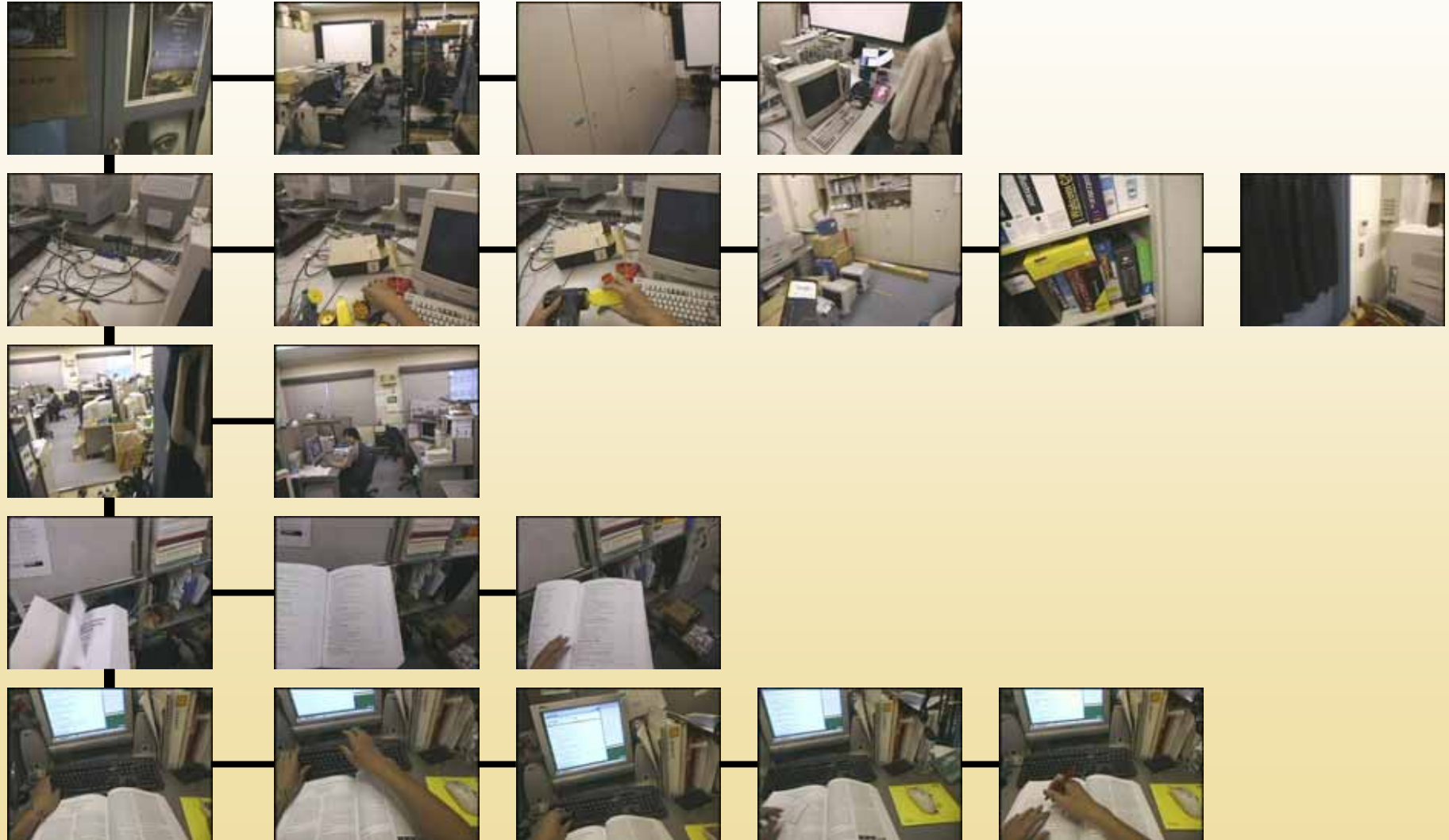


31

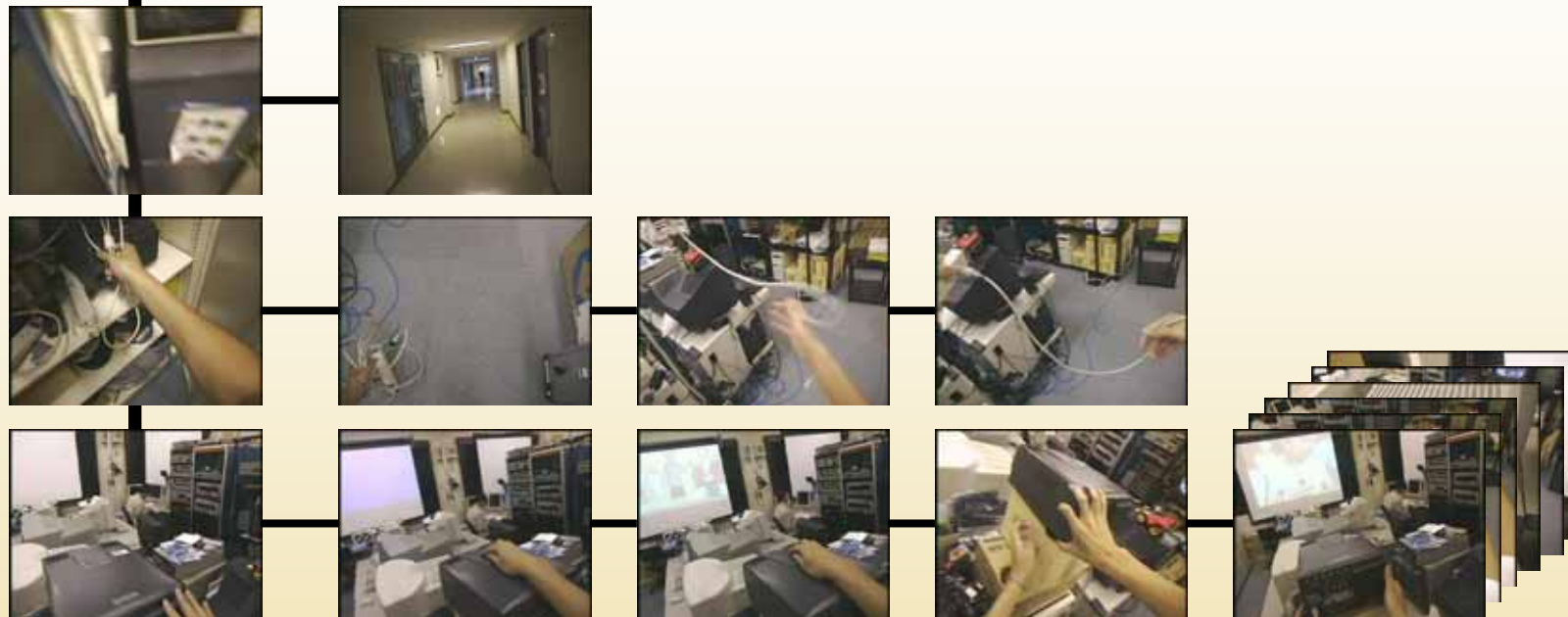


32

The result of Detecting Scenes of Attention



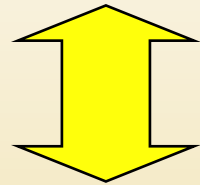
The result of Detecting Scenes of Attention



Link between a surveillance view and a personal view

Personal view

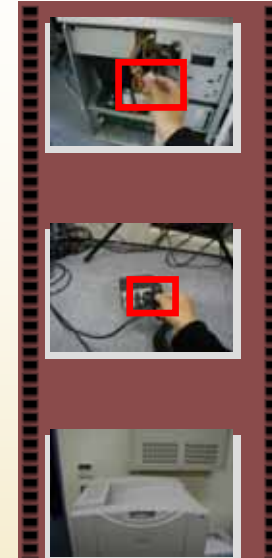
- analyze a user's behavior
- detect a scene of attention



Linking

Surveillance view

- track a human in the view
- detect a user's location

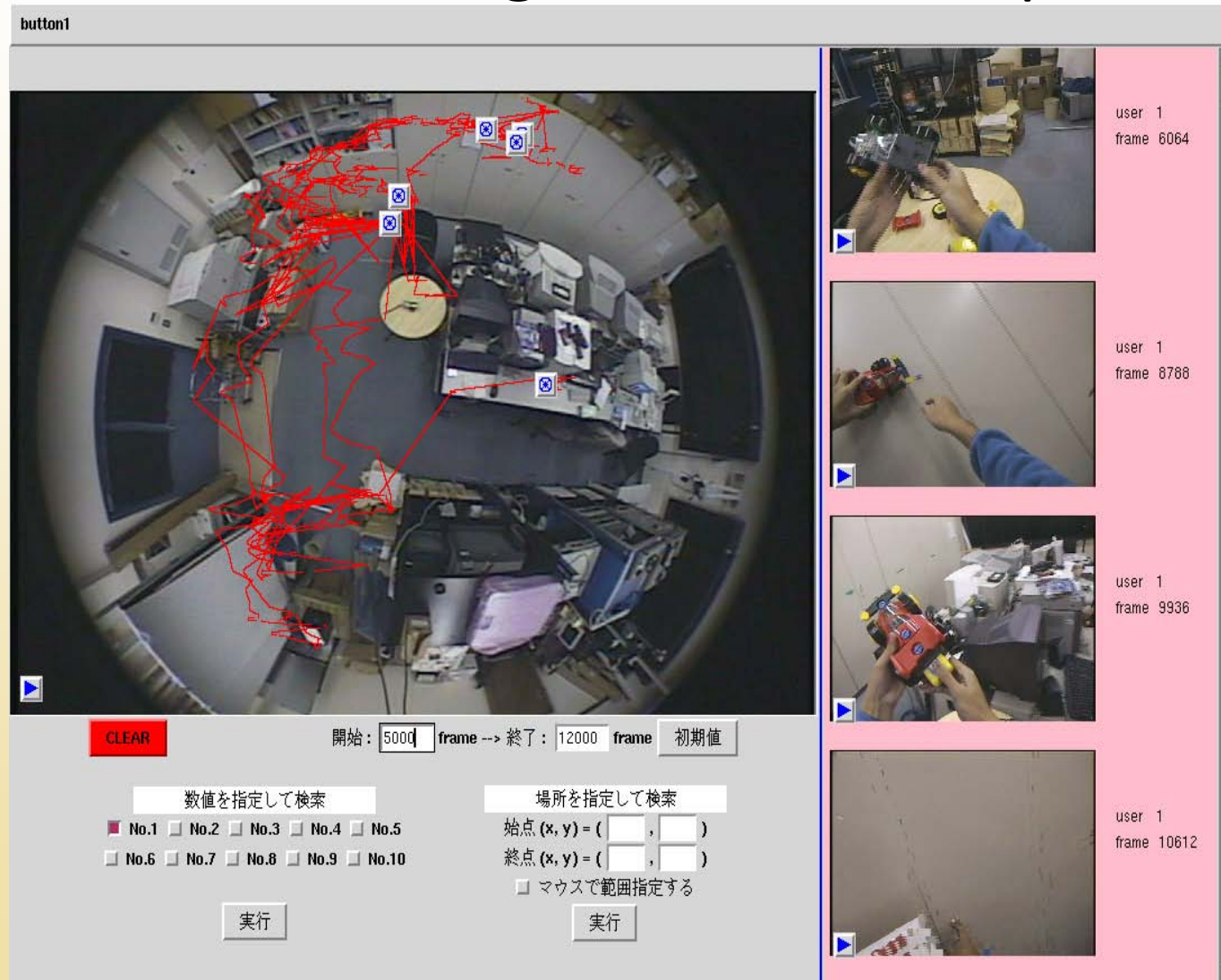


Use of surveillance camera



GUI Browser

Results of integration with the personal view



**where and
what the user
paid attention**

**what the user
did**

Group Log

What is 'Group Log' ?

- Multimedia Log of Experimental and Educational Group Activities
 - Field work study, Outdoor activity, educational trip, etc.



Why Group Log ?

- Review group activities so as to make good use of the obtained knowledge for future experiences
 - For participants : inspire their metacognition
 - For organizers : give valuable feedback about the activity



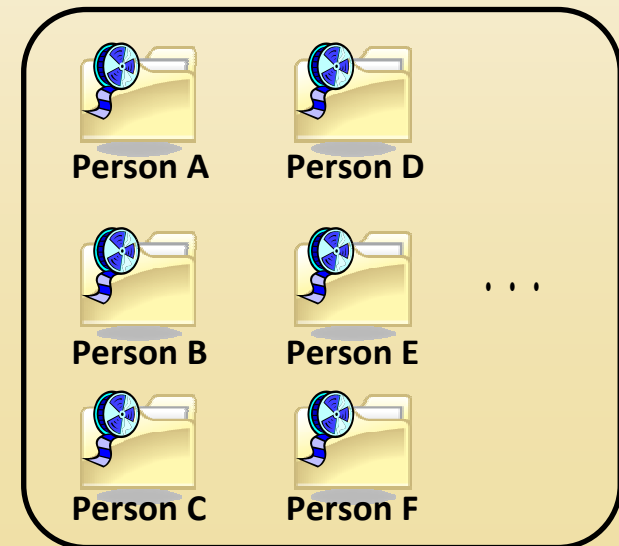
Summarize own experiences



Review and discuss conducted activities

Collective First-person View Video

- A First-person view (FPV) video records
 - Scene, Objects, Events that a person looked
 - Head motions and moving events
- Collective FPV video
 - Consists of FPV video logs of all participant
 - The FPV videos interact for each other



Issues on Collective FPV Video

- Not easy to review
 - Unstable camera work, e.g. rapid shaking
 - Difficulty in simultaneously reviewing multiple FPV videos
 - Long time video log of all participants



Integrating experiences



outdoor school for an elementary school

- same events
- different view points with different behaviors
- various aspect of the same events

personal experience



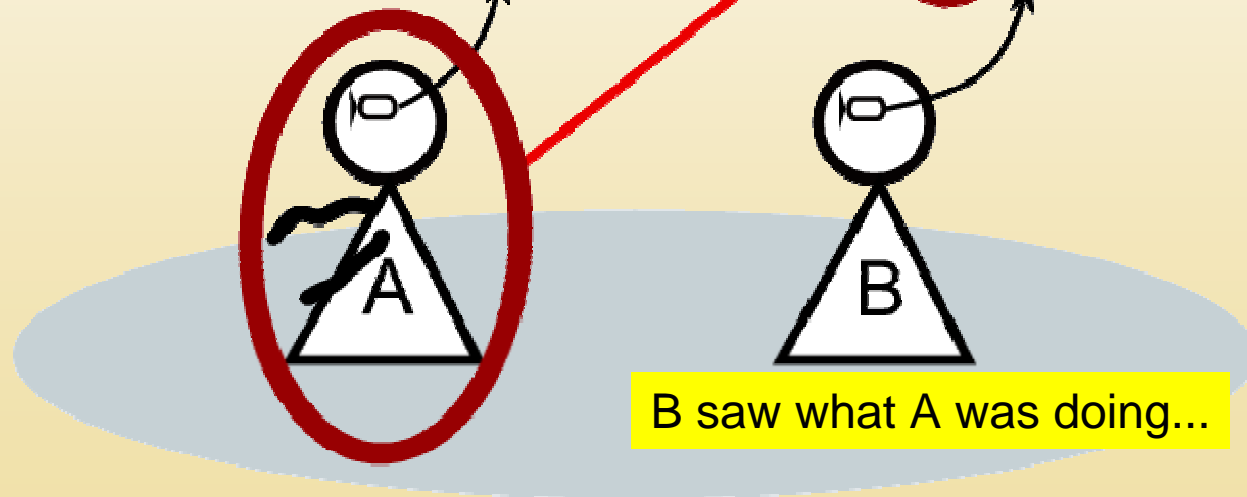
when, what, and where each person did

Reflection

Aの体験記録映像

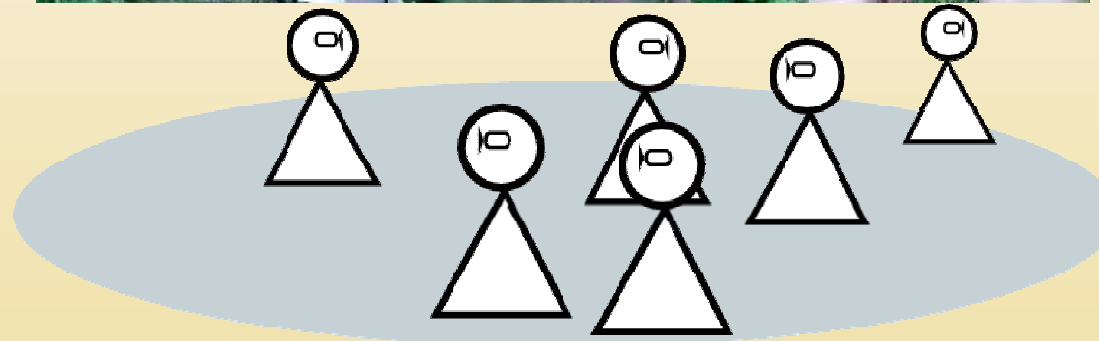


Bの体験記録映像



subjective + objective => comprehensive

differences and diversity



different points of view among persons at the same place

finding organization



two groups were generated without supervising

Vision research on FPV Videos

re-framing, gazing estimation,
summarization

Re-framing of FPV Video

- Re-framing for easy review
 - Stabilize
 - Zoom into and track a particular interesting object
 - Zoom out to understand a whole scene
- Re-framed video may have lack on the view

Input video

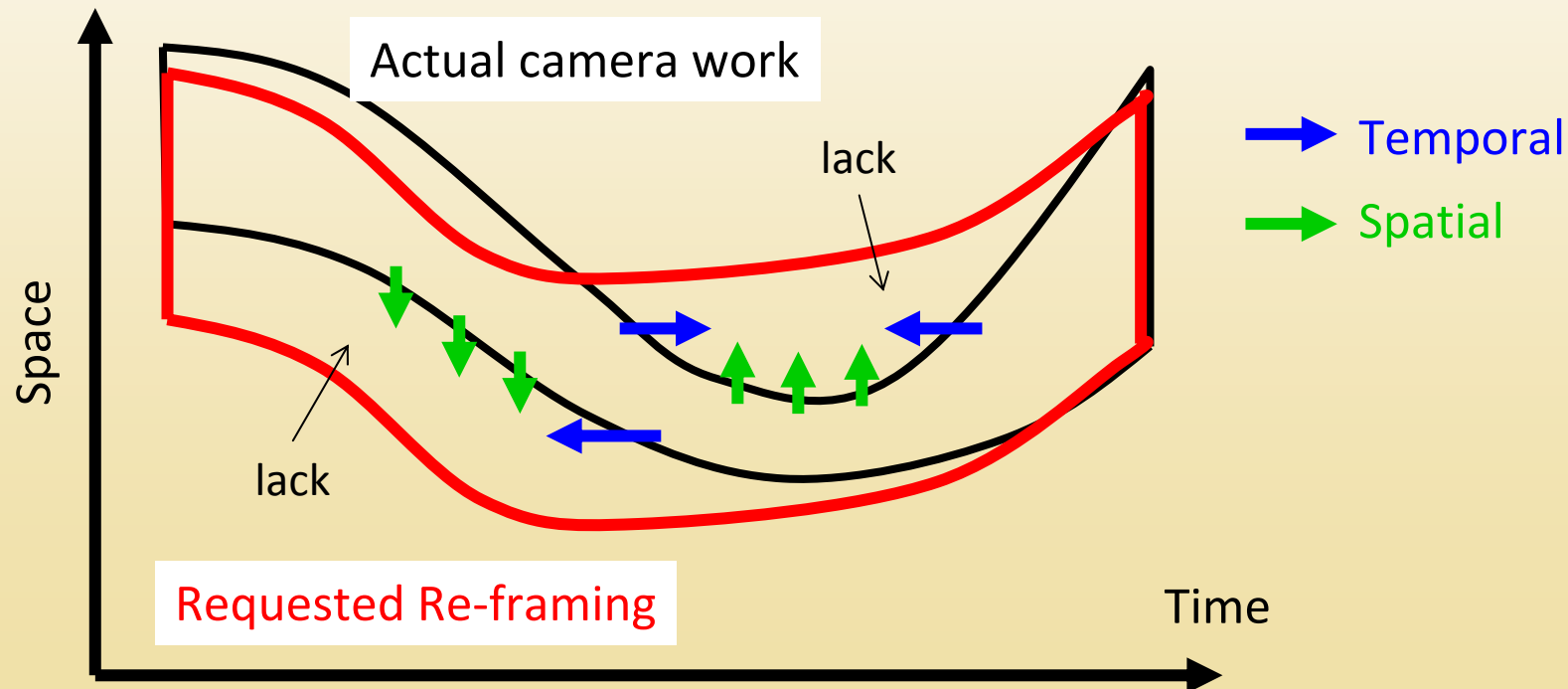


Re-framed video

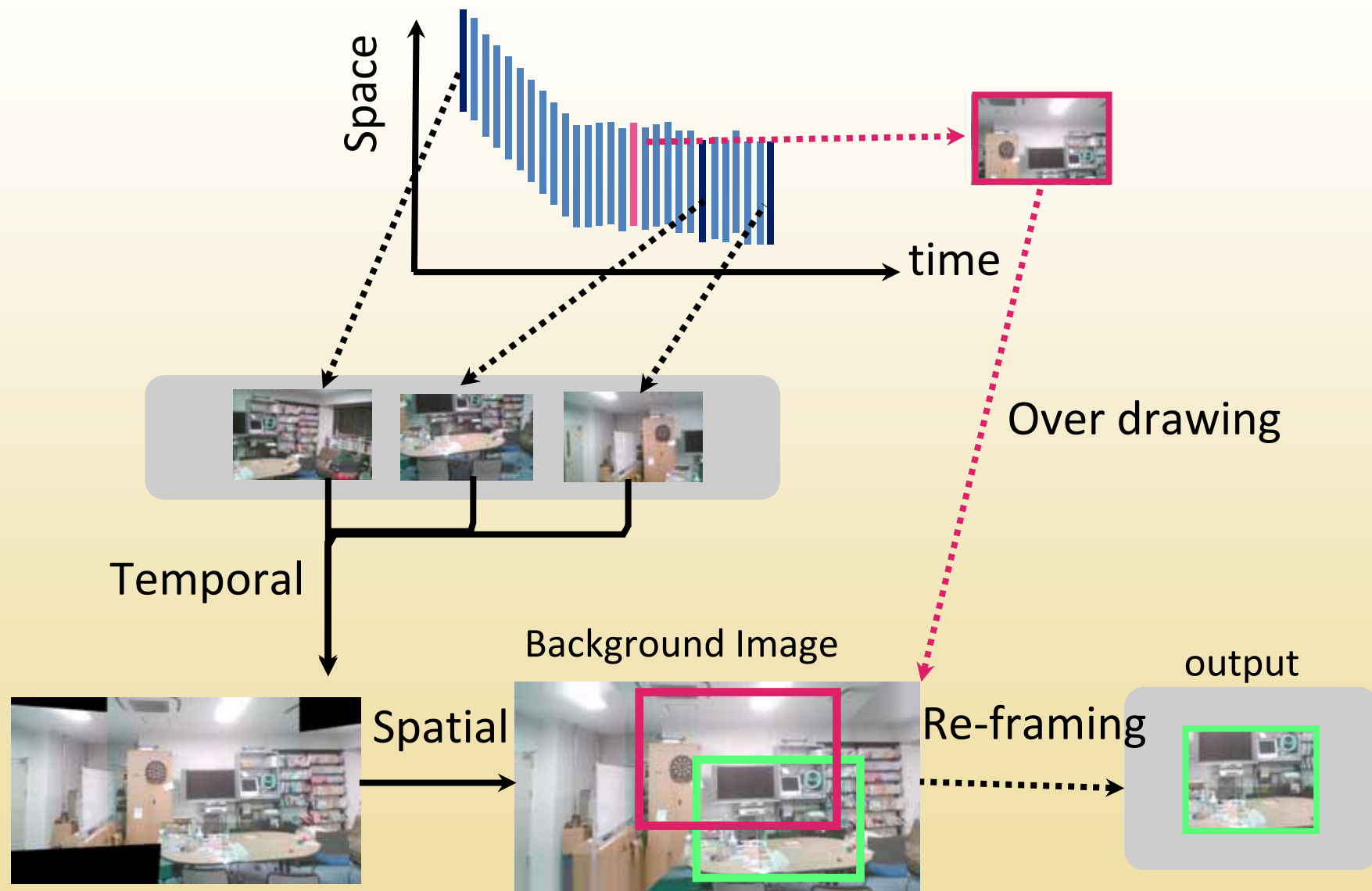


How to fill the lack

- Idea : Interpolation
 - Temporal interpolation : use scenes captured at different time
 - Spatial interpolation : estimate outer region



Processing flow



Algorithms

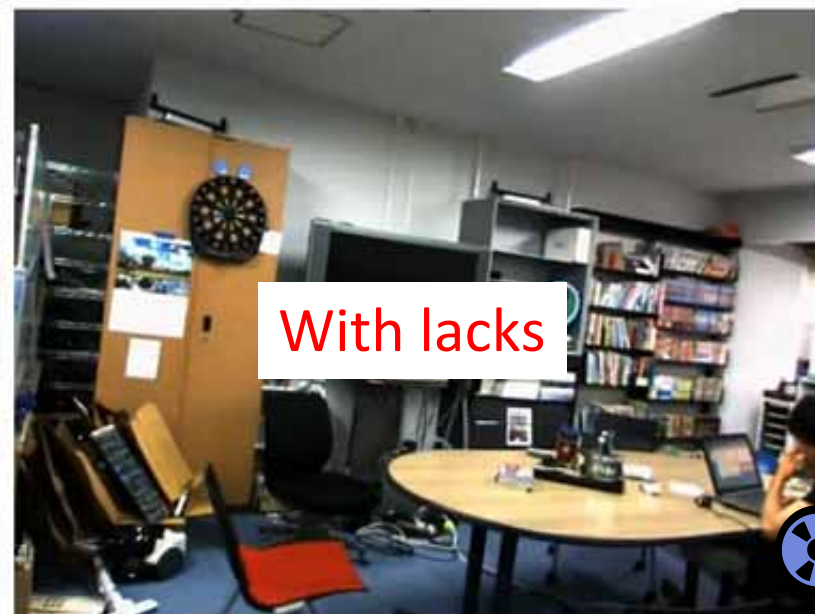
- Temporal interpolation
 - Image stitching with correspondences of local feature points



- Spatial interpolation
 - Image inpainting

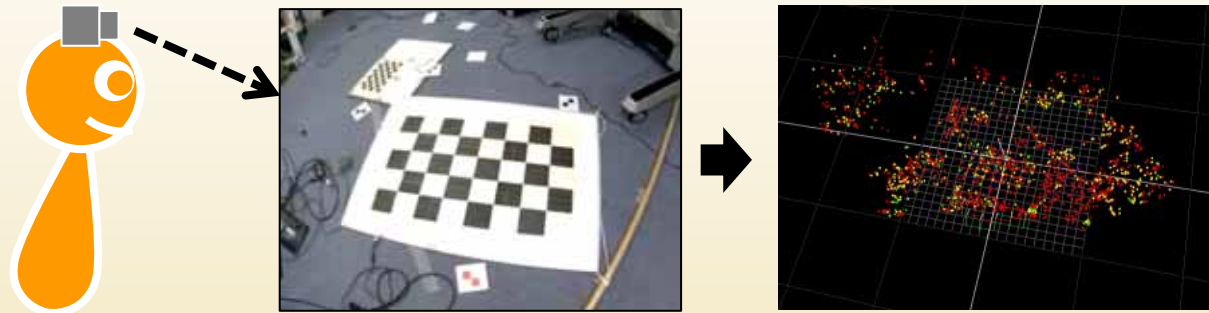


Results

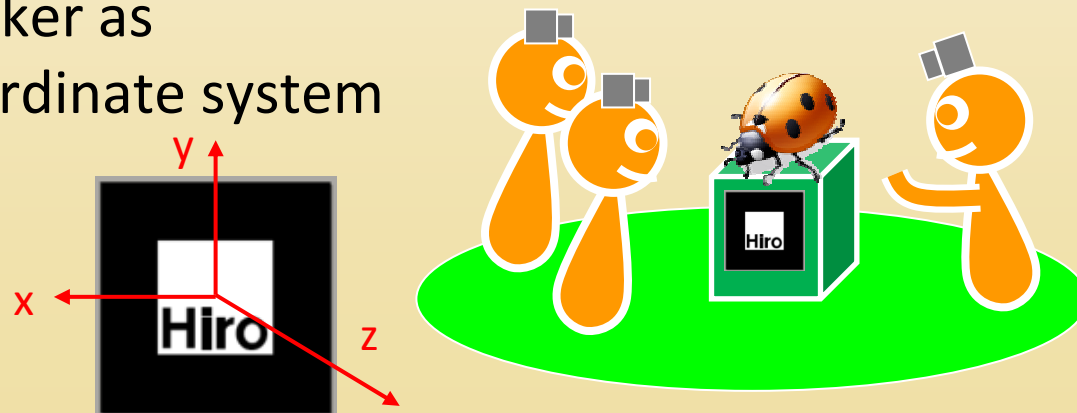


Tech: Estimation of gazes

- Estimate a gaze through scene construction
 - Visual SLAM(Simultaneous Localization and Mapping)

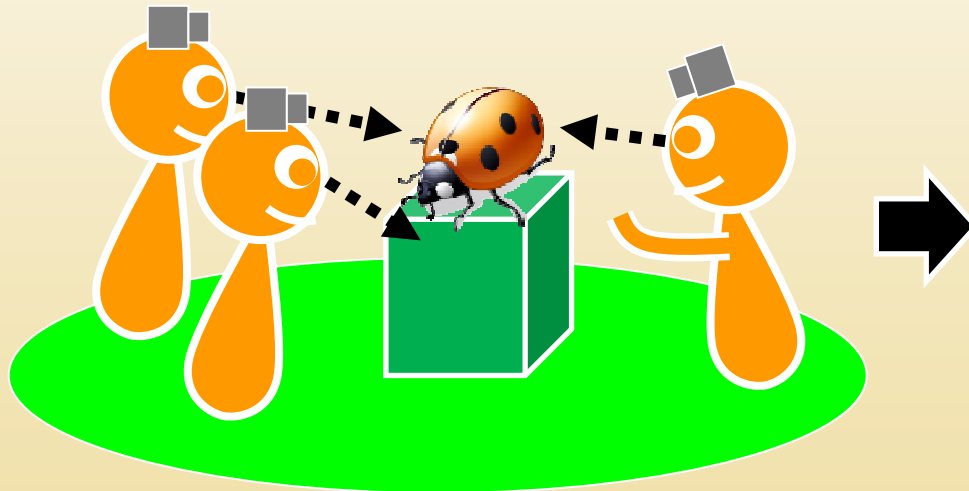


- Unify coordinate systems of multiple gazes
 - Use a visual marker as a reference coordinate system



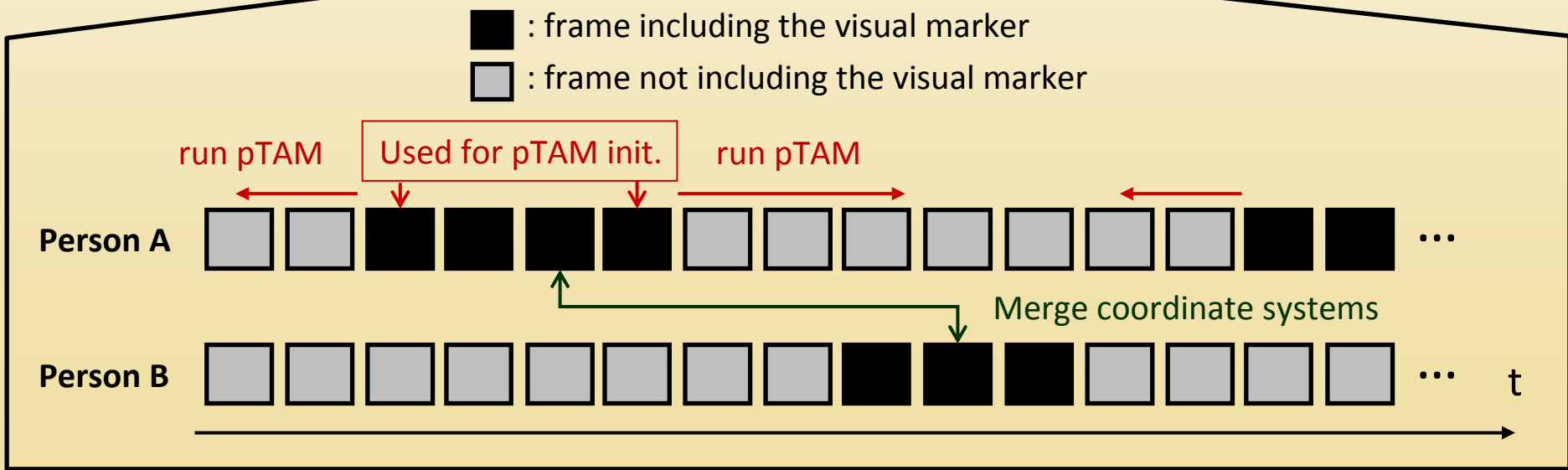
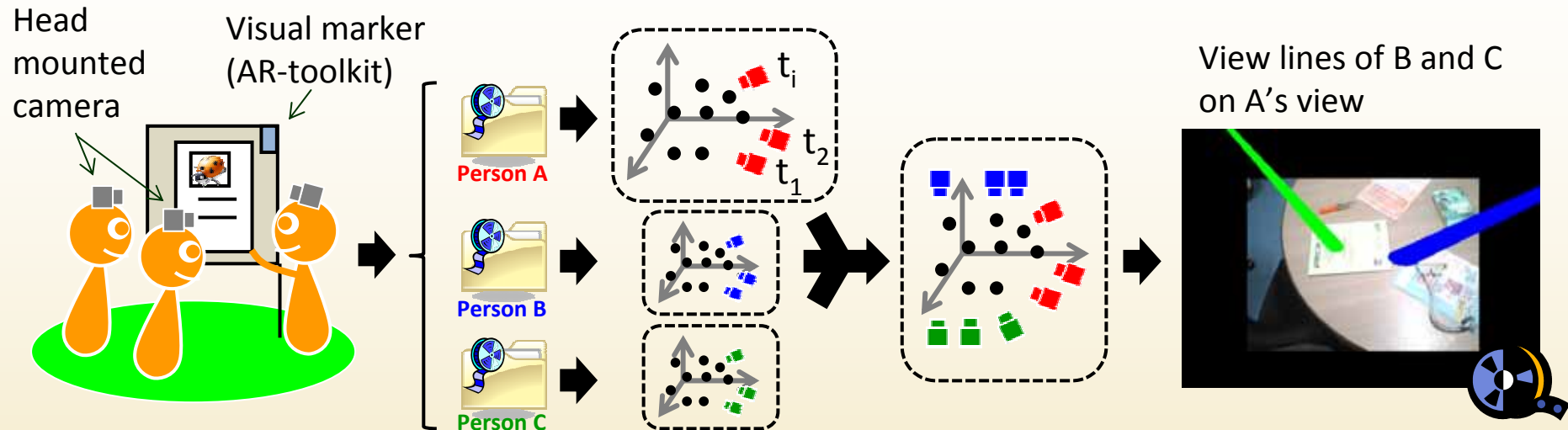
Visualizing Lines of Sight

- Relationship between lines of sight (LoS) give
 - Concentration, diffusion, translation of interest
 - Difference of interest in multiple person



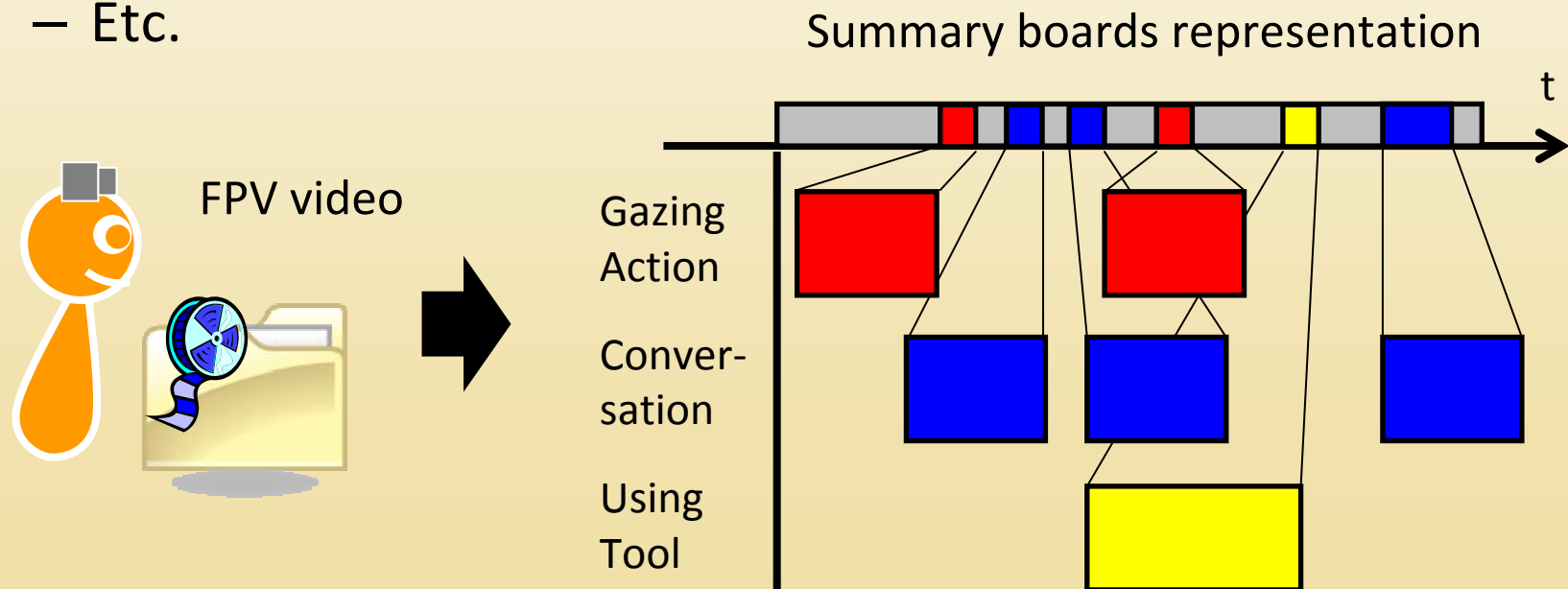
Los distribution view

Algorithm



Summarization of FPV video

- Summarize portions of a FPV video with synthesized image boards to interpret situations at a glance
 - Summarize about gazing action
 - Summarize about conversation
 - Summarize about using tool
 - Etc.



Summary board about gazing action



Captured FPV video



Synthesized summary board

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Thank you for your attention!