Investigating Document Layout and Placement Strategies for Collaborative Sensemaking in Augmented Reality

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Motivation and Basic Idea

Augmented Reality (AR) has the potential to revolutionize our workspaces, since it considerably extends the limits of current displays while keeping users aware of their collaborators and surroundings. Collective activities like brainstorming and sense-making often use space for arranging documents and information and thus will likely benefit from AR-enhanced offices. However, we lack understanding of how the physical surroundings might affect virtual content placement for collaborative sensemaking.
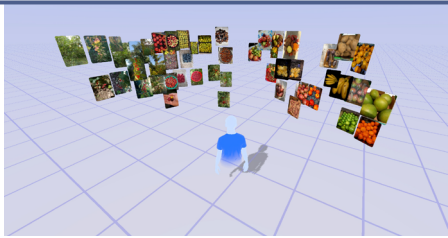
Contributions

▶ For content placement and organization, we found that participants tend to use
  ▶ the room's vertical sufaces and
  ▶ the room's funiture, particularly via edges and gaps.
▶ We identified three different spatial layout patterns: panoramic-strip, semi-cylindrical and furniture-based distribution.
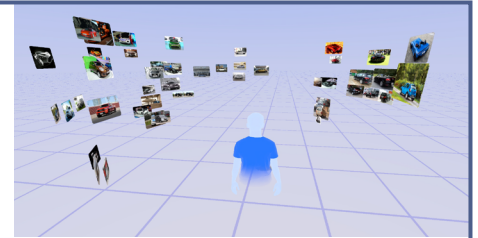▶ We observed the usage of temporary storage space specifically for collaboration.

### Spatial Layout
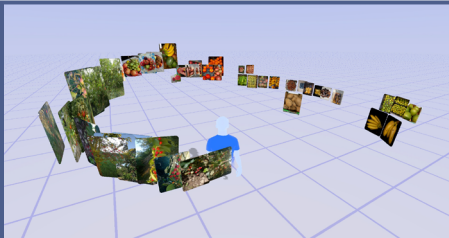
Panoramic-strip Pattern | **Semi-cylindrical Pattern** | **Furniture-based distribution Pattern**

Preliminary User Study

As a first step, we designed a **within-subjects** experiment with two study conditions. We conducted a user study with **eight participants** as four teams for a **card sorting task** (image organization and grouping) as a low-level sensemaking task. And we were interested in the users' workflow, content organization, spatial arrangement and layout.
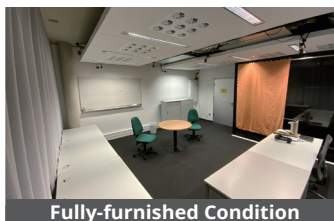
Fully-furnished Condition | **Less-furnished Condition**

Observation Results

Based on our analysis, we identified three different *spatial layout* patterns for grouping and organizing the images of datasets. In addition, we observed *spatial placement* patterns, where participants used the physical environment for their content placements. During the task, we also observed the usage of temporary storage space.

Vertical Plane Usage

Furniture-oriented Usage

Free Gap and Column Usage

Future Work

▶ **Run further in-depth studies** in order to extract more representative and generic conten layout patterns.
▶ **Take into account a high level brainstorming task** emphasizing the creative process.
▶ **Extend to multiple people collaborative scenario** aligned with the daily brainstorming and sensemaking activities.
▶ **Investigate** the characteristics and the form factor of the **physical surroundings**.

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