INTRODUCTION

“Flattening” is a standard process for digitally colouring comics.
- Image regions are outlined by hand and assigned a colour.
- Manual, labour intensive process.
- Each image region must be coloured individually.
- Occlusion may split objects into multiple regions.
- We would like to colour multiple parts of an occluded object in a single interaction.
- Low-level relationships in line drawings can reveal information about occlusions.
- We present a framework that infers occlusion relationships in line drawings, inspired by perceptual cues.
- We apply this framework to the problem of flattening in comics.

PRE-PROCESSING

- Scan black and white line art.
- Apply morphological line thinning.
- Extract t-junctions.

CONTOURS AND RELATABILITY

- T-junctions indicate possible occlusions.
- Compare junction pairs.
- Exclude pairs unlikely to form "completions" (perceived as single unit).
- Evaluate completions based on contour-level occlusion cues from vision research (such as relatability).

REGION COMPLETION

- Examine region pairs joined by at least one contour completion.
- Evaluate completions based on region-level occlusion cues from vision research.

OBJECT CONSTRUCTION

- Seed region is selected.
- Regions connected by a completion are added.
- Repeat until no more regions can be added.

USER INPUT

- Gesture-based input is used to fix ambiguous or missed occlusion relationships.
- Default object selection.
- A short stroke limits selected regions based on stroke direction.
- Weak occlusion cues cause some regions to be missed.
- A long stroke extends the completion in the stroke direction.
- A lasso-style curve adds a shape constraint to object construction.

RESULTS

- Input comic panel containing multiple occlusions.
- Hypothetical occluded contours (thick lines represent strength).
- Hypothetical occlusion relationships.
- Abstract colour assigned to occluded objects. The cape and pants require a single click, the cape requires a "long special" gesture.

FUTURE WORK

- Improve handling of looser, more imprecise drawing styles (these are more sensitive to misalignments).
- Exploration of additional interactive techniques for refining results (e.g., multi-touch).

REFERENCES