Visual Design Reuse Through Style Recognition and Transfer

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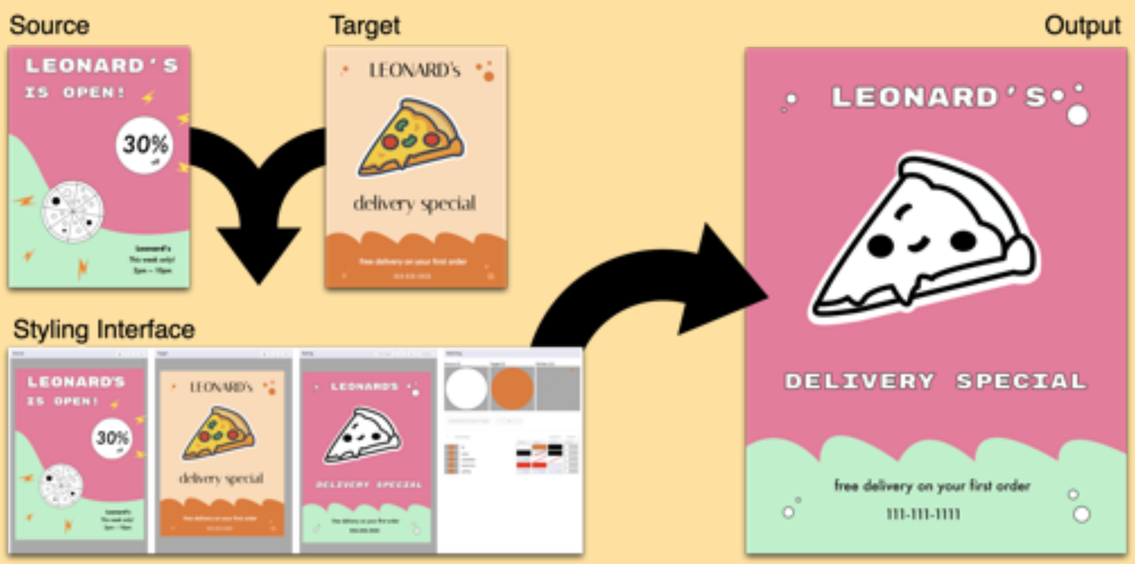
Transferring Design Styles



Motivation

Consistent styling is a hallmark of quality graphic design. Stylistic design patterns exist throughout visualizations, presentations, and interactive media experiences (games, visual novels).

However, except for explicitly structured document layouts (e.g., HTML/CSS), **design tools either don't enforce consistent style decisions or must be manually maintained.**

Approach

This work transfers design attributes and styles within and across visual design documents such as user interface designs, presentation slides, and infographics**.**

This work introduces algorithms [1] that recognize and match implicit design patterns and style structures in visual design documents. The work also presents new interfaces that let designers operate on these styles, specifically, to view, customize, and apply design changes across pattern instances flexibly.

Results

The key benefits:

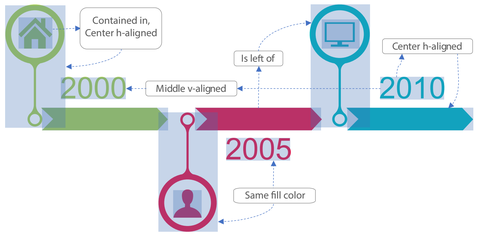
(1) removing the need for upfront formal design style declarations,

(2) enabling automated recognition and distribution of implicit visual styles, and

(3) facilitating the exploration of novel designs via style transfer and mixing.

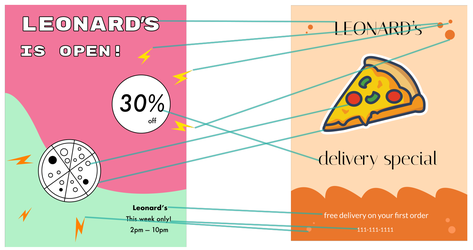
Recognizing Style Structure

We record how each element relates to the larger design structure with a multi-graph where vertices are unique design elements and edges measure element relationships (e.g., containment, alignment, color).



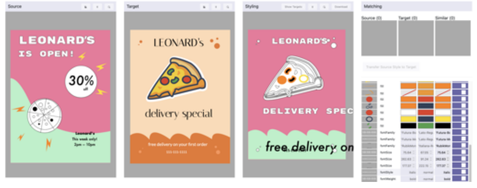
Finding Design Correspondences

We apply a walk-based graph kernel to the source and target designs to identify similar element structures. We refine this technique with direct element comparisons, resulting in a mapping from one target design's elements onto a source design's elements.



Mapping Styles Across Designs

Once we recognize design styles and construct a correspondence between two designs, designers use an interactive tool that can customize and preview what the resulting output design will look like.



Evaluating Style Transfer

To evaluate this technique & interface, we recruited designers to bring an original source designs to stylize new target design examples. The output is shown in the grid, with participant input designs labeled P1-6. The target designs were provided.

Rows show consistency from the target's structure, while **participant columns show style coherence** for the newly generated designs in a similar family of styles relative to the original (P1-6) participated created design.

[1] Shin, Hijung, Jeremy Warner, Björn Hartmann, Celso Gomes and Holger Winnemöller. "Multi-level Correspondence via Graph Kernels for Editing Vector Graphics Designs." (2021).