Correcting Images for Observers with Color-Deficient Vision

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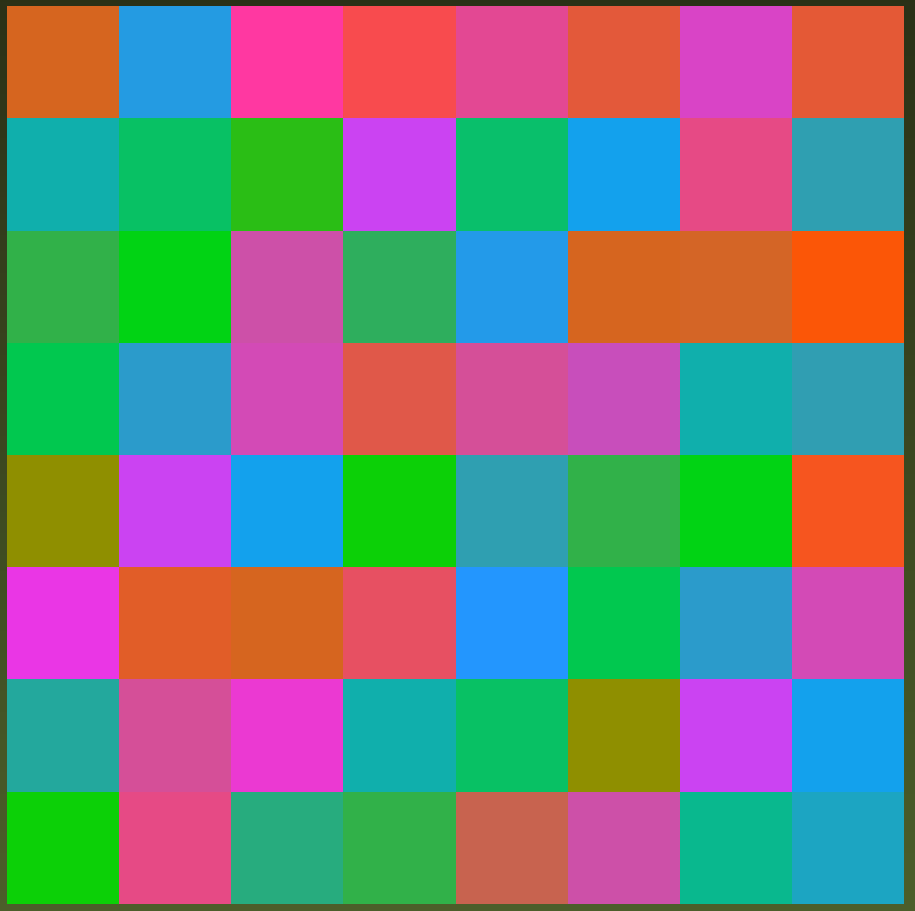
Color Dimension Reduction



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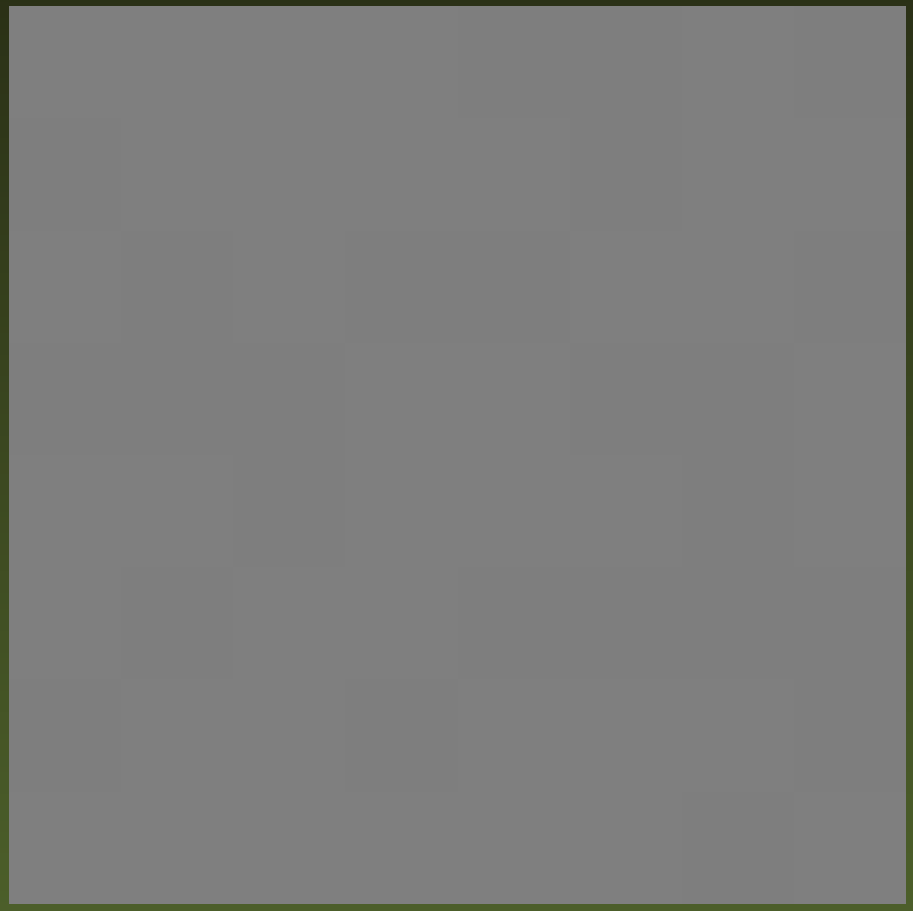

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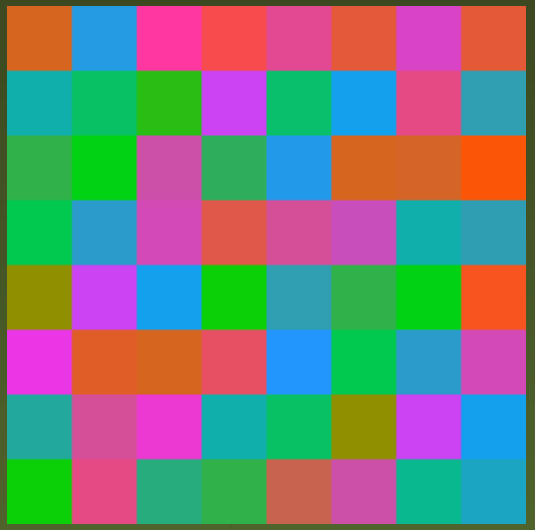

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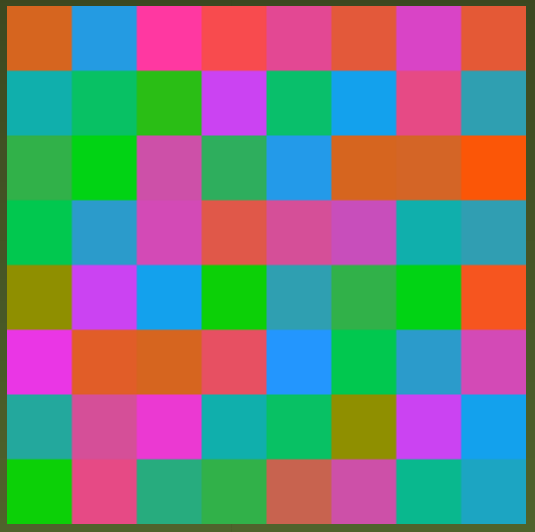

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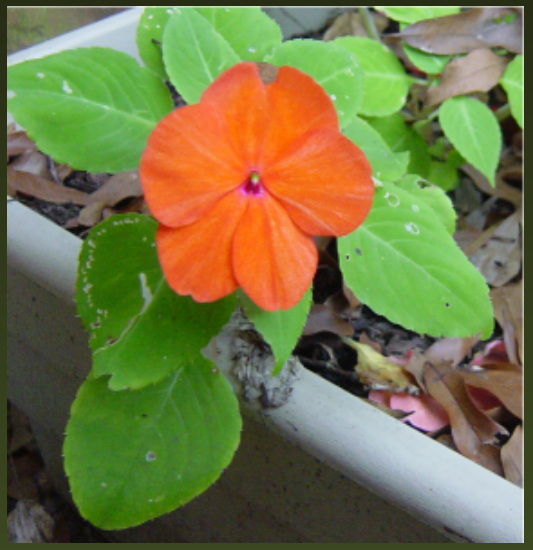


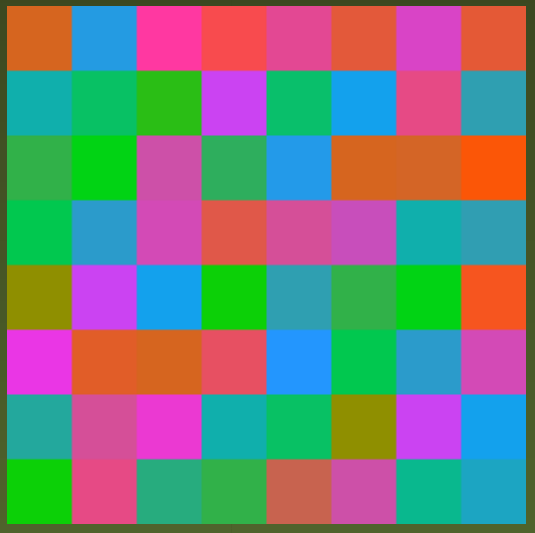

Dimension Reduction - Goals

- maintain contrast

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- avoid luminance reversals

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- avoid luminance reversals
- do it quickly

Dimension Reduction - Technique

- express mapping $C \rightarrow G$ as constrained quadratic optimization

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- express mapping $C \rightarrow G$ as constrained quadratic optimization
- transform to equivalent sequence of linear programming problems
- execute on a GPU

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- almost all see a two-dimensional subspace

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Color Deficient Observers ???

- almost all see a two-dimensional subspace
- subspace is deficiency-dependent, but well-known
- problem is the same as $C \rightarrow G$, but $3 \rightarrow 2$ instead of $3 \rightarrow 1$!

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Project Goals

- make it real-time

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- include in web-browser/iphone app

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- include in web-browser/iphone app
- 10M Americans - support from NIH?

Important?

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Extensions?

Multi-spectral image fusion ($5 \rightarrow 3$) would give:

- shrimp vision
- bee vision
- improved military target acquisition
- improved MRI + CT images