Evolutionary Graphical Design

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What tools would complement a designer's aesthetic sense and skills?
More specifically:
How can we aid Interface’s designers?

Objective

• I have an idea in mind
  – say, Paul Smith type stripes
  – palette, widths, swish etc
• There are very many variants of the basic idea I have in my head
• I will know the perfect design when I see it
• I just need to explore some ideas
  – by hand
  – designer-guided automated search…

From designer’s perspective:
Selective breeding

Key components:
- Selective agent: man
- Evolution: heritable variation
- Variation
  - Mutation: generates diversity
  - Recombination: choose parents

How does it work?

Genetic material

A design: vector of shapes or graphical elements:

\[(\text{shape}_1, \text{shape}_2, \ldots, \text{shape}_n)\]

= \{(x,y,r, R,G,B), \{x_0,y_0,x_1,y_1,R,G,B\}, \ldots,\{x_0,y_0,x_1,y_1,r,R,G,B\}\}

= \{(4,10,3,255,128,0), \{9,3,11,12,225,225,153\}, \ldots,\{14,12,16,18,145,225,39\}\}
How does it work?

Mutation

Parent: Circle's B value: 0 → 100

Offspring 1: Circle's x coord: 4 → 10

Offspring 2

Guided Search

Recombination

Designer-chosen parents

Offspring

...
Crossover 

evoDesign demo
Ideal Interactive Evolution Tool...

- Fully interactive
  - See value of every attribute
  - Edit / manipulate value of every attribute
    - Including all mutation rates
    - Including freezing components of choice
- See complete evolutionary history
  - Restart search from any point
  - Save / load any and every design
Tiling

Freezing vertical stripe's size and color
A sample of findings
Oriented Search

Customer - tailored Tool
What tools would drive customer – designed bespoke floor covering sales?

“FLOR Rugs are not like any rug you’ve purchased before. It’s interactive. We give you a professionally designed rug but since FLOR is modular you can change your mind and rearrange your rug your own design! The possibilities are endless.”

http://www.interfaceflor.com/service/flor/shop.html
“FLOR Rugs are not like any rug you've purchased before. It's interactive. We give you a professionally designed rug but since FLOR is modular you can change your mind and rearrange your rug your own design! The possibilities are endless.”

We want to make it even more interactive!

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Tailored coverings...

• Tile Configurator
  – Limited number of tiles [20x20]
  – Limited configuration [rectangle]
  – Limited to certain Interface tiles

• What if the use could evolve a grid of tiles?
• What if the user could specify their own room shape?
• What if the customer could evolve their own bespoke tile?

Existing tools
The next level
**Truly organic forms**

"genetic art"

\[ g(x,y) = (\ln(\sin(x)))^3 \times \tan(y)) \]
\[ h(x,y) = (\ln(\cos(y)))^3 \times \tan(x)) \]


**Generated in less than 30 seconds:**

WIRED: 09/04, p. 76
Multiple levels

Designer:
out-of-the-box

Genetic Art

Interface designer:
explore idea that they have

Interface designer’s Tool

Key Interface Customer:
reasonably good idea

Hotel Designer’s Tool

Customer:
don’t have such a clear idea

“Lay” Customer’s Tool

Questions?

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