

RELEVANCE OF USING A GENETIC ALGORITHM IN WEB PAGE CUSTOMIZATION

BONAVERO Yoann

LIRMM, CNRS, UM2
Berger-Levrault

March 2014

Reminder of the global context

NFB
National Federation of the Blind
Voice of the Nations Blind

The real problem of blindness is not the loss of eyesight. The real problem is the misunderstanding and lack of information that exists. If a blind person has proper training and opportunity, blindness can be reduced to a physical nuisance.

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Upcoming Events
June 30-July 5, 2012: **National Convention**

What's New
NFB Urges Boycott of Goodwill Industries

NFB NEWSLINE® Announces iPhone App

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Outline

- 1 The context
- 2 Input data
 - Variables
 - Objectives
- 3 Population evolution
- 4 "Portail citoyen" example
- 5 Possible optimizations
 - Graph splitting
 - Alternative color system

Main bases

Resolution is based on

- A set of variables
- A set of objectives
- Some end criteria
 - Time
 - Generations
 - satisfaction

Variables

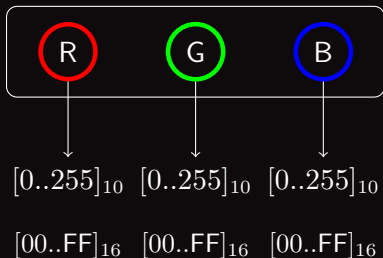
Some kind of variables

- Text size
- Text weight
- Size
- Color
- etc.

Color type variable

Standard RGB (sRGB) system

A color



	R	G	B
	255	255	0
	255	0	255
	107	46	5
	255	255	255
	128	128	128
	0	0	0

A solution

Representation

- $[V_1, V_2, \dots, V_i]$ a set of variable
- v_i a value of V_i

v_1

v_2

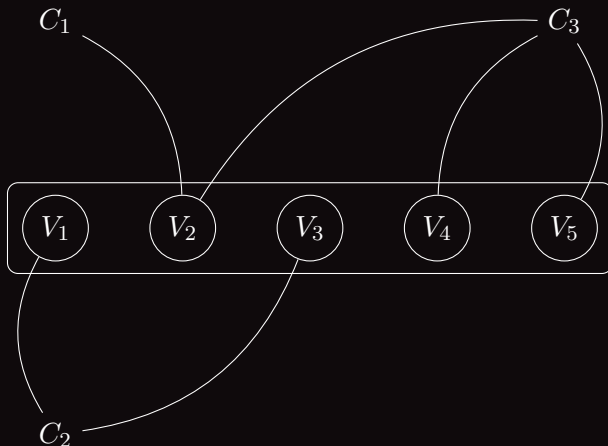
v_3

v_4

v_5

Objectives and relations

Representation



Objectives functions

Objectif / Constraint / Preference

- Size
- Color contrast
- Luminance contrast
- Luminance
- Original context proximity
- etc.

Size constraint

Definition

$C : V_i \geq x$, V_i size is greater or equal to x

Representation



SizeConstraint

+ minSize : integer

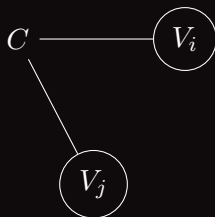
eval(s : Solution) : float

Contrast constraint

Definition

$C : \text{contrast}(V_i, V_j) \geq x$, Contrast between V_i and V_j is greater or equal to $x\%$. With $i \neq j$.

Representation



ContrastConstraint

+ minContrast : integer

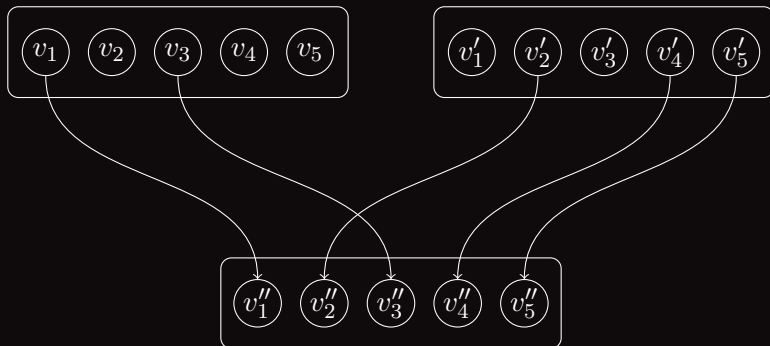
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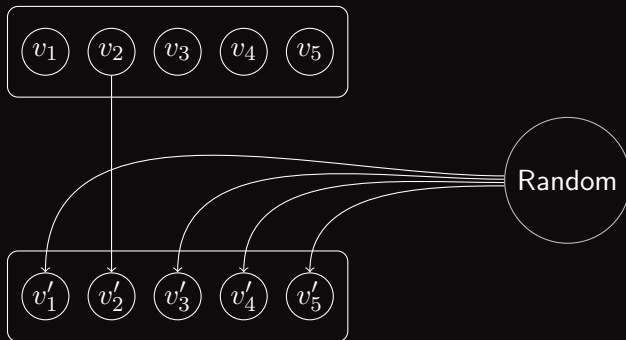
Evolution of the population

Crossover



Evolution of the population

Mutation



Evolution of the population

Other operators

- Selection
- Parent selection
- Union

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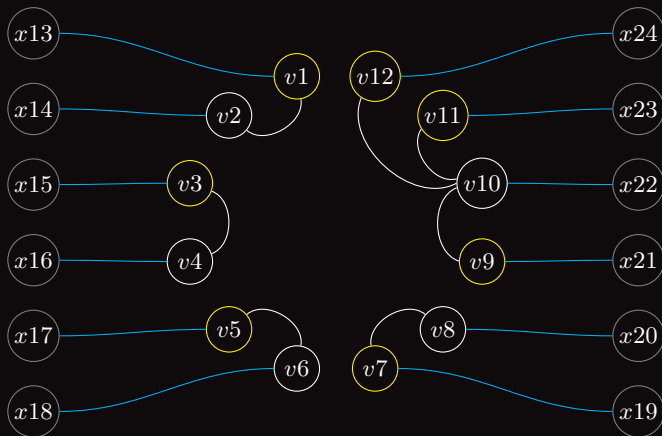
Main menu

Initial context

	Text	Background	Constrast
Mon accueil	255 255 255	000 170 195	2.79/21
Accueil	203 205 205	000 170 195	1.74/21
Mon profil	255 255 255	249 144 004	2.33/21
Profil	205 205 205	046 046 046	8.54/21
Abonnements	205 205 205	046 046 046	8.54/21
Mes services	255 255 255	154 194 057	2.07/21
Enfance	205 205 205	046 046 046	8.54/21

Relation representation

Left main menu graph



Application of NSGA-II

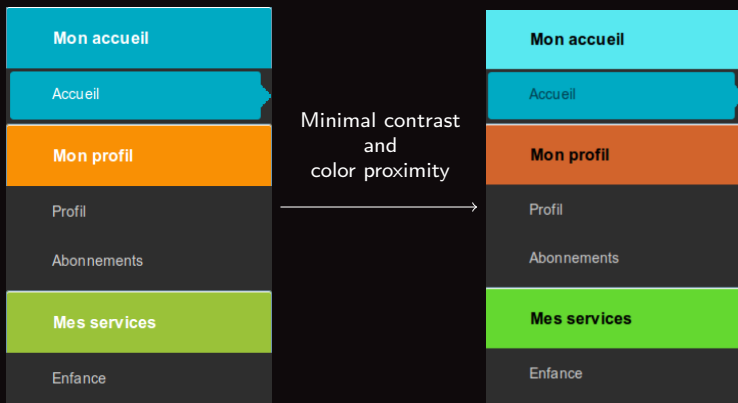
Some figures

- 12 color variables
- 19 objectives functions
- 32 768 values in color domain
- About 10^{54} combinations
- 400 individual in population
- 5% of mutation
- Polynomial complexity : $19 \times 400^2 (mn^2)$

Application of NSGA-II

Result

Average execution time : $> 6s$

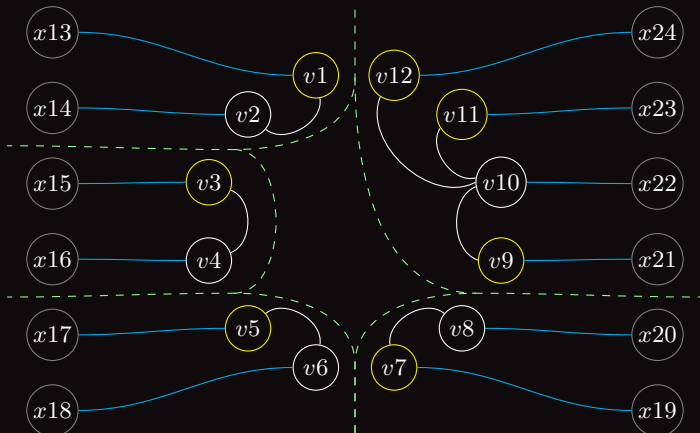


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Optimization - smaller datasets

Splitting graph in connected component



HSP color system

HSP

- H : hue $[0,360[$
- S : saturation $[0.0,1.0]$
- P : Perceived brightness
 - $P = \sqrt{0.299 \times R^2 + 0.587 \times G^2 + 0.114 \times B^2}$