UNIVERSIDAD SIMÓN BOLÍVAR
DECANATO DE ESTUDIOS PROFESIONALES
COORDINACIÓN DE INGENIERÍA DE LA COMPUTACIÓN

DESARROLLO DEL MÓDULO PRINCIPAL Y ESTADÍSTICAS DE LA LIBRERÍA AUDITORÍAS TURPIAL

Por:
Stefani Carolina Castellanos Torres

INFORME DE PASANTÍA
Presentado ante la Ilustre Universidad Simón Bolívar
como requisito parcial para optar al título de
Ingeniero de la Computación

Sartenejas, Enero 2018

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RESUMEN

Este es el resumen

DEDICATORIA

RECONOCIMIENTOS Y AGRADECIMIENTOS

First of all, I would like to thank . . . .

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símbolos

LISTA DE ABREVIACIONES

VIM	Variational Iteration Method
MVIM	Multistage Variational Iteration Method
ODEs	Ordinary Differential Equations
PDEs	Partial Differential Equations
λ	Lagrange Multiplier
ADM	Adomian Decomposition Method
SADM	Standard Adomian Decomposition Method
MADM	Modified Adomian Decomposition Method
RK4	Fourth-order Runge-Kutta Method
HAM	Homotopy Analysis Method

INTRODUCCIÓN

Implementar, probar y presentar las funcionalidades de selección, gestión y listados de auditorías y todas las funcionalidades del módulo Estadísticas de la librería de Auditorías Turpial e implantar un sistema de integración continua con el repositorio.

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2.2 Justificación

2.3 Planteamiento del problema

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ALGORITHMS

A.0 Simulated Annealing

Random decimal numbers g to a and T to T_0
Loop - *Cooling*
    Loop - *Local Search*
        Derive a neighbour, j of i
        $\triangle E := E(j) - E(i)$
        If $\triangle E < 0$
        Then $i := j$
        Else derive random number $r \in [0, 1]$
            If $r < e^{-\frac{\triangle E}{T}}$
            Then $i := j$
            End If
        End If
    End Loop – *Local Search*
    Exit (when goal is satisfied or the stopping criterion is reached)
    $T = C(T)$
End Loop -*Cooling*

Figure A.1: Algorithm of Simulated Annealing

A.1 Genetic Algorithm

S1: [**Start**] Generate an initial population P_{pop}, of n chromosomes.
S2: [**Fitness**] Evaluate the fitness $g(x)$ of each chromosome x in the population.
S3: [**New Population**] Create a new population by repeating the following steps until the new population is complete.

i. [**Selection**] Select 2 parent chromosomes from a population according to their fitness (the fitter, the better chance of being selected).
ii. [**Crossover**] With a crossover probability p_c, cross over the parents to form 2 new offspring (children). If no crossover was performed, the offspring is an exact copy of parents.
iii. [**Mutation**] With a mutation probability p_m, mutate new offspring at each locus (position in chromosome).
iv. [**Replace**] Place new offspring in the new population.

S4: [**Fitness**] Evaluate the fitness $g(x')$ of each chromosome x' in the new population.
S5: [**Test**] If the end condition is satisfied, **STOP**, and return the fittest solution found; otherwise, go to **S3**.

Figure A.2: Algorithm of a Genetic Algorithm

A.2 Tabu Search

```
procedure SEARCH(t, k, diversify, z):
    penalty* := +∞;
    for each j ∈ S_t do
        for each k-tuple K of bins not including t do
            S := {j} ∪ (⋃_{i∈K} S_i);
            penalty := +∞;
            case
                A(S) < k:
                    execute the move and update the solution value z;
                    k := max{1, k − 1};
                    return;
                A(S) = k:
                    if the move is not tabu or S_t ≡ {j} then
                        execute the move and update the solution value z;
                        if S_t ≡ {j} then k := max{1, k − 1};
                        return
                    end if;
                A(S) = k + 1 and k > 1:
                    let I be the set of k + 1 bins used by A;
                    t̄ := arg min_{i∈I}{φ(Si)}, T := (S_t\{j}) ∪ S_t̄;
                    if A(T) = 1 and the move is not tabu then
                        penalty := min{φ(T), min_{i∈I\{t̄}}{φ(S_i)}}
            end case;
            penalty* := min{penalty*, penalty};
        end for;
    end for;
    if penalty* ≠ +∞ then execute the move corresponding to penalty*
    else if k = k_max then diversify := true else k := k + 1
return.
```

Figure A.3: Unified Tabu Search: Procedure SEARCH

APPENDIX B

TABLES

B.1 Complex Tables

Example of complex table . . . e.g. Table B.1

Table B.1: Typology of Machine Scheduling Problems

Characteristic	Symbol	Description
Machine Environment α	$\alpha_1 = \circ$	a single machine
	$\alpha_1 = P$	identical parallel machines
	$\alpha_1 = Q$	uniform parallel machines
	$\alpha_1 = R$	unrelated parallel machines
	$\alpha_1 = F$	a flow shop
	$\alpha_1 = O$	an open shop
	$\alpha_1 = J$	a job shop
	$\alpha_2 = \circ$	the number of machines is arbitrary
	$\alpha_2 = m$	there are a fixed number of machines m
Job Characteristics β	$\beta_1 = \circ$	no release dates are specified
	$\beta_1 = r_j$	jobs have release dates
	$\beta_2 = \circ$	no deadlines are specified
	$\beta_2 = \bar{d}_j$	jobs have deadlines
	$\beta_3 = \circ$	there are no setup times
	$\beta_3 = s_{ifg}$	there are general family setup times
	$\beta_3 = s_{fg}$	there are machine independent family setup times
	$\beta_3 = s_{if}$	there are sequence independent family setup times
	$\beta_3 = s_f$	there are machine and sequence independent family setup times
	$\beta_4 = \circ$	no precedence constraints are specified
	$\beta_4 = prec$	jobs have precedence constraints
	$\beta_4 = pmtn$	preemption of jobs is allowed
Optimality Criterion γ (involves the minimisation of)	$C_{\max}$	maximum completion time
	$L_{\max}$	maximum lateness
	$\sum_j (w_j) C_j$	total (weighted) completion time
	$\sum_j (w_j) T_j$	total (weighted) tardiness
	$\sum_j (w_j) U_j$	total (weighted) number of late jobs
	$\sum_j (w_j) E_j$	total (weighted) earliness

Example of landscape (or sideway) table . . . e.g. Table B.2

Table B.2: A Comparison of Different Local Search Algorithms

Due Date Class	Data Class	**SGA**			**MXGA$_F$**			**UTS$_{LGF}$**			**RDM**		
		Ratio	OBU	ARD	Ratio	OBU	ARD	Ratio	OBU	ARD	Ratio	OBU	ARD
A	I	1.056	83.10	16.58	1.042	85.26	12.37	1.053	83.42	16.02	1.088	78.73	22.27
	II	1.033	63.69	17.38	1.020	66.19	11.15	1.025	64.92	13.17	1.025	65.36	12.00
	III	1.109	71.36	30.86	1.078	75.40	22.00	1.084	74.51	27.90	1.092	73.23	26.59
	IV	1.047	60.68	21.74	1.047	61.65	17.29	1.033	62.25	19.09	1.040	61.77	18.95
	V	1.087	72.45	24.24	1.070	74.46	18.00	1.077	73.61	21.97	1.076	73.53	21.73
	VI	1.110	54.51	23.23	1.093	56.01	16.66	1.110	54.41	21.49	1.103	55.34	19.34
	VII	1.120	74.45	33.48	1.090	78.54	23.52	1.107	76.70	29.67	1.099	77.10	29.46
	VIII	1.125	74.14	33.96	1.089	78.79	23.31	1.102	77.26	29.99	1.103	76.41	29.03
	IX	1.007	44.07	1.68	1.007	44.10	1.68	1.007	42.92	1.74	1.007	43.17	2.12
	X	1.099	74.96	27.90	1.080	77.27	23.89	1.089	76.59	32.05	1.093	74.93	27.54
Average		1.079	67.34	23.10	**1.062**	**69.77**	**16.99**	1.069	68.66	21.31	1.073	67.96	20.90
B	I	1.065	81.82	34.93	1.046	84.73	24.17	1.069	81.58	31.78	1.088	78.46	38.27
	II	1.033	63.61	47.72	1.027	65.52	33.98	1.038	64.05	39.68	1.032	63.68	33.46
	III	1.132	68.91	66.78	1.088	73.90	46.21	1.128	69.99	64.99	1.107	71.50	56.46
	IV	1.060	59.27	53.45	1.047	61.70	35.98	1.063	59.58	49.09	1.060	59.22	45.72
	V	1.113	69.66	48.58	1.080	73.43	35.51	1.104	70.91	48.33	1.094	71.59	40.41
	VI	1.110	54.34	48.85	1.110	54.93	37.73	1.090	55.34	46.41	1.097	55.00	42.01
	VII	1.133	72.88	71.94	1.102	76.80	52.17	1.135	73.47	65.82	1.122	74.28	58.16
	VIII	1.143	72.19	72.72	1.099	77.38	49.41	1.122	75.08	67.28	1.118	74.27	60.49
	IX	1.007	43.84	2.42	1.007	43.97	2.42	1.007	43.09	2.53	1.007	43.30	3.79
	X	1.113	73.38	67.45	1.087	76.31	53.48	1.125	72.90	81.02	1.110	73.23	64.39
Average		1.091	65.99	51.48	**1.069**	**68.87**	**37.11**	1.088	66.60	49.69	1.084	66.45	44.32
C	I	1.085	79.30	136.69	1.054	83.50	92.98	1.083	79.76	115.41	1.104	76.50	128.02
	II	1.050	61.80	232.20	1.040	64.02	149.48	1.048	62.60	165.41	1.040	62.44	179.75
	III	1.164	65.80	180.45	1.093	73.28	124.96	1.148	68.01	173.81	1.127	69.10	148.03
	IV	1.070	58.68	223.21	1.053	60.59	153.24	1.063	60.12	210.69	1.063	59.19	183.06
	V	1.134	67.32	149.25	1.088	72.38	105.04	1.134	68.20	142.07	1.106	69.88	121.12
	VI	1.110	54.34	274.92	1.110	54.43	241.31	1.110	54.42	264.36	1.117	53.73	251.38
	VII	1.161	70.18	296.58	1.106	76.20	209.59	1.164	70.42	261.95	1.134	71.77	227.27
	VIII	1.153	70.86	421.53	1.101	76.79	273.28	1.172	69.72	387.14	1.135	72.15	320.40
	IX	1.007	43.71	9.93	1.007	43.81	9.93	1.008	43.14	15.13	1.008	43.29	18.72
	X	1.131	71.33	396.65	1.100	75.24	318.50	1.148	70.83	412.62	1.134	70.87	345.31
Average		1.107	64.33	232.14	**1.075**	**68.02**	**167.83**	1.108	64.72	214.86	1.097	64.89	192.31