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Estimation of Graph Coloring Problem Using Weighted Sum Method

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Abstract

Graph coloring problem is some of the elements of a graph Colors subject to restrictions is to allocate. Vertex coloring too Generic graph coloring problem The problem is, Given m colors, a For coloring the vertices of the graph Find the way, ie Two adjacent vertices are identical Color will not be painted using color.graph coloring problem is a some of the restrictions and to constraints Some of the graphs included Assigning colors to elements Includes. In other words That is, two adjacent ones The vertices are not the same color Assigns colors to vertices The procedure is collar graph coloring.The weighted sum method is a multi-criteria decision-making method, there are many alternatives and we must decide which is the best alternative based on many criteria.Alternative: Clique, Clique + Block Color + MultPath, Clique + Block Color + Mult Path + MultCli, Clique + MultCli + Hole, Clique + Block Color + MultPath + MultCli + Hole. Evaluation Preference: Initial gap, Final gap, Time, Round.From the result it is seen that Clique + Block Color + MultPath + MultCli + Hole is got the first rank where as is the Cliqueis having the lowest rank.

Keywords- Graph Coloring Problem, WSM, Initial gap

1. Introduction

Graph coloring problem is some of a diagram for some restrictions on components Subject is assigning colors. Vertex coloring too Graph coloring trouble The problem is, Given m hues, a For coloring the vertices of the graph Find the way, ie Two adjacent vertices are identical Color will not be painted using color. Like edge coloring no vertex Other graph coloring issues For two edges of the same color Equivalents and face color geography Vertex color graph Can be changed to color. Graph Coloring is a graph Color each vertex of G Allocation process ie Any Adjoining vertices does now not get the same coloration. A graph of colors when coloring the goal is to reduce the number. Color a graph for G The minimum required for installation Number of colors of that graph its color number is called. Graph coloring are the vertices of a graph the problem with coloring indicates. This is vertex coloring this is also known as the vertex coloring problem. Using at most k colors if it is colored, it is called k-coloring. Required for color chart the smallest wide variety of colors is known as its coloration quantity. Color wide variety is denoted with the aid of X (G). For the diagram finding a coloration quantity is an NP-whole hassle. The decision letters WSM We Let's save millions. WSM Officially broadcast on October, 1925 started It will be The Grand Ole Opry A month after the show Aired for the first time. To find the weighted average, each number Multiply by its weight and then calculate the results add If the weights do not coincide Sum of all variables and their Multiply by weight, of weights Divide by the sum.

2. Graph Coloring Problem

Such techniques graph Perfect for coloring issues. They have up to 1000 nodes Almost optimal of apps we offer colors We show, and their Performance is popularly simulated is shown to be significantly superior to annealing [1]. Graph coloring problem These algorithms are very new type Special crossover operators And the well-known tab search Algorithms combine Tests of such a hybrid algorithm The big DIMACS challenge benchmark carried out on graphs. Graph Coloring problem max Independent synthesis is reduced to complexity. Including local search methods Continuous color classes Create maximum independent packages various techniques to detect are proposed. This strategy for coloring large random graphs One of the most effective approaches [2]. Graph coloring problems, of the graph given in this A limited number of vertices Coloring with colors, thus Two nearby worms Does not get the same color, on this paper Various planning in and Many applications including partition problems arise. And such colors Effectiveness of generating mechanisms A graph is explored for G. G is the minimum required for color Indicates the colors and which Also for graph coloring algorithm[3]. Graph color, MIS and related problems. Distributed Unfamiliar with the field of coloring A monograph for readers To make it relevant, in the first chapters We provide the necessary background [4]. The graph coloring problem is quite investigated NP-hard One of the problems, and informal method. An undirected graph given, two adjacent two colors assigned to nodes To be different For the edges of the graph In phrases of less With wide variety of colors One likes to give color. Graph coloring term Scheduling and resource allocation has many practical applications such as [5]. Problem with graph color Colors in graph color Since they are indistinguishable, Usually the same number Various associated with colors May have symmetrical colors. Integer programming of the problem Solutions to the model are that property if exposed, a small-scale graph Even for coloring events The branching and cutting system is poor behaves. Our model, to a certain extent, that disturbance avoids. The results we get, In most cases, well A well-known exact solution diagram The coloring algorithm is by Dsatur Improves the results given Computational experience indicates that[6]. For the graph coloring problem Two watermarking techniques Let's take

examples. First, some are well-chosen between vertical pairs Adding extra margins will be labeled with different colors by The second technique is from the original drawing One or more independent Select package(s). Each set correctly Mark with a color[7]. Graph coloring problem A popular difficult combination Optimization is problematic. of applications Examples include time table and between vertical pairs Scheduling, Radio Frequency Allocation, Computer registration is allocated And published Includes circuit board testing. The specific algorithms are 100 vertices can resolve cases with However, heuristic for large instances Methods are required. The maximum current Graph coloring heuristics are local search techniques or Hybrid methods are, they are Local search population Link based algorithm. The purpose of this thesis is to graph Proposed for coloring presenting a study of met heuristics [8]. Multiple optimizations in graphs As with problems, graph The coloring problem is also a linear integer May be formulated as a programming trouble. Unique In formulating optimization problems, In addition to having the correct mathematical model, Well-structured that solves effectively It is also important to have a model. There is a natural symmetry, If it spreads to the model, a cut Unreliable flight mechanism can be immersed in the method[9]. The Graph coloring trouble is is well-known NP-difficult The trouble is that in VSS Col Local search algorithms used VSS-Col than Tabu Col and Partial Col Very useful, but a search Works in place. VSS- Col is the current best hybrid Evolutionary graph coloring Appears to be competitive with algorithms [10]. An experimental PL/I optimization Global register allocation in the compiler Graph coloring to do For the number of machine registers Register with as many colors as possible To color the confederate graph When not possible, go to storage and register Reload code must be added. Previously, the compiler spilled the code Techniques. Available by the compiler previously, the compiler spilled the code Created, its quality sometimes leaves much to be desired Existing, and used ad hu The techniques will compile considerably took time. Graph coloring How to extend the approach Now we have discovered, thus It naturally solves the leakage problem [11]. Selective graph coloring Problem is, standard graph coloring The problem and its potential range Generalization of applications. Many Its arranged in clusters One with partition of vertex Given a graph, a To select a vertex for the cluster Wanted means chosen of a subgraph induced by vertices Color number will be minimum. Graph coloring problem can be used. by each model In induced specific graph classes We focus, and more Selective graph coloring[12]. This paper is distributed memory best suited for parallel computers An asynchronous graph Provides a colorful heuristic. Our heuristic random heuristic uses, followed by several good sequences In colorful heuristics A local grid that uses one. The initial phase is the maximum independent set For the Monte Carlo algorithm to determine Expected good received Maintains running time limits [13]. To perform registration assignment popular techniques are graph coloring are based on precedent. These allocators protect the allocator Indicates required controls making a graph. Graph Target using techniques In the process of registering on the machine Graphping from values in discovered [14]. The basic idea is that considering only direct routes and different flight positions separate vertically by assigning Intersecting routes are thus graphed Coloring can lead to problems.Bigger with greedy algorithms after identifying groups, control this problem is solved by using Ralakam. Post global restrictions Guide the search strategy these groups are used [15]. A graph coloring algorithm is within the input graph Also the range of colors used for the chromic number of this diagram is the worst ratio between [16]. Graph to frozen development the solution of coloring is also pricey the interactions between us Let's explore. In SAT, in the order parameter Suspension in SAT events Associated with hardness, and our for coloring the data is an asymptotic continuum indicates character. Colorlessness range Hard to draw-color For test cases is known to lead [17]. A graph coloring algorithm and this observation is important cause's consequences. Space For estimating Jacobian matrices To examine the characteristics of mechanisms This led to us, and CPR Significantly improve the algorithm We have shown that it can[18]. This is the purpose of the article Frequencies in wireless networks or allocation of time slots is the minimum graph color Classical applications are Many For distributed graph-theoretic problems On the contrary, in the last few years More on distributed color No progress. This situation Improving and coloring graphs To understand the distributed problem This is a step forward[19]. Local Graph Color informally, For each vertex we A methodology is required here integrated The question is, such color of colors required for execution Bound in numbers [20]. the undirected graph of Coloring is vertices By dividing into color classes, thus Any two edges are in the same class Does not connect vertices. As few as possible The goal is to use colors. NP-Every graph With minimal colors Difficult to color [21]. In the Graph coloration on-line model, A graph is presented one vertex at a time. Each new vertex with previous vertices with all connecting edges Given together. An on-line A coloring algorithm is derived Assigns a color to each vertex And once assigned, the color cannot be changed[22]. The graph coloring problem is NP-complete, k-color for any constant k ~ 3 The graph problem remains NP-complete This by showing that Reinforced the result. General diagram The difficulty of the coloring problem Considering, many researchers polynomial-time approximation developed algorithms[23]. Providing a summary of insights And in graph color Implementation of optimization techniques, as well as a meta-heuristic for GCP Trends in programs of algorithms Description. Meta-heuristic Importance of optimization algorithms There are many benefits they offer to overcome the challenges faced llustrates and graphs in color[24]. Limited differences or using automatic differentiation Sparse Jacobian and Hessian matrices efficiently Graphs from the 1980s to calculate Coloring was used. Matrix is a Whether Jacobian or Hessian Specifications of Computational Techniques Depending on, many in this environment Coloring problems occur[25]. Early break, concrete cracks and deformation modulus of the bed rock and are the pressures of the penstock have a significant impact. For the men you need Shopping Cap for Final Sale. Our little pieces. Your Personal style. Since 1969. circling around or circling. A complete to make the rounds; Go around completely. groups are tight groups, which Stricter of members in general Code and working methods have Spring sunshine And bright days are bold Call for a mirrored wardrobe. It will be hot this spring A full-color trend color. In radio communication, multipath is Antenna for receiving radio signals Two or more Diffusion is the phenomenon of reaching through pathways. MultiCliQ is a B2B travel and Banking Specialized Website Established in 2022.

3. Weighted Sum Model (WSM)

A weighted sum multi-objective optimization (MOO) method, stable, is not ideal for providing multiple solution points by

varying the weights, although additionally a set selection is included for a single answer that displays options continue to deliver the point is used. Weights. Weights to expose setting options an approach, and it's diverse applies to methods. Because of this, weights the solution for the weighted sum method understanding how affect others include similar method parameters has implications for attitudes. A selection theory Weighted sum sampling method WSM is very The well-known MCDM (multi-criteria decision-making) is one of the techniques And primarily some Alternatives based on criteria Easier to evaluate is one. WSM is valid handiest while all information supplied are in the same size or unit [26]. The in each column Rows are compressed, using their respective rank sums Columns are sorted If the rank sum is reduced The column molecule is searched Same as reference form will be Others mixtures of rating matrix except summation have been studied. This approach is relevant to tuning parameter choice and different regions in which Subgroup variables of variables must be selected from the set This is when the SRD method is monitored The approach can be considered unsupervised (A goal vector is used) In addition to the SRD approach Can be used in molecular fitting research [27]. Factor weights for robot selection and are A weighted sum model with This model has no institution consensus on those values. In choosing robots, the best and weights and subjectivity Less expert on components Values are removed. The main purpose for getting rid of These values are any capacity at the last stage It is to reduce the impact of distorted desire to explain version and program A numerical example is presented the ranking change while in comparison to a version that does not do away with those excessive values [28]. Using weighted-sum beamforming, the microphone arrangement, which includes the variety and function of the microphones, determines the weight for every microphone signal. To determine the design parameters, diverse simulations had been finished if the listener had a head. To make amends for the and the impact is accounted for using the round head-related transfer function (HRTF). We perform simulations with respect to a round head version [29]. The Weighted Sum Model (GWSM) accounts for multi-year uncertainties with the aid of comparing the enterprise environment in West Africa. The deal with a first-rate problem now not blanketed through DBP, specifically, ranking countries throughout years by considering inside-country uncertainty and investor possibilities as criterion weights. Second, we enlarge the traditional weighted sum model. weights containing pure gas The sum equals A common way to use calculate the entire emissions by means of making a grey approximation to resolve the spectrally included RTE. An alternative method Non-gray or bar formula [30].To decides the depth of penetration, the sum rule need to be cautiously applied. Our effects display that Normal and superconducting to move the c-axis between positions A within energy There is trade, for a speed-dependent gap; This exchange in kinetic energy ought to be taken under consideration to properly derive the penetration intensity from conductance sum regulation Naïve use of conductivity sum [31]. Important (1) part Determination of sum rule closely related the greater trendy trouble of improving the feature Out of test range is widely recognized the evaluation (holomorphic) of a complicated feature $\sigma(\omega)$ on a given area D can be persevered analytically over the complete domain inclusive of the last boundary from a subset of the boundary of this area [32]. The weight trouble must be solved first. Furthermore, modelling the dynamic shape factor studied with the aid of MNS is extra tricky considering that discrete Sum laws of theoretical models are satisfying. In fact, any theory Notification of serious settlement dynamic structure issue measured in absolute devices should provide an explanation for how the regulation of composition is happy or why it is violated [33]. All like the weight of white fuel a0 The sum of the weights zero = zero; Therefore, εt , calculated by the SNB version, is the sum of the differences among L and by the WSGG version of SQP Extraordinary path with help Calculated for length set of rules [23]. Weighted sum rules for exchange forces A very sensitive test Fourier components optimization measures, Roughly speaking, it proved. transfer potential of the two-particle interaction density [34]. Sum (SNNMS) reduces the number of LDPC decoding network Correction factors. A single revision in a single layer by dividing the factors Through the SNNMS LDPC decoding network Good performance can be achieved a small increase in computational complexity. The weighted sum model does not require any supported solutions to be pruned with this optional correlation. To the best of our understanding, the priority relation is only implemented to given answers and non-stop multi-objective optimization troubles [35].

4. Analysis and Discussion

TABLE 1. graph coloring problem

	Initial gap	**Final gap**	**Time**	**Round**
Clique	65.11	52.53	28.15	15.05
Clique + Block Color + MultPath	57.12	74.97	33.69	11.30
Clique + Block Color + MultPath + MultCli	74.08	69.58	29.18	13.10
Clique + MultCli + Hole	83.17	58.28	34.60	14.59
Clique + Block Color + MultPath + MultCli + Hole	73.33	86.41	27.96	12.89

Table 1 shows the graph coloring problem using the Analysis method in WSM Initial gap, Final gap, Time, Round. Clique, Clique + Block Color + MultPath, Clique + Block Color + MultPath + MultCli, Clique + MultCli + Hole, Clique + Block Color + MultPath + MultCli + Hole. it is also data set of in the Value.

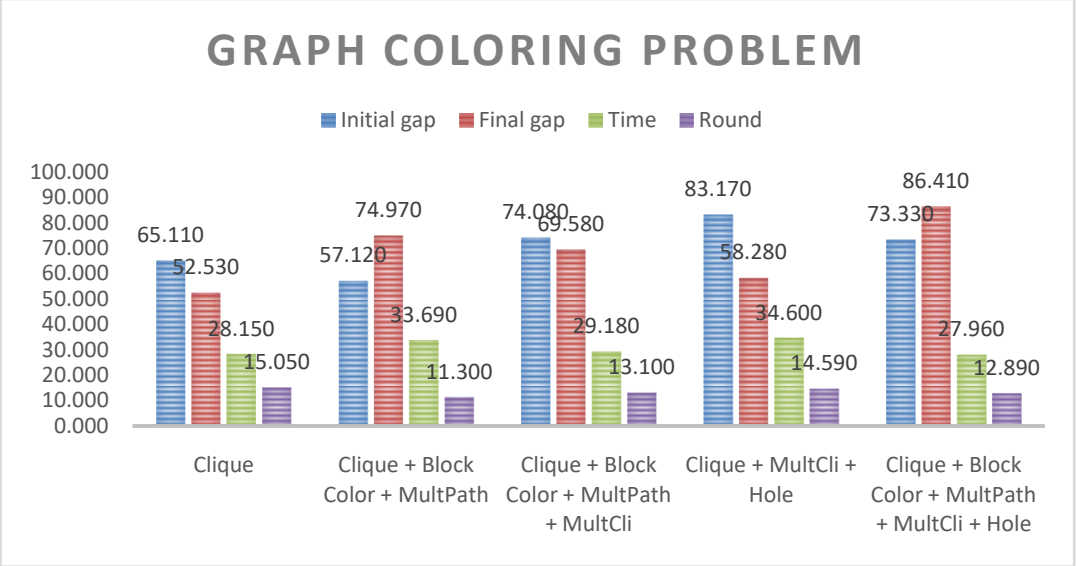

FIGURE 1. graph coloring problem

Figure 1graph coloring problem Shows the graphical representation Initial gap it is seen that Clique + MultCli + Hole is showing the highest value for Clique + Block Color + MultPath is showing the lowest value. Final gap it is seen that Clique + Block Color + MultPath + MultCli + Hole is showing the highest value for Clique is showing the lowest value. Time it is seen that Clique + Block Color + MultPath is showing the highest value for Clique + Block Color + MultPath + MultCli + Hole is showing the lowest value. Round it is seen that Clique is showing the highest value for Clique + Block Color + MultPath is showing the lowest value.

TABLE 2. Normalized Data

Normalized Data			
0.782854	0.607916	0.99325	0.750831
0.686786	0.867608	0.82992	1
0.890706	0.805231	0.958191	0.862595
1	0.674459	0.808092	0.774503
0.881688	1	1	0.876649

Table 2 shows the Normalized data for graph coloring problemInitial gap, Final gap, Time, Round. Clique, Clique + Block Color + MultPath, Clique + Block Color + MultPath + MultCli, Clique + MultCli + Hole, Clique + Block Color + MultPath + MultCli + Holeit is also the Maximum in Normalized value.

TABLE 3. Weightages

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Table 3 shows Weightages used for the analysis. We take same weights for all the parameters for the analysis

TABLE 4. Weighted normalized decision matrix

Weighted normalized decision matrix			
0.195714	0.151979	0.248313	0.187708
0.171697	0.216902	0.20748	0.25
0.222676	0.201308	0.239548	0.215649
0.25	0.168615	0.202023	0.193626
0.220422	0.25	0.25	0.219162

Table 4 shows the weighted normalized decision matrix for Initial gap, Final gap, Time, Round. Clique, Clique + Block Color + MultPath, Clique + Block Color + MultPath + MultCli, Clique + MultCli + Hole, Clique + Block Color + MultPath + MultCli + Holeis also Multiple value.

TABLE 5. Preference Score

Preference Score	
Clique	0.783713
Clique + Block Color + MultPath	0.846078
Clique + Block Color + MultPath + MultCli	0.879181
Clique + MultCli + Hole	0.814264
Clique + Block Color + MultPath + MultCli + Hole	0.939584

Table 5. Shows thePreference ScoreClique=0.783713, Clique + Block Color + MultPath=0.846078,Clique + Block Color + MultPath + MultCli=0.879181,Clique + MultCli + Hole=0.814264, Clique + Block Color + MultPath + MultCli + Hole=0.939584.

TABLE 6. Rank

Rank	
Clique	5
Clique + Block Color + MultPath	3
Clique + Block Color + MultPath + MultCli	2
Clique + MultCli + Hole	4
Clique + Block Color + MultPath + MultCli + Hole	1

Table 6 shows the of the final result of this paper the Clique is in 5th rank, the Clique + Block Color + MultPath is in 3rd rank, the Clique + Block Color + MultPath + MultCli is in 2nd rank, the Clique + MultCli + Hole is in 4th rank and the Clique + Block Color + MultPath + MultCli + Hole is in 1st rank.

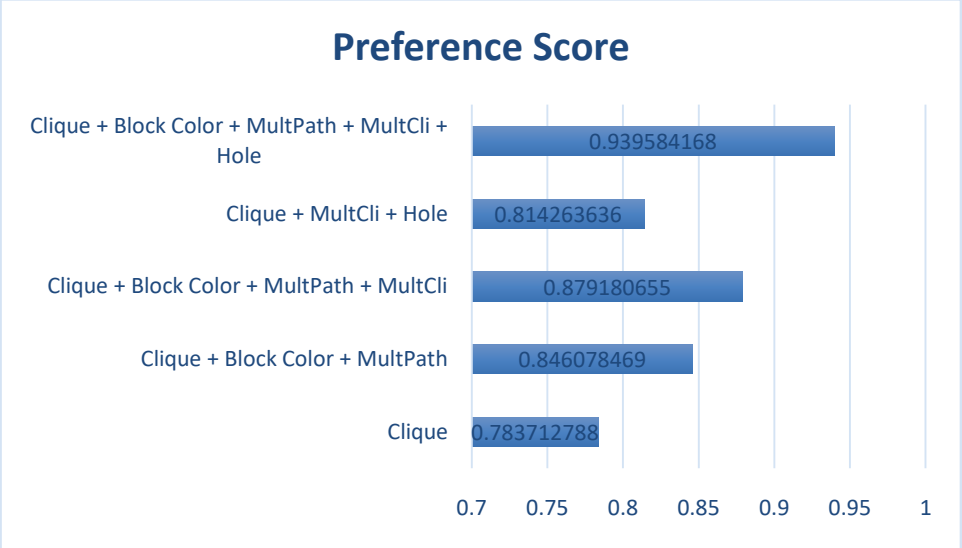

FIGURE 2. Preference Score

Figure 2 shows the preference Score for Clique + Block Color + MultPath + MultCli + Hole is showing the highest value for Cliqueis showing the lowest value.

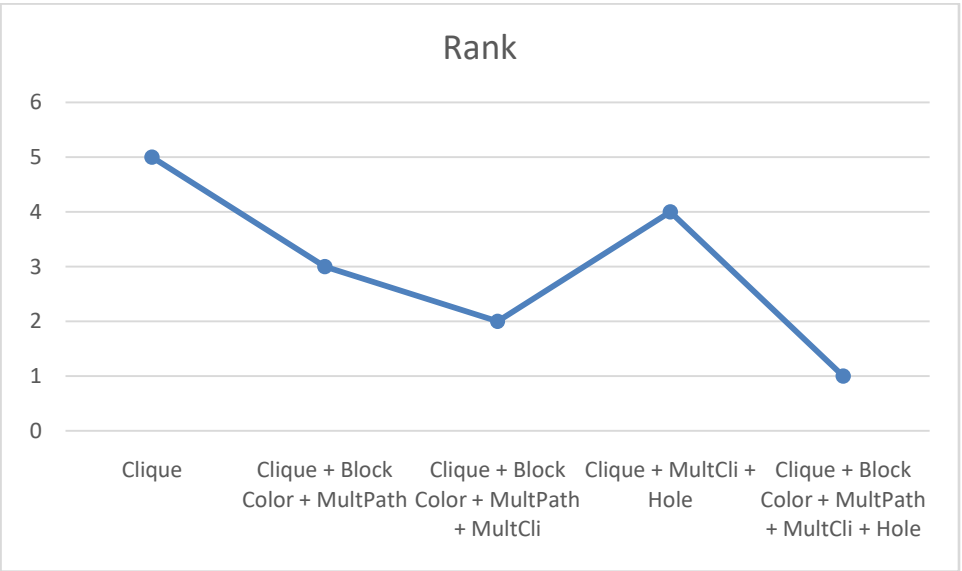

FIGURE 3. Rank

Figure 3 Shows the Ranking of graph coloring problemClique + Block Color + MultPath + MultCli + Holeis got the first rank whereas is the Cliqueis having the Lowest rank. the Clique + Block Color + MultPath + MultCli + Hole is in 1st rank, the Clique + Block Color + MultPath + MultCli is in 2nd rank, the Clique + Block Color + MultPath is in 3rd rank, the Clique + MultCli + Hole is in 4th rank And the Clique is in 5th rank.

5. Conclusion

graph coloring problem is some of a diagram For some restrictions on components Subject is assigning colors. Vertex coloring too Generic Graph coloring trouble The problem is, Given m hues, a For coloring the vertices of the graph Find the way, ie Two adjacent vertices are identical Color will not be painted using color. Like edge coloring no vertex Other graph coloring issues For two edges of the same color Equivalents and face color geography Vertex color graph Can be changed to color. A weighted sum multi-objective optimization (MOO) method, stable, is not ideal for providing multiple solution points by varying the weights, although additionally a set selection is included for a single answer that displays options continue to deliver the point is used. Weights. As a result, Clique + Block Color + MultPath + MultCli + Hole has got the first rank, where the Clique has got the lowest rank.

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