Application Employee Shift Scheduling Algorithm Recursive Largest First (RLF) at PT. Invilon Sagita Medan

Finus Buulolo¹, R.Mahdalena Simanjorang²

^{1,2}Informatics Engineering Study Program, STMIK Pelita Nusantara, Jl. St. Iskandar Muda No. 1 Medan, North Sumatra, Indonesia 20154

E-mail: finusbuulolo96@gmail.com

Abstract -Scheduling is one of the important things in any company such as PT. Invilon sagita currently have employees reaches hundreds of people so that employees who handle scheduling of employees experience difficulty in because of the number of employees is too much. Constraints in the natural is a very long time so it is necessary a method in solving the problem. In this study using Lagert Recusiv First (RLF) in the preparation of Karawan scheduling with visual studio 2010. program based on those already in the test results with the number of employees by 5 people RLF method can resolve employee scheduler quickly.

Keywords: RLF, Scheduling, Employees

1. Introduction

In this age of globalization, information technology is becoming one of the company's main facility in generating quality information that is also one of the business strategy for the company. Information is one of a fairly important part in human life, because with the information that will support us in making decisions more quickly and accurately. To present this information can be obtained easily. This is because of the help of technologically advanced tools to process data into information needed, such as computers. Computers can help facilitate the work of human beings, including the scheduling and employee.

Scheduling is an activity that should be owned by every person to be able to assist in performing daily activities. Moreover, an institution or institutions that have an important agenda to be completed regularly and tidy. So important is this scheduling so that activities can be run in accordance with what has been planned (Rifai, 2011). Scheduling is required to set the working time, so we get the schedule as efficiently as possible. A scheduling would seem easier if the component is scheduled in relatively small amounts, but it would be complicated if the constituent components in large quantities.

PT. Invilon Sagita is one of the companies engaged in the production and marketing of this plastik.Saat pipeline, the company is still applying the manual system in adjusting employee shift schedules. The process of manually scheduling often face several challenges such as the schedule is yet streamlined so that the production process is not running optimally, employees are often unable to attend because of schedule given is not adjusted to the time of the employee and the scheduling process often takes a long time. Therefore, it needs a scheduling system that terkomputerisasi.Salah an algorithm that can be used to make decisions and scheduling where the node graph coloring is Recursive Largest First.

2. Theory

2.1 scheduling

According Suseno & Efaoga Dhuha (2017: 298) Labor Scheduling is the allocation of human resources at the work station as needed, to increase the productivity of the company must schedule an optimal workforce. Modification of the algorithm is to accommodate the production time of 3 shifts per day to 6 days a week, where workers work 5 days a week with a turn three shifts and holidays two days, namely on Sunday according to company policy and one day after the shift 3 (Erika FA, Arif R . & Cheers FM T (2014: 22).

2.2 Graf

By Nabila A (2015: 2) Graph theory is a subject which is an old but has many applications today. Graf used to represent discrete objects and the relationships between these objects. Graf was first used to solve the problem bridges of Königsberg in 1736. In that year, a Swiss mathematician named L. Euler solved the problem of the Königsberg bridges. He modeled this problem in the form of graphs with the mainland (dots connected by a bridge) is modeled as a node or vertex and the bridge is expressed as a line or edge.

A possible graph does not have any satubuah side but every vertex must exist (at least one). Graf can be grouped into several categories based on the presence or absence of double sided tau, based on the number of nodes, or based on the orientation direction on the side.

2.3 Recursive Largest First

By Nabila (2015: 3) Algorithm Recursive First Largest almost similar principle with the Welch-Powell algorithm. Step Recursive work of Largest First is as follows. 1. Create a list of all the nodes that have not been tinged with a degree of neighbor (the number of vertices of the neighborhood who have not stained) sequences in descending order. 2. Take neighbor node that has the highest degree and paint it with a color. 3. Buang node that has been dyed in the previous step and all the neighboring node from the node list. 4. Warnai all the remaining vertices of the same color on the knot earlier. Then repeat the steps above until all the nodes in the graph has stained all.

2.4 Use Case Diagram

According to Rice N. & Novita S (2015: 3) Use Case Diagram consisting of actors, use case and as well as the relationship. Use case diagrams are important for visualizing, specifying and documenting the needs of system behavior. Usecase diagram is used to describe any activity that can be done by the user / users running system (). Use case explain in simple terms the system functions from the perspective of the user.

2.5 Activity Diagram

According to A. Handini (2014: 22) Activity diagram illustrates the workflow (workflow) or activity of a system or business process. The symbols used in the activity diagram, namely:

2.6 ERD (Entity Relationship Diagram)

According to Eka. W. F, Tias, Mahdiati (2016: 132) ERD (Entity Relationship Diagram) is a model of approaches which states or describes the relationship of a model. In this connection it is stated that the main object is to show the data ERD (Entity) and relationships (Relationship), which is on the next Entity. The process allows the analyst generate database structures can be stored and retrieved efficiently. The symbols in the ERD (Entity Relationship Diagram) is as follows:

- Entity: a real or abstract which have characteristics which we will store data.
- Attributes: general characteristics of all or most of the agencies in certain entities.
- Relationships: natural relationship that occurs between one or more entities.
- Link: the connecting lines with a collection of entities and attributes of a collection of entities with relationships.

3. Results and Analysis

3.1 Data analysis

Research done at PT. Terrain Sagita Invilon get problems facing researchers in this institution in the prepare the election of employee schedules still conventional, is still done manually in the preparation of this research karyawan scheduler doing research at PT. Invilon Sagita Jl Medan. Payageli Mosque Medan.

Analysis of the system needs to support the design of these systems can be yangakurat and effective system, the researchers do research directly to the PT. Invilon Sagita Medan to collect employee scheduling data that already exists in the studied company.

The analysis will build is a scheduling system that is designed with Microsoft Visual Studio 2010 Programming with SQL server 2008 database.

3.2 Analysis Methods RLF

Step Recursive work of Largest First (RLF) can briefly be seen ditabel 4.1

Table 1.
Data Shift Employee

No	Name	Day	Room	Hour	staff
1	Darius Syahputra	Monday	BX01	8:00 to 16:00	Production
2	Jorisan Pratama	Tuesday	BX02	8:00 to 16:00	Production
3	Sela Permata Sari	Wednesday	BX03	13:00 to 21:00	Selection
4	Susi Andini	Thursday	BX03	13:00 to 21:00	Warehouse staff
5	Eko Ludoni	Friday	BX01	8:00 to 16:00	Warehouse staff

In order to better understand the process of coloring is done, see a simple example which can be done from chapter 2 as follows: Suppose that there are seven staff Production (A, B, C, D, E, F, G) and two pieces of expertise namely Cutting and Packing, with the following details:

cutting: A, B, C, D, E, Packing: F, G

the scheduling process *shift* RLF work using the algorithm can be detailed as follows:

- Employees with the same expertise means that the employee node should not be linked. Picture input graph as shown in Figure 4.1 below:

Figure 1. Describing Graph Structure Staff Relations.

- b. After completion of the imaging process graph, then the process is continued with the process of graph vertex coloring using vertex coloring algorithm graphRecursive First Largest which has the following steps:
- 1) List all the nodes that have not been colored as shown in Table 4.2 below:

Table 2.
List Knot Not Treated

Node name	Total Node Neighbors the Not Treated
F	5
G	5
A	2
B	2
C	2
D	2
E	2

- 2) Node that has a number of nodes that have not been characterized most neighbors are colored beforehand. Since there are two nodes with the highest degree, then the node will be chosen randomly. Suppose that node F is selected and colored in W1, as in Figure 2:

Figure 2. Staining Node F on Graph

- 3) Remove node F and all nodes neighboring the node F from node list, because the neighboring node can not be colored with the same color as the node F, so that the vertices A, B, C, D and E removed from the list of vertices. The remaining node list can be seen in table 4.3 below:

Table 3.
List Node Remaining After step (c)

Node name	number of Nodes Neighbors are Not Treated
G	5

- 4) All the remaining node in the node list colored with the same color with the color of the node F, the colors W1. On the list of the only remaining node node G, the G colored vertices W1, as in Figure 3:

Figure 3. Staining Node G at Graph

- 5) All the remaining node in the node list colored with the same color with the color of the node A, which is the color of W2. On the remaining node list node B, C, D and E, then the node will be chosen randomly. Because this study used a maximum of three colors, which means that there are up to three rooms per membership or a maximum of three people per room. Because the number of people who left only four people, then used the condition that a maximum of three people per room, suppose node randomly selected row is D, E, C and B, then node D and E are colored W2. While the nodes C and B will be colored W3.

Figure 4. Tinting All Nodes on Graph

All the nodes in the graph has been colored, then the process is completed.
From the graph the solution in Figure 4.6 above, can be obtained the following solutions:

1. It only requires three pieces of different rooms, because there are only two colors in a graph, which is W1, W2 and W3.
2. Staff F and G are scheduled into the same room.
3. The staff are A, D and E are scheduled into the same room.
4. The B and C are scheduled into the same room.
5. The results obtained scheduling are:

Table 4.
Scheduling Results

No.	Name	Day	Room	Hour	code Staff
1	Darius Syahputra	Monday	A1	8:00 to 16:00	A
2	Jorisan Pratama	Tuesday	A1	8:00 to 16:00	B
3	Sela Permata Sari	Wednesday	B2	13:00 to 22:00	C
4	Susi Andini	Thursday	B2	13:00 to 21:00	D
5	Eko Ludoni	Friday	B1	8:00 to 16:00	E

To generate scheduling for Tuesday through Friday, then the above process can be repeated again.

4. Conclusion

Based on the results of the scheduling application that has been designed by the method of RLF with some number of employees who are tested can complete employee scheduling fast. Penjadwalan this application can help the company in organizing penjadwalan employees.

- 1) Computerized system strongly supports the work processes such as data storage, scheduling work shifts that can easily provide the information needed by the sales staff when needed.

- 2) This application mengimplementasi method of RLF in the process of preparation of employee scheduling, input the data and in making the report.
- 3) With the application system using the method of RLF penjadwalan this, the drafting process that was previously manual scheduling is now faster and easier in inputting data that can be processed in a computer.

5. Reference

- [1] Marbun, Murni, et al. "Perancangan Sistem Perencanaan Jumlah Produksi Roti Menggunakan Metode Fuzzy Mamdani." *Jurnal Mantik Penusa*, vol. 20, no. 1, 2016, pp. 48–54.
- [2] Sari, Janer Irma, et al. "Implementasi Penyembunyian Pesan Pada Citra Digital Dengan Menggabungkan Algoritma HILL Cipher Dan Metode Least Significant BIT (LSB)." *Jurnal Mantik Penusa*, vol. 1, no. 2, 2017, pp. 1 –8.
- [3] Sihotang, Hengki Tamando. "Penerapan Tata Kelola Teknologi Informasi Dengan Menggunakan Cobit Framework 4.1 Studi Kasus Pada PT. Perkebunan Nusantara III Medan (Persero)." *Jurnal Mantik Penusa*, vol. 17, no. 1, 2015, pp. 1 –7, <http://e-jurnal.pelitanusantara.ac.id/index.php/mantik/article/view/119/35>.
- [4] Sihotang, Hengki Tamando. "Perancangan Aplikasi Sistem Pakar Diagnosa Diabetes Dengan Metode Bayes." *Jurnal Mantik Penusa*, vol. 1, no. 1, 2017, pp. 36–41, <http://e-jurnal.pelitanusantara.ac.id/index.php/mantik/article/view/280>.
- [5] Sihotang, Hengki Tamando. "Sistem Pakar Mendiagnosa Penyakit Kolesterol Pada Remaja Dengan Metode Certainty Factor (Cf) Berbasis Web." *Jurnal Mantik Penusa*, vol. 15, no. 1, 2014, pp. 16 –23.
- [6] Sihotang, Hengki Tamando. "Sistem Pakar Untuk Mendiagnosa Penyakit Pada Tanaman Jagung Dengan Metode Bayes." *Journal Of Informatic Pelita Nusantara*, vol. 3, no. 1, 2018, pp. 1 –9, <http://e-jurnal.pelitanusantara.ac.id/index.php/JIPN/article/view/281/178>.
- [7] Sihotang, Hengki Tamando, and Jijon Raphita Sagala. "Penerapan Tata Kelola Teknologi Informasi Dan Komunikasi Pada Domain Align, Plan And Organise (APO) Dan Monitor, Evaluate And Assess (MEA) Dengan Menggunakan Framework Cobit 5 Studi Kasus: STMIK Pelita Nusantara Medan." *Jurnal Mantik Penusa*, vol. 18, no. 2, 2015, pp. 90–96, <http://e-jurnal.pelitanusantara.ac.id/index.php/mantik/article/view/112/19>.
- [8] Sihotang, Hengki Tamando, and Maria Siboro. "Aplikasi Sistem Pendukung Keputusan Penentuan Siswa Bermasalah Menggunakan Metode Saw Pada Sekolah Smp Swasta Mulia Pratama Medan." *Journal of Informatics Pelita Nusantara*, vol. 1, no. 1, 2016, pp. 1–6.
- [9] Simangunsong, Agustina, et al. "Perancangan Aplikasi Sistem Pakar Menggunakan Metode Bayes Untuk Diagnosa Gejala Asma Pada Puskesmas Deli Tua." *Journal of Informatics Pelita Nusantara*, vol. 2, no. 1, 2017, pp. 14–21, <http://e-jurnal.pelitanusantara.ac.id/index.php/JIPN/article/view/273/171>.
- [10] Simanjorang, R. Mahdalena, et al. "Sistem Pendukung Keputusan Penentuan Penerima Bahan Pangan Bersubsidi Untuk Keluarga Miskin Dengan Metode AHP Pada Kantor Kelurahan Mangga." *Journal Of Informatic Pelita Nusantara*, vol. 2, no. 1, 2017, pp. 22–31, <http://e-jurnal.pelitanusantara.ac.id/index.php/JIPN/article/view/274/172>.
- [11] Sihotang, Hengki Tamando. "Sistem Informasi Pengagendaaan Surat Berbasis Web Pada Pengadilan Tinggi Medan." *Journal Of Informatic Pelita Nusantara*, vol. 3, no. 1, 2018, pp. 6–9, <http://e-jurnal.pelitanusantara.ac.id/index.php/JIPN/article/view/276/174>.
- [12] Hasugian, Penda Sudarto, Harvei Desmon Hutahaean, and Hengki Tamando Sihotang, 'Sistem Pendukung Keputusan Penentuan Guru Wali Kelas Pada SMP Negeri 19 Medan Dengan Menggunakan Metode Simple Additive Weighting', *Journal Of Informatic Pelita Nusantara*, 2 (2017), 32–39
- [13] Sihotang, Hengki Tamando, Erwin Panggabean, and Herlina Zebua, 'Sistem Pakar Mendiagnosa Penyakit Herpes Zoster Dengan Menggunakan Metode Teorema Bayes', *Journal Of Informatic Pelita Nusantara*, 3 (2018), 3340
- [14] Simbolon, Fransisco Alexander, Syahputra Guntur, Panggabean Erwin, and Hengki Tamando Sihotang, 'Pembuatan Aplikasi Pengenalan Suara Dan Objek Hewan Sebagai Media Pengenalan Bagi Anak Usia Dini Dengan Metode Computer Based Instruction (CBI)', *Journal Of Informatic Pelita Nusantara*, 3 (2018), 23 –31
- [15] Sihotang, Hengki Tamando. "Pembuatan Aplikasi E-Learning Pada SMK Swasta Pariwisata Imelda Medan." *Jurnal Mantik Penusa*, vol. 1, no. 2, 2017, pp. 70–75, <http://e-jurnal.pelitanusantara.ac.id/index.php/mantik/article/view/287>.
- [16] M. Marbun and B. Sinaga, "Buku Ajar Sistem Pendukung Keputusan Penilaian Hasil Belajar Dengan Metode Topsis," 2018, 0th ed., pp. 1–127.
- [17] E. Situmorang and F. Riandari, "Decision Support System For Selection Of The Best Doctors In Sari Mutiara Hospital Using Fuzzy Tsukamoto Method", *mantik*, vol. 3, no. 3, Nov, pp. 28-33, Nov. 2019.
- [19] F. Ridandari and A. Panjaitan, "Expert System to Diagnose Extra Lung Tuberculosis Using Bayes Theorem", *mantik*, vol. 3, no. 3, Nov, pp. 34-39, Nov. 2019.
- [20] A. Pamungkas and F. Riandari, "Analysis of Disease in Plants Guava Demspiter Shafer Method Using Web Based in the village of Paradise Sei Rampah", *mantik*, vol. 3, no. 3, Nov, pp. 69 -72, Nov. 2019.
- [22] R. Sibagariang and F. Riandari, "Decision Support System for Determining the Best Wood For the Production Cabinet Using Bayes Method", *mantik*, vol. 3, no. 3, Nov, pp. 99 -103, Nov. 2019