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Synergy Magic Chess Optimization for 3 Evolution with Binary Integer Programming (Case Study Magic Chess v.255.1)

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***Abstract*— Mobile Legends: Bang Bang or MLBB is a game with the Multiplayer Online Battle Arena or MOBA genre, and this game genre is part of the Action Real Time Strategy. This arcade-mode game consists of brawl and magic chess. In magic chess mode, players must arrange pawns as heroes to create a strong synergy to defeat the opposing troops. In addition to synergy combos to manage playing strategies in Magic Chess, there are Line up heroes or hero ranks to get synergy with three evolutions. The integer program can be used in designing a plan for playing Magic Chess with the QM for Windows v5 Software. Binary PBB. The objective function modelling minimizes the number of heroes used; the problem is the number of hero slots and synergies that players want, as well as the limiting value of the binary variables, namely when 0 heroes are not used or 1 when the hero is used, the solution obtained is the formulation to optimize synergy with 3 Evolution. The result of this research is the determination of the hero taken from the beginning of the game to get 3 Evolutions.**

***Keywords*— Magic chess, Integer program, Binary, Optimization, Sinergy**

I. INTRODUCTION

Games are a form of entertainment, a diversion from fatigue caused by daily activities; the technology industry sector is developing quickly, including the game industry. Mobile Legends: Bang Bang! Having millions of players in the world, this game was created and developed by a game development company from Shanghai, China, called Moonton, with the number of downloads in June 2022 reaching more than 500 million [1].

MLBB is a game in the Multiplayer Online Battle Arena or MOBA genre, and this game genre is part of the Action Real Time Strategy, which is in great demand and is supported by choice of controls with many units brought directly to make the RTS seem full of action. The multiplayer game itself is a type of game that is played simultaneously with more than one person. Players will be in a virtual world to fight enemies, which uses the concept of strategy [2].

Mobile Legend consists of 2 choices of game modes: arcade, brawl, and magic chess. Magic Chess is like chess; in this mode, each player must arrange hero pawns to create a strong synergy to defeat opposing troops. But many still need to realize the mistakes in playing magic chess that end in defeat. According to Kelvin Alfiando ProPlayer mobile legend [3] nominee for gaming at XYZ DAY 2018, some mistakes that magic chess players are not aware of, namely not saving additional gold, wanting to win in the early game, choosing the wrong fate box, taking the hero first rather than choosing the item needed, chance percentage of heroes, bad item placement, don't know the hero combo and don't know the ability of the commander character. Magic chess also presents other excitement, one of which is by implementing Line Up; apart from *synergy combos* that can be used to set playing strategies in Magic Chess, there are Line up heroes or any line of heroes that can be used to become a strong combination of *synergy combos.* Mobile Legends provide popular lineup recommendations on magic chess, which can be used as a reference to be used as a strategy for defeating opponents, which can be seen in the table below:

TABLE I. POPULAR LINE UP IN MAGIC CHESS

No	List of Synergies Emblem			Evolution
1	6 Gunners	4 Lightborn	-	1
2	6 Cadia Riverlands	3 Northern Vale	3 Weapon Masters	1
3	6 Weapon Masters	4 Abysses	3 Northem Vale	2
4	6 Astropowers	4 Assassins	-	2
5	6 Archers	4 Abysses	-	2
6	6 Elementalists	2 Mages	3 Superheroes	1
7	6 Archers	3 Guardians	2 VENOMS	1
8	6 Cadia Riverlands	3 Weapon Masters	2 Abysses	1
9	4 Abysses	4 Wrestlers	3 Weapon Masters	2
10	6 Mech Era	4 Swordsman	2 Targetmen	2

Source: MLBB Magic Chess Game

This research aims to design an additional strategy (line up) in the Magic Chess game to get a line up with three evolutions, using a binary integer program with the help of Software QM for Windows v5.

II. Theoretical Review

According to [4] an optimization technique that is most effective and often used in determining problem solving that aims to maximize or minimize is known as linear programming [5], [6]. In this model there are 2 methods that can be used, namely the Graphical Method and the Simplex Method. The graphical method is a way that can be used to solve optimization problems [7] in linear programming with variables that can be used is limited (only two) whereas The simplex method is an iterative algebraic procedure that moves step by step, starting from the extreme point in the feasible region (sousi space) to the optimum extreme point. This model cannot be used in some cases. According to [8] a problem that can be said to be a linear programming problem must have special characteristics, namely that all the compilation variables are not negative and the objective function can be expressed as a linear function of the variables [9] Integer programming is a part of linear programming where all or some of the decision variables have a weaker disibility assumption. Branch and bound is one of the methods to produce optimal solutions to linear programs. This method is often used to solve an integer program problem because the results obtained in the optimal solution are more accurate and better than the other two methods. The main weakness of this method is that the procedure for achieving optimal results is very long [10]

The model of binary integer programming as follows:

Minimum right

$$\sum_{j=1}^{n} c_j \varphi_j \quad (1)$$

With constraints

$$\sum_{j=1}^{n} a_{ij}\varphi_j = b_i, i = 1,2,3,4,\dots,m \quad (2)$$

$\varphi_j = 0$ or 1, for some or for all j = 1, 2, 3… ,n

Binary Integer Linear Programming method in modeling problems related to resource allocation that has a decision value in the form of an integer and in it there is a linear equation that explains the utilization of the operating space. Then the process of determining the value of the decision variable as a solution to the optimal value is used by QM for Windows v5 software.

III. Research Methodology

The research steps in this study are described in the following steps:

1. Assemble five new Line Ups with 3 Evolutions
2. Modeling the problem in the form of a binary integer program
3. Establishing the Objective Function minimizes the number of heroes collected
4. Forming Obstacles to fulfil synergy in the lineup mentioned in number 1, as well as blessing constraints, additional synergy, and hero slots.
5. Forming decision variables, namely the heroes used or collected from the start of the game.
6. Incorporated optimization problem modelling into QM for Windows v5
7. A solution is obtained using the help of QM Software for Windows v5
8. implementation into the Magic Chess game.

Thus the following research steps from start to finish, for details will be explained in detail in the results and discussion.

IV. Results and Discussion

The research methodology employed in this study encompasses the following steps: assembling five new Line Ups with 3 Evolutions, modelling the problem as a binary integer program, establishing an Objective Function to minimize the number of heroes collected, addressing obstacles related to synergy, blessing constraints, additional synergy, and hero slots, determining decision variables for the heroes used, incorporating optimization problem modelling into QM for Windows v5, obtaining a solution with the assistance of QM Software for Windows v5, and implementing the optimized strategies into the Magic Chess game. A comprehensive exploration of these research steps, from inception to fruition, will be presented and discussed in detail in the results and discussion chapter.

Results and Discussion will be discussed modelling integer programs for line-up recommendations other than the popular line-ups recommended by Game Magic Chess. In this paper, the author recommends several lineups, namely:

TABLE II. Proposed Line Up with 3 Evolutions

No	List of Synergies Emblem				Evo
1	6 Mech Era	6 Gunner	4 Swordsman	2 Targetmen	3
2	6 Archer	6 Astro Power	4 VENOM	3 Guardian	3
3	6 Wrestler	6 Superhero	4 Swordsman	-	3
4	6 Abyss	4 Assassin	4 VENOM	-	3
5	6 Mages	6 Superhero	4 VENOM	-	3

Of the 5-line *ups* recommended by the author above, *the line ups* that the writer often sees are in the order of 1 to 4 during the game.

Binary Integer Program Modeling 6 Mech Era 6 Gunner 4 Swordsman 2 Target (3 Evolutions)

Objective Function

$$Min\ Z = \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14}$$

Constraint

- Hero Slots
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} \le 9 + h_0$$
- 6 Mech Era
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 = 6 - h_1$$
- 6 Gunners
$$\varphi_3 + \varphi_4 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} = 6 - h_2$$

- 4 Swordsmen

$$\varphi_1 + \varphi_2 + \varphi_{12} + \varphi_{13} = 4 - h_3$$

- 2 Targets

$$\varphi_7 + \varphi_{14} = 2 - h_4$$

Binary Value Delimiter

$$\varphi_i = 0 \; or \; 1, i = 1,2, \dots ,14$$

TABLE III. VARIABLES AND HEROS

Variable	Information	Variable	Information
φ_1	Hayabusa	φ_{11}	Roger
φ_2	Saber	φ_{12}	Lancelot
φ_3	Lesley	φ_{13}	Ling
φ_4	Beatrix	φ_{14}	Tigreal
φ_5	Gatotkaca	h_0	Bonus slots heroes
φ_6	Gord	h_1	The number of blessing era mech heroes
φ_7	Johnson	h_2	Number of gunner blessing heroes
φ_8	Granger	h_3	Number of swordsman blessing heroes
φ_9	Layla	h_4	target blessing heroes
φ_{10}	Claude		

Binary Integer Program Modeling 6 Archer 6 Astro Power 4 VENOM 3 Guardian (3 Evolutions)

Objective Function

$$Min\,Z = \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16}$$

Constraint

- Hero Slots

$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16} \leq 9 + h_0$$

- 6 Archers

$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 = 6 - h_1$$

- 6 Astro Powers

$$\varphi_2 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} = 6 - h_2$$

- 4 VENOMS

$$\varphi_4 + \varphi_{12} + \varphi_{13} + \varphi_{14} = 4 - h_3$$

- 3 Guardians

$$\varphi_{13} + \varphi_{15} + \varphi_{16} = 3 - h_4$$

Binary Value Delimiter

$$\varphi_i = 0 \; or \; 1, i = 1,2, \dots ,16$$

TABLE IV. VARIABLES AND HEROS

Variable	Information	Variable	Information
φ_1	Mia	φ_{11}	Karina
φ_2	Irithel	φ_{12}	Harleys
φ_3	Bruno	φ_{13}	Grock
φ_4	Hanabi	φ_{14}	Gusion
φ_5	Wanwan	h_0	Hero slot bonus (0=don't have, 1=have max 1)
φ_6	Moscov	h_1	Number of archer blessing heroes
φ_7	Martis	h_2	astro power blessing heroes
φ_8	Lunox	h_3	The number of VENOM blessing heroes
φ_9	Odette	h_4	The number of guardian blessing heroes
φ_{10}	Badang		

Binary Integer Program Modeling 6 Wrestler 6 Superhero 4 Swordsman 3 Mech Era (3 Evolutions)

Objective Function

$$Min\,Z = \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16}$$

Constraint

- Hero Slots

$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16} \leq 9 + h_0$$

- 6 Wrestlers

$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 = 6 - h_1$$

- 6 Superheroes

$$\varphi_3 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 = 6 - h_2$$

- 4 Swordsmen

$$\varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} = 4 - h_3$$

- 3 Mech Era

$$\varphi_5 + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16} = 3 - h_4$$

Binary Value Delimiter

$$\varphi_i = 0 \; or \; 1, i = 1,2, \dots ,16$$

TABLE V. VARIABLES AND HEROS

Variable	Information	Variable	Information
φ_1	Aldous	φ_{11}	Saber
φ_2	Badang	φ_{12}	Hayabusa
φ_3	Chou	φ_{13}	Lesley
φ_4	Dyrroth	φ_{14}	Gord
φ_5	Gatotkaca	h_0	Hero slot bonus (0=don't have, 1=have max 1)
φ_6	Bruno	h_1	Number of wrestler blessing heroes
φ_7	Vale	h_2	The number of superhero blessing heroes
φ_8	Esmeralda	h_3	swordman blessing heroes
φ_9	Lancelot	h_4	The number of blessing era mech heroes
φ_{10}	Ling		

Binary Integer Program Modeling 6 Abyss 4 Assassin 4 VENOM (3 Evolutions)

Objective Function

$$Min\ Z = \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11}$$

Constraint

- Hero Slots
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} \leq 9 + h_0$$
- 6 Abysses
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 = 6 - h_1$$
- 4 Assassins
$$\varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 = 6 - h_2$$
- 4 VENOMS
$$\varphi_7 + \varphi_9 + \varphi_{10} + \varphi_{11} = 4 - h_3$$

Binary Value Delimiter

$$\varphi_i = 0\ or\ 1, i = 1,2,\dots,16$$

TABLE VI. VARIABLES AND HEROS

Variable	Information	Variable	Information
φ_1	Argus	φ_9	Hanabi
φ_2	Terizla	φ_{10}	Harleys
φ_3	Moscov	φ_{11}	Grock
φ_4	Dyrroth	h_0	Hero slot bonus (0=don't have, 1=have max 1)
φ_5	Helcurt	h_1	Number of abyss blessing or *synergy* abyss heroes
φ_6	Karina	h_2	The number of assassin blessing heroes
φ_7	Gusion	h_3	The number of VENOM blessing heroes
φ_8	Fanny		

Binary Integer Program Modeling 6 Mage 6 Superhero 4 VENOM (3 Evolutions)

Objective Function

$$Min\ Z = \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16}$$

Constraint

- Hero Slots
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16} \leq 9 + h_0$$
- 6 Wrestlers
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 = 6 - h_1$$
- 6 Superheroes
$$\varphi_3 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 = 6 - h_2$$
- 4 Swordsmen
$$\varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} = 4 - h_3$$
- 3 Mech Era
$$\varphi_5 + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} + \varphi_{15} + \varphi_{16} = 3 - h_4$$

Binary Value Delimiter

$$\varphi_i = 0\ or\ 1, i = 1,2,\dots,16$$

TABLE VII. VARIABLES AND HEROS

Variable	Information	Variable	Information
φ_1	Kadita	φ_{10}	Chou
φ_2	Odette	φ_{11}	Lancelot
φ_3	Esmeralda	φ_{12}	Hanabi
φ_4	Harleys	φ_{13}	Grock
φ_5	Chang'e	φ_{14}	Gusion
φ_6	Harith	h_0	Hero slot bonus (0=don't have, 1=have max 1)
φ_7	Aurora	h_1	Number of heroes mage blessing
φ_8	Bruno	h_2	The number of superhero blessing heroes
φ_9	Vale	h_3	The number of VENOM blessing heroes

With j, a non-negative integer h_j value will adjust to the course of the game; it can also be determined at the beginning so that the decision is clearer. The importance of h_j will depend on the visibility of the solution. The point is that h_j must always be prioritized to surpass other synergy or blessing heroes.

Solution Visibility

Because getting three evolutions is not easy, it is necessary to calculate the amount of *synergy* and additional hero slots needed to achieve three or optimal evolutions. Because of this, the following equation is made:

$$h_0 + h_1 + \cdots + h_p = n$$

Information:

$h_0 =$ The number of additional slot hero (only one allowed)
$p =$ The number of synergy constraint
$n =$ The number of synergy and slot hero are needed for 3 evolution

Based on *the synergy* that is used for *the synergy* that has an effect or an evolution, this value must be limited. With the following rules:

1. For maximum hero slots take 1 hero slot, then $h_0 = 0\ atau\ 1$
2. For *synergy* that requires 6 *synergy* for evolution, then $\sum h_i = 0\ or\ 1\ or\ 2\ or\ 3$
3. For *synergy* that requires 4 *synergy* for evolution, then $\sum h_i = 0\ or\ 1\ or\ 2$

4. For *synergy* that requires 2 *synergies* to be optimal, then $\sum h_i = 0 \text{ or } 1$

Of course, the value depends on what is obtained during the period of the game, and solutions will develop based on changes in value.

Implementation of Simulation

Line Up recommendations for 6 Mech Era 6 Gunner 4 Swordsman 2 Target, so the visibility equation is as follows:

$$h_0 + h_1 + h_2 + h_3 + h_4 = 4$$

Value limit h_i, with $i = 0,1,2,3,4$. as follows:
$h_0 = 0 \text{ or } 1\ (slot\ hero)$
$h_1 = 0 \text{ or } 1 \text{ or } 2 \text{ or } 3\ (Additional\ Mech\ Era\ Synergy)$
$h_2 = 0 \text{ or } 1 \text{ or } 2 \text{ or } 3\ (Additional\ Gunner\ Synergy)$
$h_3 = 0 \text{ or } 1 \text{ or } 2\ (Additional\ Swordsman\ Synergy)$
$h_4 = 0 \text{ or } 1\ (Additional\ Targemen\ Synergy)$

Because of the many solutions, the following strategy was chosen in playing:

1. Trying to get 1 hero slot ($h_0 = 1$)
2. Trying to get 1 additional *synergy* Mech Era / blessing ($h_1 = 1$)
3. Trying to get 1 Gunner / blessing additional synergy ($h_2 = 1$)
4. Trying to get 1 additional *synergy* Swordsman / blessing ($h_3 = 1$)

Therefore, modeling is obtained as follows

Objective Function

$$Min\ Z = \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14}$$

Constraint

- Hero Slots
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} + \varphi_{12} + \varphi_{13} + \varphi_{14} \leq 10$$
- 6 Mech Era
$$\varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 + \varphi_5 + \varphi_6 + \varphi_7 = 5$$
- 6 Gunners
$$\varphi_3 + \varphi_4 + \varphi_8 + \varphi_9 + \varphi_{10} + \varphi_{11} = 5$$
- 4 Swordsmen
$$\varphi_1 + \varphi_2 + \varphi_{12} + \varphi_{13} = 3$$
- 2 Targets
$$\varphi_7 + \varphi_{14} = 2$$

Binary Value Delimiter

$$\varphi_i = 0 \text{ or } 1, i = 1,2,\dots,14$$

TABLE VIII. VARIABLES AND HEROS

Variable	Information	Variable	Information
φ_1	Hayabusa	φ_{11}	Roger
φ_2	Saber	φ_{12}	Lancelot
φ_3	Lesley	φ_{13}	Ling
φ_4	Beatrix	φ_{14}	Tigreal
φ_5	Gatotkacha	h_0	Hero slot bonus (0=don't have, 1=have max 1)
φ_6	Gord	h_1	The number of blessing era mech heroes
φ_7	Johnson	h_2	Number of gunner blessing heroes
φ_8	Granger	h_3	swordman blessing heroes
φ_9	Layla	h_4	target blessing heroes
φ_{10}	Claude		

Using the help of the QM for Windows v5 calculating tool, the modeling is obtained as follows:

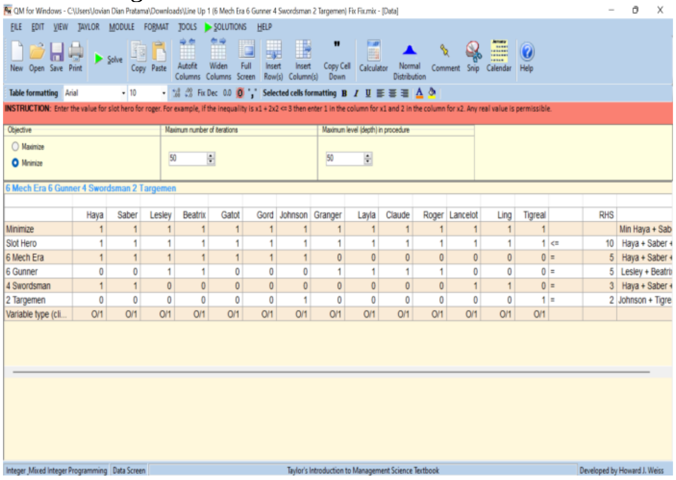
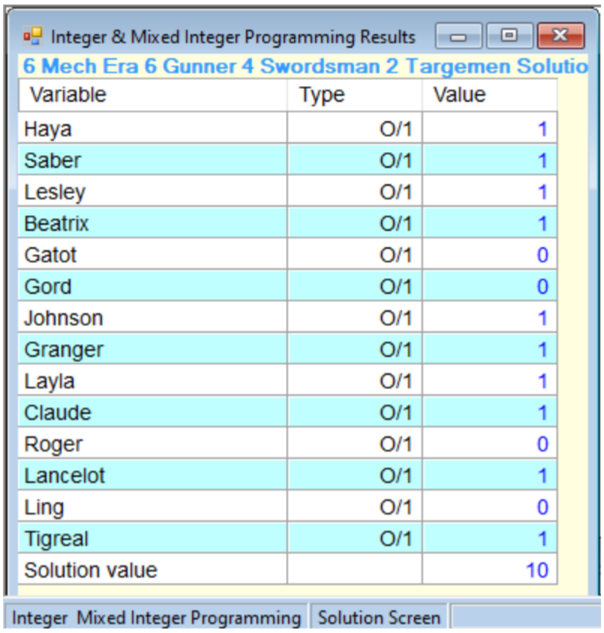


Fig. 1. Input QM for Windows v5 application

And obtained the following solutions:



Integer & Mixed Integer Programming Results
6 Mech Era 6 Gunner 4 Swordsman 2 Targemen Solutio

Variable	Type	Value
Haya	0/1	1
Saber	0/1	1
Lesley	0/1	1
Beatrix	0/1	1
Gatot	0/1	0
Gord	0/1	0
Johnson	0/1	1
Granger	0/1	1
Layla	0/1	1
Claude	0/1	1
Roger	0/1	0
Lancelot	0/1	1
Ling	0/1	0
Tigreal	0/1	1
Solution value		10

Integer Mixed Integer Programming | Solution Screen

Fig. 2. Results for Windows v5 application

If the 4 strategy points are met, the following picture conditions will be obtained,

Fig. 3. 6 Mech Era 6 Gunner 4 Swordsman 2 Target

In Figure 3 the author gets additional hero slots ($h_0 = 1$), Saber Blessing Mech Era ($h_1 = 1$), Layla Blessing Gunner ($h_2 = 1$), Hayabusa Blessing Swordsman ($h_3 = 1$)so that Evolution 3 *Synergy can be fulfilled*, namely Mech Era, Gunner, and Swordsman. Under these conditions Lancelot can also be replaced with Ling and Granger can be replaced with Roger, but Granger is more important because it adds 2 *Synergy* Lightborn.

Fig. 4. The modeling solution shows the results of "win"

The author doesn't claim to win 100% of the time, but one of the best strategies to get first place in Magic Chess is a strong combination of *Synergy*. As well as from the UN Binary modeling solution directing heroes that should have been collected from the start of the game.

V. Conclusion and Recommendation

Binary integer program can be applied to design strategies for playing Magic Chess. Modeling is done by designing an objective function in the form of many heroes used to form a line up with constraints in the form of many hero slots and *the synergy* desired by *the user*, the limiting value of the binary variables is 0 when the hero is not used or 1 when the hero is used. The modeling solution obtained is *the user's* chosen hero to optimize *Synergy* with 3 Evolutions and calculate how many additional heroes or *synergy* are needed. Binary Integer program, binary synergy optimization, can be used as a reference for lineup recommendations outside the popular recommended lineup in Mobile Legends: Bang Bang, which is only 1 to 2 evolutions.

The following research results contribute to science, especially applied mathematics and game studies, determining game strategy using binary integer programs. The form of application or implication of the binary integer program is strategic decision-making by forming a combination of heroes with three evolutions.

The following research can only be applied to Magic Chess v.255.1, where in the next version, there will be changes starting from the hero, synergy, and adding rules in the game for balance in the game and avoiding bugs. The following research is a proposed strategy that will continue to change along with updates in the following versions of magic chess.

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