Comparison of Two Efficient Mining Techniques in Minecraft

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Abstract

Mining has always been a vital part of the video game “Minecraft” in order to get many rare resources and materials that would otherwise be much harder to acquire (although not impossible). Minecraft version 1.14.4 will be used. In this paper, we will compare the two main mining techniques that yield effective returns on investments for time and resources spent on mining. These methods center around the fastest way to find diamonds specifically. As the variable for cost of these methods, we will use both time and blocks mined. This paper will mainly focus on time as the variable to be optimized. Diamonds spawn only so frequently, so the variable we will use for the yield of these methods is the blocks that the player can see, or the checked blocks. Variations in the tools used are also compared in this paper.

Background

(I) Understanding Variables

In order to measure the effectivity of a mining technique, we have two main options. The first is the blocks mined to seen ratio (bmts). This is given by equation (a) where *m* is the number of blocks mined for a given interval, and *S* is the number of blocks that have been seen in that same interval. *P* is the bmts ratio. A higher value of *P* indicates more blocks are seen given the same amount of tool durability used.

Eq (a)

$$P = \frac{S}{m}$$

Another measure for mining effectiveness, and the primary measure used in this paper, is the scan rate (β_s) This is given by equation (b) where *S* is the number of blocks seen in a given interval of time *t*. This is commonly given in the unit blocks/minute. A higher value of β_s indicates more blocks seen in the same amount of time.

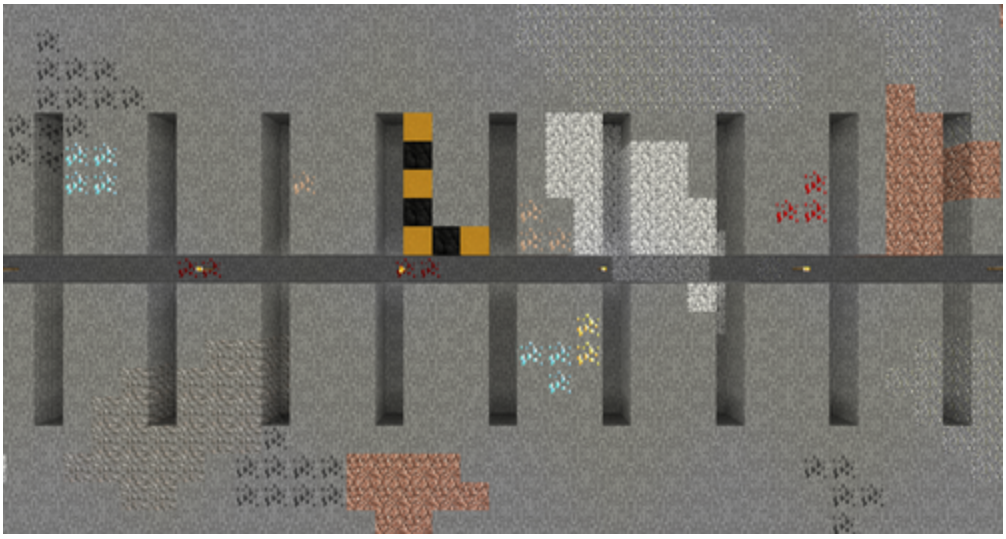
Eq (b)

$$\beta s = \frac{S}{t}$$

(II) Pokehole Technique

This mining technique has been fairly popular in the past for its high *P* ratio. In this method, the player mines in a straight line, similar to the most common 1x2 mine shaft style, but instead, the player drills a 5 deep hole on either side of the tunnel every 4th block (See Figure a). It is recommended to do this at y-level 11.

Figure (a)



This will yield a *P* ratio of 4.22, meaning every 1 block mined will discover 4.22 other blocks on average. This method has also been optimized for mining specifically diamonds. This is because although there is a small layer of blocks that can not be seen in between poke holes, diamonds normally spawn in cubes of 2x2 so they will normally be revealed as seen in Figure (a).

(III) Swim Mining Technique

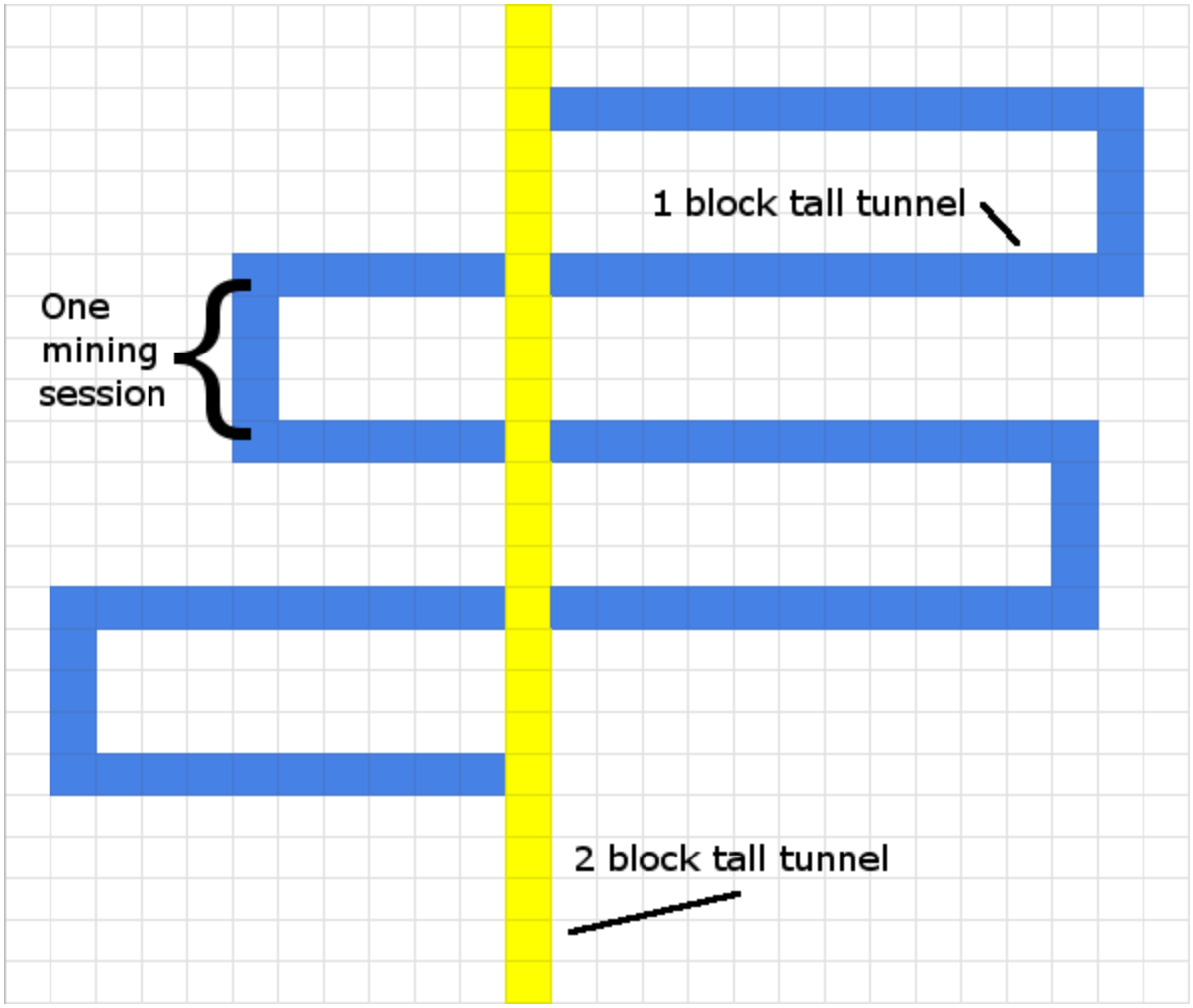
This mining technique is newer, as it uses a new feature of the game to be able to fit inside a 1x1 tunnel. In this method, the player uses water and sprints while fully submerged to enter into this one block tall state. This is also done at the y-level 11. The player can now travel while mining in a straight line as seen in Figure (b). In this method, the player's speed is fairly limited, so using an iron pickaxe will have the same effect as using a diamond one with Efficiency V. Despite this, this method can be useful because of its *P* ratio of 5, which is the theoretical maximum. In an attempt to overcome the speed bottleneck, the player can use speed I or speed II while also using

a diamond pickaxe or a diamond pickaxe efficiency I respectively to keep up with the movement speed.

Figure (b)

It should also be noted that the slow player movement speed means returning to where you came from is a tedious task. To counteract this, use a pattern as seen in Figure (c). Each mining session the player has can be done in one “loop” where half the time is spent traveling away from the main shaft and the second half of the trip making their way back. Notice how the distance between shafts is 3 blocks for the same reason to the pokehole method. The distance the loops go away from the main shaft also does not have to be the same each time. When using this method, the player may want to plan how long they want to mine for.

Figure (c)



Method

To put these techniques to the test, a player performed each mining technique with variations in tools and potion effects. This was done in a “Tunnelers Dream” flat world in version 1.14.4. The player mined for three minutes using that technique, then the sum of blocks seen was totalled. From this, we are able to calculate the *P* ratio as well as the β_s.

Results

(I) Testing Data

IP - Iron Pickaxe

DP - Diamond Pickaxe

Technique	Modifications	*P* ratio	β_s (Blocks/Min)
Pokehole	IP	4.22	325.3
Pokehole	DP	4.22	380.0
Pokehole	DP, Efficiency I	4.22	405.3
Pokehole	DP, Efficiency II	4.22	430.7
Pokehole	DP, Efficiency V	4.22	582.7
Swim Mining	IP	5	393.3
Swim Mining	DP, Speed I	5	470.0
Swim Mining	DP, Efficiency I, Speed II	5	526.7

(II) Pros-Cons List for Swim Mining

Pros	**Cons**
Very effective when in iron stage	Slow moving speed
Minimal durability used for amount of blocks searched (high *P* ratio).	High mining speed pickaxes have little effect on results
Easy method requires little thinking while performing.	Potions required for better results
Mobs can’t spawn in this tunnel.	Slow travel in case of need to return to main shaft

Conclusion

The newer swim mining strategy has proven to be more efficient in many scenarios over the pokehole strategy. One major time that the player should use this strategy is when they are in the iron stage, and even after some time after the player has found diamonds. This is because swim mining with an iron pick will find resources faster than pokehole mining with an unenchanted diamond pickaxe (393.3 vs 380.0 β_s). The moment the player may want to turn to pokehole mining is when they have Efficiency II or greater. Although Efficiency I pokehole mining did have a higher β_s than swim mining, swim mining may still be the recommended option due to its simplicity. Pokehole mining takes much more concentration, whereas swim mining is somewhat mindless as the player travels linearly in one direction. The results are even more interesting when speed effects are used. Swim mining with speed I won over Efficiency I and II pokehole mining with a very high β_s of 470.0. It should also be noted that swim mining with speed II is comparable with pokehole mining with Efficiency V (526.7 vs 582.7 β_s). Although we did not test Efficiency IV, we can estimate that it would have similar results with swim mining with speed II, however it would likely not be worth it considering the extra concentration required to pokehole mine.

TLDR - When you reach y-level 11 in your world, use swim mining until you get an Efficiency II or more diamond pickaxe. At this point use pokehole mining, but if you are willing to spend potions, then simply continue with swim mining using speed II. It is only worth it to return to pokehole mining after this point if you have an Efficiency V diamond pickaxe.

References

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https://gaming.stackexchange.com/questions/8310/whats-the-most-efficient-minecraft-mining-strategy