Responsive NFT Mint Price Optimizing Formula

Omar Ameen

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1 Weighted Total Sales

Our Algorithm is loosely based off of the Exponential Moving Average algorithm.
Let x be the number of sales in the most recent block.
Let k be some constant such that $k < 1$.
We will define our recent EMA as

$$EMA_i = kx + EMA_{i-1} * (1 - k)$$

where

$$EMA_0 = 0$$

We will then recursively define our WTS as:

$$WTS_i = 2 * EMA_i - (k * EMA_{i-1} + WTS_{i-1} * (1 - k))$$

This has the function of being far more responsive and accurate in the short and medium term relative to a normal EMA. Going forward, this will be called the WTS (Weighted Total Sales) for a given time period.

2 Price Controlling

Before the sale begins, we define G as the target sales per block. Thus, we have $G = \frac{TotalNFTsforSale}{EstimatedBlockstoSellOut}$

We also define d as a frequency variable controlling how frequently we update our price (1 being every block.)

Every d blocks, we will perform a check as follows:
If $\frac{WTS}{G} > 1$, we increase our price.
If $\frac{WTS}{G} < 1$, we decrease our price.

2.1 Determining How Price is Changed

We will have two methods of changing our price. Firstly, we will have a best approximation function. Secondly, we will be monitoring our customers' Price Elasticity of Demand (PED) until we have a satisfactory estimate. Once we've reached that point, we will switch to using PED to determine how much we should increase/decrease price.

3 Price Change Approximation Function

When $\frac{WTS}{G} > 1$, we will use the following function:

$P_{new} = P * (\frac{WTS}{G})$

When $\frac{WTS}{G} < 1$, we will use the following function:

$P_{new} = P * (1 - 0.25k)$

4 PED

For each time we apply our Price Change Approximation Function, we will keep track of how sales change relative to our percent change in price.

Price Elasticity of Demand is defined as

$$\frac{\%ChangeinSalesRate}{\%ChangeinPrice}$$

Once we've calculated PED to a reasonably accurate degree, we can begin using it to calculate our necessary change in price using the following formula:

$$\%ChangeinPrice = \frac{Desired\%ChangeinSales}{PED}$$

NOTE: PED has not been implemented in the model due to time constraints.

4.1 Applying PED

In order to calculate what our Desired % Change in Sales is, we need to do the following:
Let $dY = TotalNFT - TotalSales$
Let $dX = GoalBlock - CurrentBlock$
Necessary Sales Rate = $\frac{dY}{dX}$
Giving our Desired % Change in Sales Rate as: $\frac{NecessarySalesRate}{CurrentSalesRate} - 1$