Analyzing Market Value of Magic Card Packs using MATLAB

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Objective of the Program

Use this program to become a more well informed consumer! This program analyzes a randomized product's online data to guide our purchasing decisions. By simulating many purchases at a time, we are able to draw conclusions about a potential individual purchase. Because it is analyzing a potential future purchase, the program retrieves up-to-date pricing information from the internet in order to make its analysis.

Introduction

Magic: The Gathering (MTG) is a trading card game. MTG cards are sold in individual packs of 15 random cards. Packs from various sets are sold at a set retail price of $3.99. Each set contain cards that are unique to the set. Cards can be traded and sold through secondary markets such as game stores, online trading sites, etc. The market price of the cards can fluctuate over time based on the supply of certain cards and demand from players. Depending on the cards in the pack, consumers can potentially make a profit from purchasing a pack.

We are simulating packs of *Eldritch Moon*, an MTG set that came out on July 22, 2016. It contains 205 total cards.

Retail Price: $3.99
Contains 15 randomized cards

Approx Market Price: $24.58
Extremely Rare

Approx Market Price: $0.02
Common

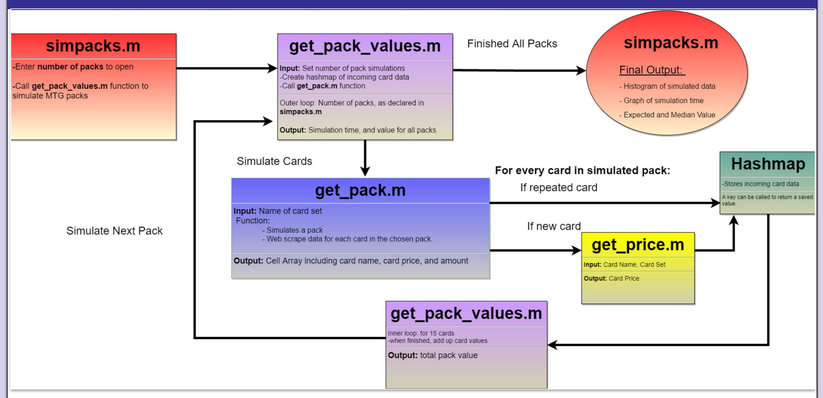
What This Program Does

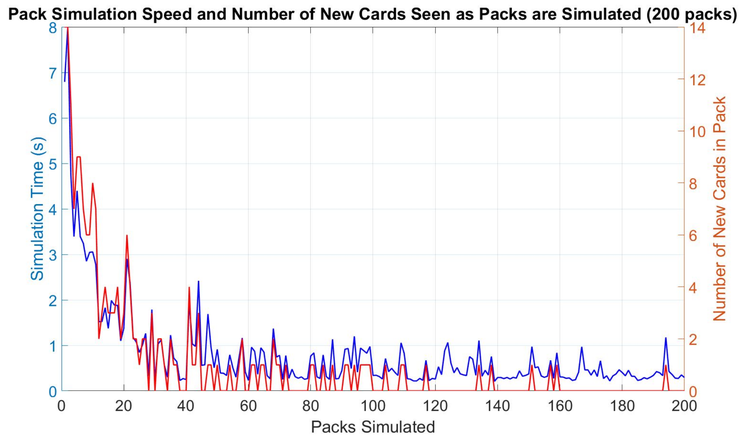
Our program simulates the opening of an MTG pack, then calculates the total secondary market dollar value for that card pack by looking up the values of the individual cards. By doing this many times over, the program creates a dataset containing many simulated packs, and analyses that data to allow the individual to draw conclusions about a potential purchase of a pack.

Matlab Functions

The program implements three functions in matlab:
1. get_pack.m: Scrapes the html and parses the information containing the contents of an individually simulated card pack.
2. get_price.m: Scrapes the html of a marketplace aggregate site to extract the prices of a card, given its name and the set it came from.
3. get_pack_values.m : Uses get_pack.m and get_price.m to simulate many packs in a row, and find the total value for each of those packs. Utilizes a hashmap to store card price data, to optimize speed when simulating large numbers of packs.

Code Flowchart





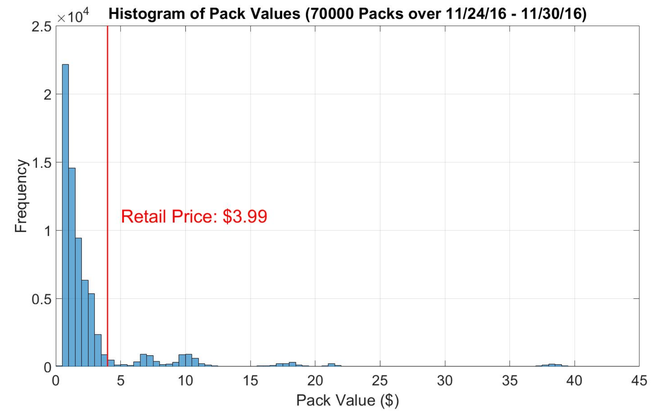
A graph of both per-pack simulation speed and the number of new cards in each pack being simulated. Note that performance improves as less new cards are seen: this is the optimization effect of our hashmap implementation.

All code, and available documentation at:
willamette.edu/~exreed/cs435.html

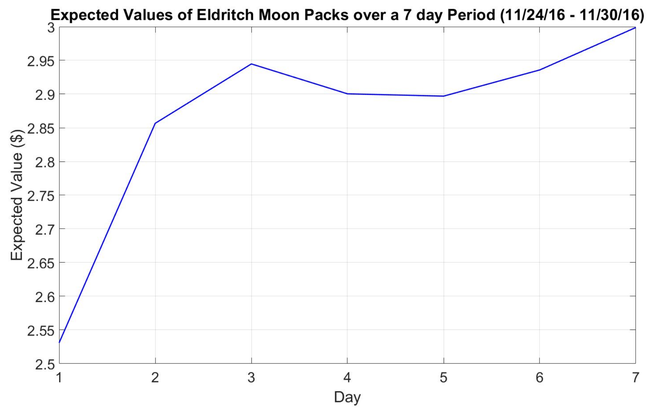
Acknowledgements: Packs simulated using data from magicdrafting.com. Secondary market prices obtained from magic.tcgplayer.com.

Results

We used our program to collect market data on 10000 simulated packs every day over a period of seven days, from 11/24/16 to 11/30/16. The average expected value over that seven day period was **$2.87**. The median value of all packs was **$1.41**. The retail price of one pack ($3.99) is the **87.3 percentile** of the data set, meaning over 87% of packs did not meet their original price.



A histogram of the secondary market pack values simulated during the test period. Note that the vast majority of the values fall below the retail price of an individual pack.



A graph of the expected values for each day over our 1 week test period (11/24/16 to 11/30/16). Note that the market can shift quite a bit over a relatively short time period.

Conclusion

Because the program operates based on day-of market information, and our short data collection window indicated that relatively large changes in expected value are possible, we encourage individuals to use our code close to the time of a potential purchase. However, given our rather striking results, wherein over a week period, 87% of packs do not meet retail value and the expected value of a pack is only 71.92% of retail price, we are confident in recommending to individuals that they not purchase packs of *Eldritch Moon* purely in order to find profit, and we would guess that this holds true for most (if not all) other MTG sets.