



DECISION MODELING AND SIMULATION WITH MCHAMMER.JL

We want to share how MCHammer.JL can be used to build and analyze Monte-Carlo simulation models with an ease and interactivity similar to Excel. Using core packages such as StatsBase, Statistics and Distributions.jl we constructed a modeling tool that has charting and all the critical statistics to build and analyze simulation results.

<https://github.com/etorkia/MCHammer.jl>

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WHY BUILD MCHAMMER?

Technical Opportunity

- Julia is an amazing language for building Monte-Carlo simulations but needed a package to make it simple for analysts making the switch from Excel.
- Julia needed an interactive Monte-Carlo tool similar to @RISK or Oracle Crystal Ball.
- Speed Matters:
 - Julia is 750-1500x faster than Excel running similar tasks
 - API integration makes data acquisition and processing much easier and less error prone.

Analyst Benefits

- MCHammer streamlines important analysis into simple functions
 - Sensitivity Analysis
 - Histogram and Density Charts
 - Trend Charts (TimeSeries Confidence)
 - Fractiles and Certainty Calculations
 - Measure of correlation
- Easy Export to other systems
- Shorter + Flatter learning curve leading to productive models fast.
- Fits in the Julia ecosystem

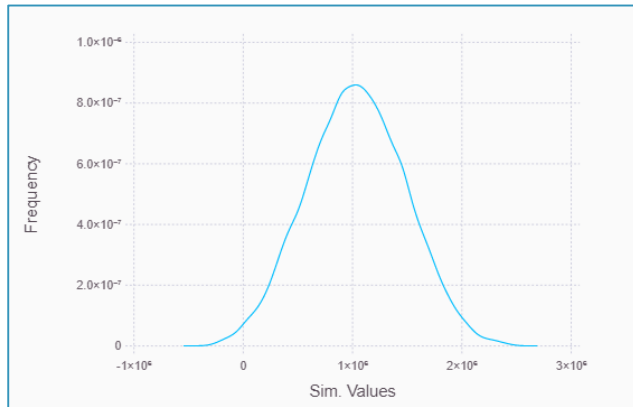


BACKGROUND

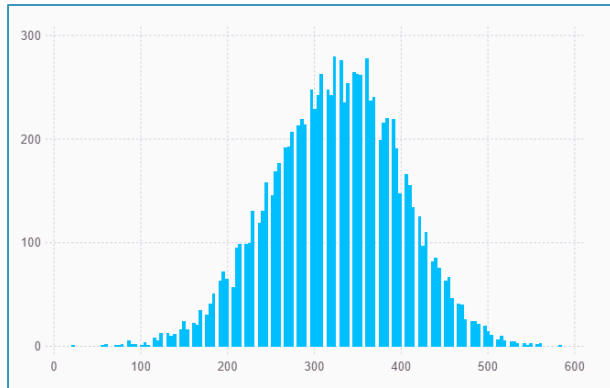
- I built MCHammer because I have been working as a Risk and Decision Analyst using Monte-Carlo simulation for 15 years and needed a tool to bridge from Excel to Julia to make models run .
- I wanted to bring the experience and the interactive nature of modeling from Excel to Julia for its speed and ability to put models into production
- Degree in Management Information Systems and have designed predictive dashboards for clients using Julia+MCHammer with PowerBI as a front end.
- I have worked with most of the major vendors to develop features and tools to enhance the modelling process. For many years Our firm was Oracle's go-to partner for Crystal Ball, a Monte-Carlo add-in for Excel, for training and consulting.



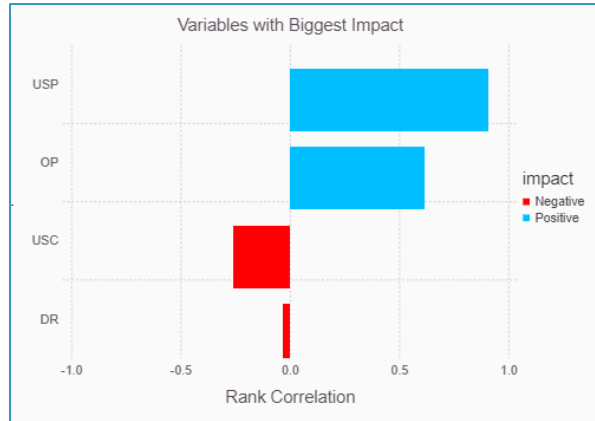
ABSTRACT



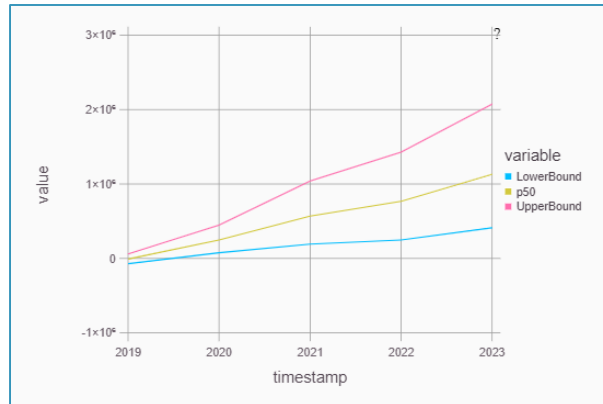
```
density_chrt(Data,  
x_label="Sim. Values")
```



```
histogram_chrt(dist, "title")
```



```
sensitivity_chrt(Trials, 1)
```



```
trend_chrt(SimTimeArray,  
PeriodRange,  
quantiles=[0.05,0.5,0.95])
```

Modeling Functions

Random Walk Time Series

```
GBMM(LastValue,  
ReturnsMean, ReturnsStd,  
PeriodsToForecast)
```

Correlating Distributions

```
corvar(ArrayName, n_trials,  
correl_matrix)
```

WHAT'S NEXT

- Future Work
 - Implement more time series tools and new stochastic processes such as Markov Chains and Martingales as model building blocks
 - Implementation of new multidimensional samplers for networked modeling
 - Implement Ogives and resampling
- Mentors and collaborators
 - A special thanks to Eric Wainwright, co-creator of Oracle Crystal Ball, for technical support and counsel on how to approach future development and usability
 - Dr. Sam Savage for his perspective on how simulation results can be shared using the SIPMath standard
 - Robert D. Brown III for helping implement some of the functions.

