

# An Interactive User Interface Improves Data Visualizations in R

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# Background

- ▶ An interactive user interface application was created using the R statistical computing environment and the Shiny package to visualize historical data on the performance of mutual funds and exchange-traded funds (ETFs).

```
> library(shiny)  
> runApp("FinApp")
```

### Mutual Funds and Exchange-Traded Funds

**Select the start and end dates.**

2011-07-11 to 2015-07-31

Select if you would like to include ETFs, Mutual Funds, or both in the analysis.

☐ ETF

☐ Mutual Fund

**Select your baseline from one of the following categories:**

☐ Index

☐ ETF

☐ Mutual Fund

☒ No Baseline

**Select your center from one of the following categories:**

☐ Index

☐ ETF

☐ Mutual Fund

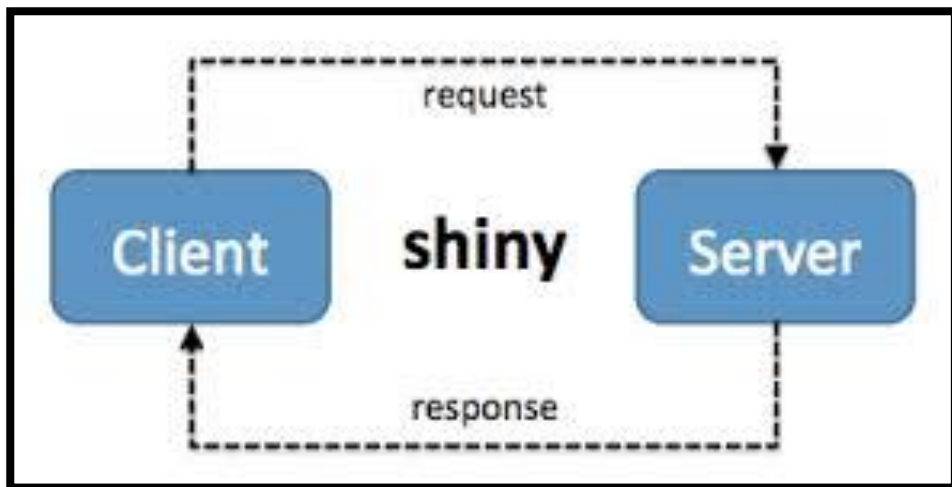
☒ No Center

Start Analysis

Lines of Comparison Scatter Plot

# Objectives

- ▶ To use the latest advancements in R and Shiny to improve the interactive capabilities of the application



# Methods

- ▶ Historical data for these funds was scraped from the Yahoo! Finance webpage.

Category: <input type="text" value="All"/>		Fund Family: <input type="text" value="All"/>					
FUND NAME	TICKER	CATEGORY	FUND FAMILY	3-MO RETURN ▼	YTD RETURN	3-YR RETURN	5-YR RETURN
Matthews China Small Companies	MCSMX	China Region	Matthews Asia Funds	+25.66%	+24.97%	+19.1%	0.0%
AllianzGI China Equity Institutional	ALQIX	China Region	Allianz Funds	+25.12%	+27.42%	+19.73%	0.0%
AllianzGI China Equity P	ALQPX	China Region	Allianz Funds	+25.07%	+27.35%	+19.65%	0.0%
AllianzGI China Equity A	ALQAX	China Region	Allianz Funds	+25.03%	+27.33%	+19.4%	0.0%
AllianzGI China Equity D	ALQDX	China Region	Allianz Funds	+24.97%	+27.24%	+19.34%	0.0%
AllianzGI China Equity C	ALQCX	China Region	Allianz Funds	+24.78%	+26.9%	+18.46%	0.0%

# Methods

- ▶ Using historical data, the application allows the user to analyze this historical data based on categories and families.

### Mutual Funds and Exchange-Traded Funds

**Select the start and end dates.**

2011-07-11 to 2015-07-30

Select if you would like to include ETFs, Mutual Funds, or both in the analysis.

☒ ETF

**Select ETF Category**

China Region Commodities Energy Bear Market

**Select ETF Family**

AdvisorShares ArrowShares Barclays Funds

☒ Mutual Fund

**Select Mutual Fund Category**

China Region Aggressive Allocation Bear Market

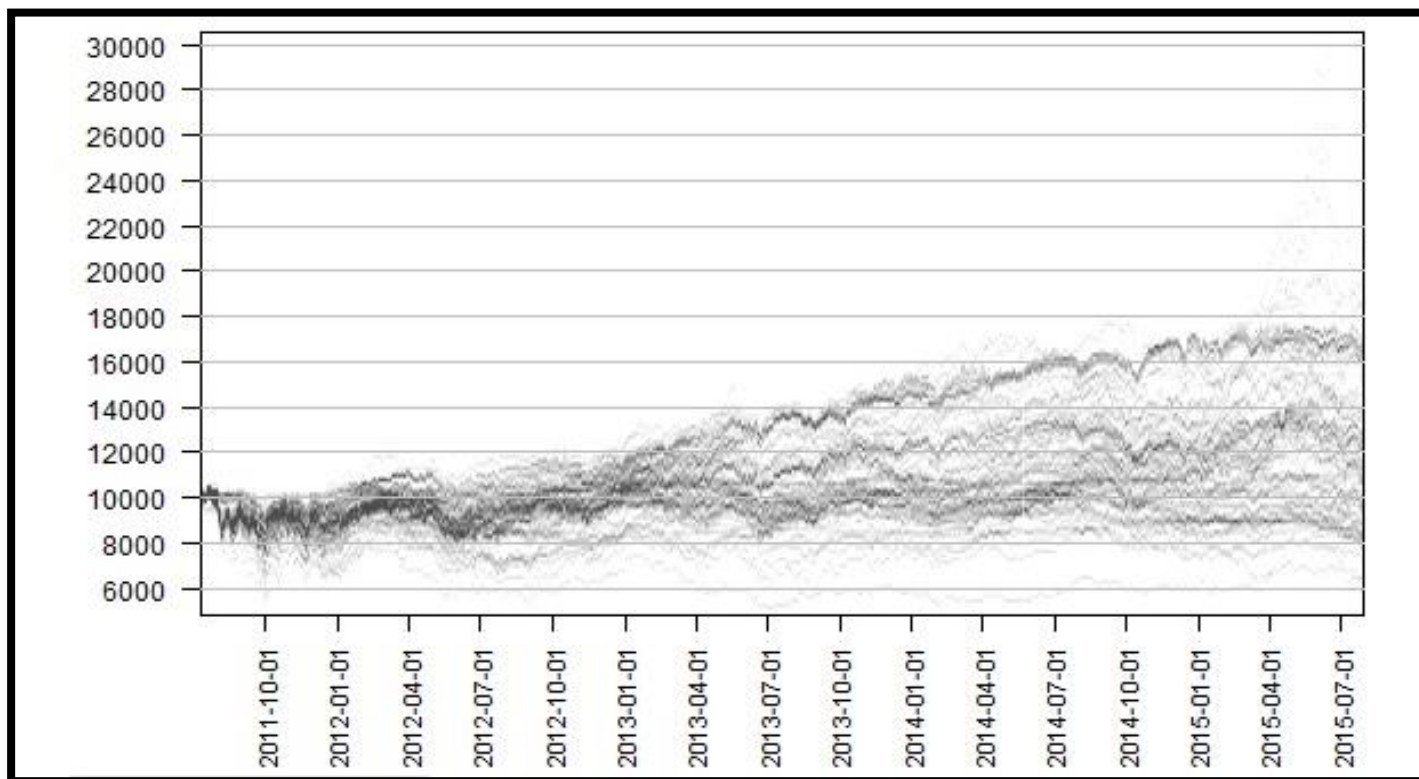
**Select Mutual Fund Family**

361 Funds  
Aberdeen  
AC ONE  
Acuitas Investments  
Advisory Research  
Alger  
AllianceBernstein  
Alliant Funds  
ETF

Lines

# Methods

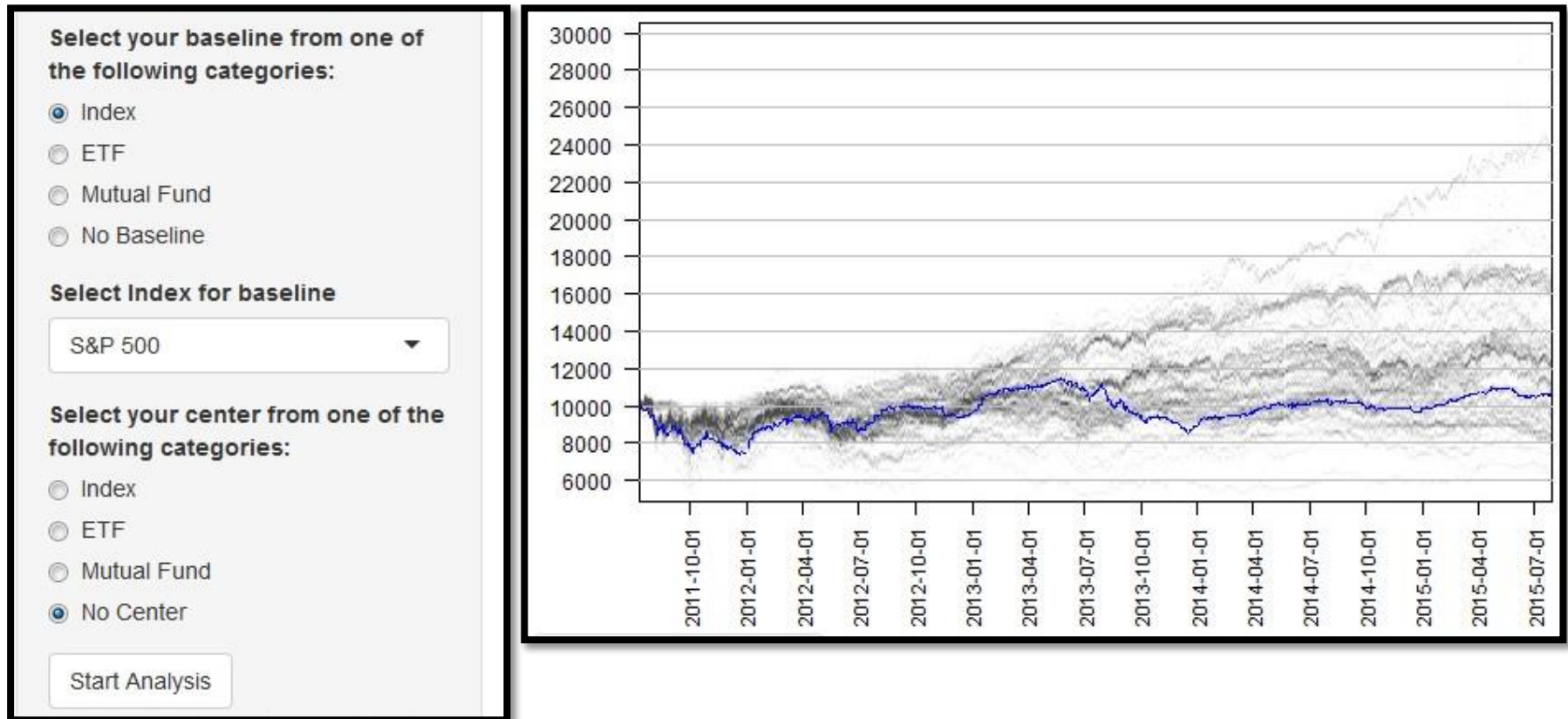
- ▶ The application generates a performance envelope (or “cloud”) based on the user’s choices of mutual fund and/or ETF categories and fund families.





# Methods

- ▶ The user also has the option to choose a baseline (shown in blue) to overlay on the cloud and a center for the analysis.



# Methods

- ▶ The application generates an interactive table of the selected mutual funds and ETFs, and assigns each a rank based on their atypicality.

ETF Data Mutual Fund Data Combined Data							
Show 25 entries					Search:		
Name	Symbol	Category	Family	Net Assets	Expense Ratio	Rank	Return
iPath® Bloomberg Coffee SubTR ETN	JO	Commodities Agriculture	Barclays Funds	100.15M	0.75	1	3003.701
iPath® Pure Beta Coffee ETN	CAFE	Commodities Agriculture	Barclays Funds	5.17M	0	2	3486.153
William Blair Emerg Mkts Sm Cp Gr I	BESIX	Diversified Emerging Mkts	William Blair	305.42M	1.4	3	18107.062
William Blair Emerg Mkts Sm Cp Gr N	WESNX	Diversified Emerging Mkts	William Blair	305.42M	1.65	4	17916.373
City National Rochdale Emerg Mkts N	RIMIX	Diversified Emerging Mkts	City National Rochdale	777.4M	1.61	6	15836.620
iPath® Bloomberg Sugar SubTR ETN	SGG	Commodities Agriculture	Barclays Funds	40.99M	0.75	8	2847.023



# Methods

- ▶ The user can then choose which specific mutual funds and/or ETFs to overlay on the cloud.

**Select specific ETF to overlay on graph above:**

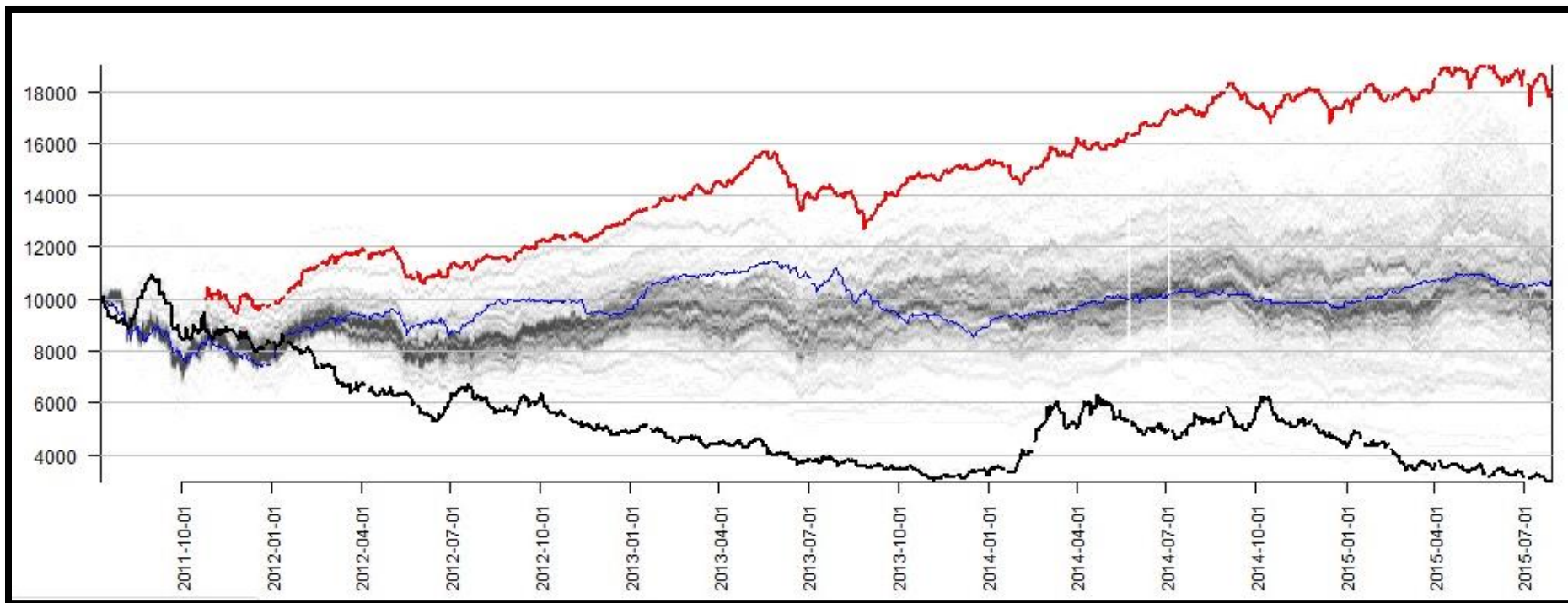
- WisdomTree Middle East Dividend ETF
- WisdomTree Commodity Country Equity ETF
- WisdomTree International Hdgd Div Gr ETF

**Select specific Mutual Funds to overlay on graph above:**

- Vanguard Health Care Adm
- Vanguard Health Care Inv
- Vanguard Tax-Managed Growth & Inc
- Vanguard International Explorer Inv
- Vanguard Health Care Index Adm

# Methods

- ▶ The application overlays the user's selections on the cloud and adjusts the plot window according to the mins and maxs of those selections.

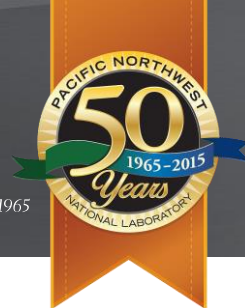


# Methods

- ▶ The application also plots interactive charts of the selected mutual funds and ETFs.



# Results



- ▶ The application has been modified to attentively match the data with current available data found on Yahoo! Finance using the XML and R Curl packages.
- ▶ Additional modifications were constructed to allow the user more flexibility in making their selections of categories and fund families.

# Discussion

- ▶ These changes will allow for improvements in the comparisons of mutual funds and ETFs of the same category.
- ▶ This application will improve data visualizations in the analysis of atypicalities of mutual funds and exchange-traded funds.
- ▶ Future changes could be made to assign a positive/negative value to atypicality scores
- ▶ Additional interactive capabilities could be added to plots



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