



Predicting Efficiency in the Nonprofit Sector

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BCSPCA 1-888-605-4375

**As a donor, how can I predict
how much of my donation will
go toward the intended cause?**

—



CHARITY SEARCH

☐ Name Only[Advanced](#)[A-Z Directory](#)[4-Star Charities](#)

Charity Contact Info

Humane Animal Rescue

6926 Hamilton Ave
Pittsburgh, PA 15208
tel: (412) 345-7300
fax: (412) 661-8726
EIN: 25-0325750

[Visit Web Site](#)

Board Leadership

Joseph Vater

President

CEO

Dan Rossi

Executive Director

Rating Profile Table of Contents

Animals : Animal Rights, Welfare, and Services

Humane Animal Rescue

Help Us Come To Their Rescue

[Add to My Charities](#)[Donate to this Charity](#)[Print](#)[SHARE](#)[Rating Profile](#)[Programs](#)[Historical Ratings](#)[IRS \(Forms 990\)](#)[Comments \(0\)](#)

	Score (out of 100)	Rating
Overall Score & Rating	89.45	★★★★☆
Financial	85.64	★★★☆☆
Accountability & Transparency	96.00	★★★★★

This rating was published 06/01/2017 and includes data from FY2015, the most recent 990 received at that time.

[Why isn't this based on more recent data?](#)



Data Collection/Engineering

All charities within the Animal Welfare category: 270 observations

Continuous Features

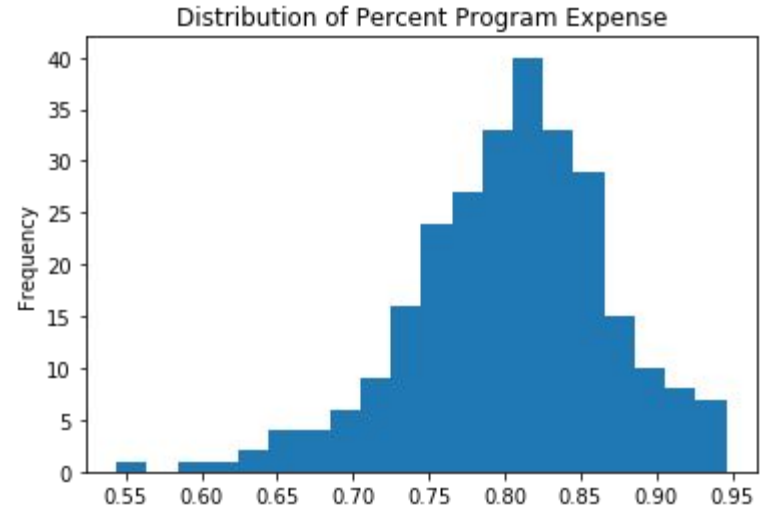
- CEO salary
- Liability to Assets
- % Admin Expense
- % Fundraising Expense
- % Program Expense
- Program Expense Growth
- Revenue
- Transparency Score
- Working Capital Ratio (Years)

Categorical Features

- Age of Charity
- State
- Government Funded
- Offers Services

Dependent Variable: % of Program Expense

$(\$ \text{ spent on charitable activities}) / (\text{total expenses})$





Designing the regression model

Ordinary Least Squares method:

- R-squared: 0.57

Lasso with Standard Scaler:

- R-squared: 0.52



Features Selected

Positive Correlation

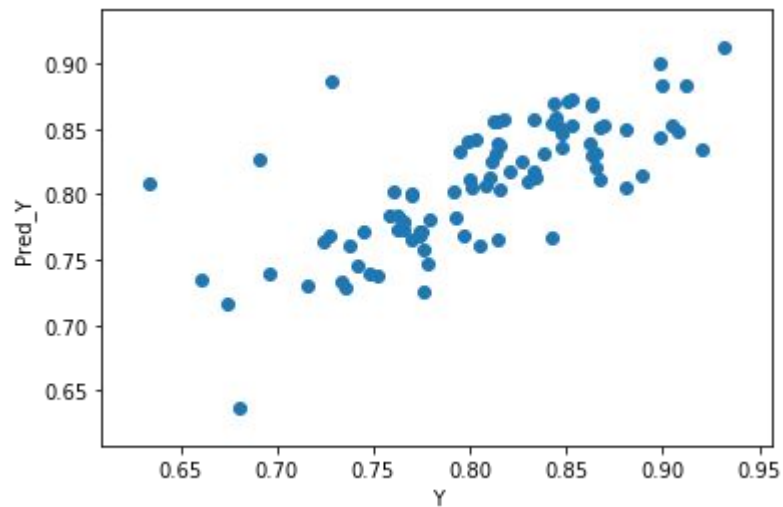
- **Transparency Score:** Score from 1 to 100 given by Charity Navigator based on qualitative data
- **Government Funded:** Describes whether or not a charity accepts grant money (categorical)

Negative Correlation

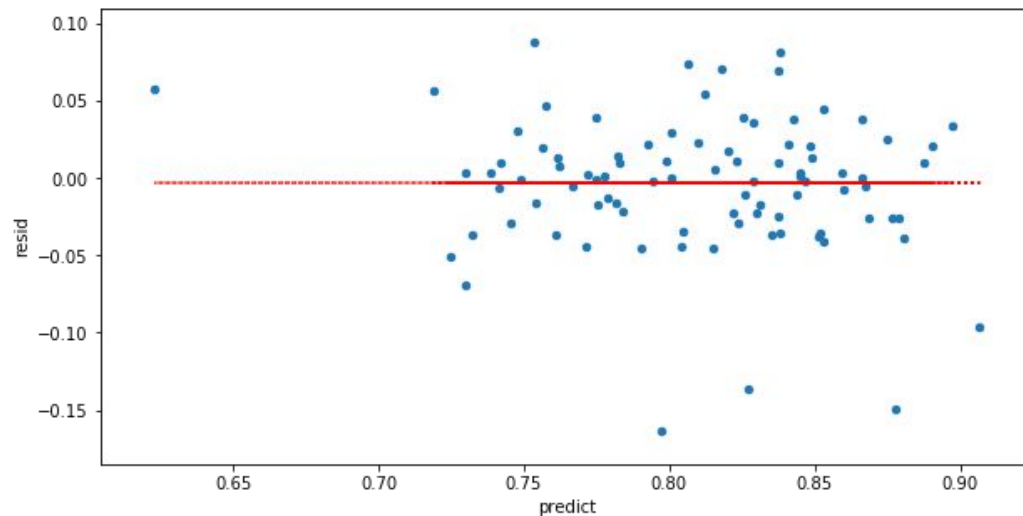
- **Percent Fundraising Expense:** ($\text{\$ spent on fundraising activities} / \text{total expenses}$)
- **Offers Services:** Describes whether or not a charity offers services for a fee (categorical)

Evaluating the model

Actual Value vs. Predicted Value



Residuals vs. Predicted





Key Takeaways

- Charities that are government funded and highly transparent have larger budgets for programs
- Charities that offer services may have higher administrative expenses
- If a charity spends a greater percentage on fundraising, it's spending less on programs



Challenges & Next Steps

- “Bad” charities tend to have missing data or not be listed at all.
- Most data is financial - introduces some codependency
- Expand analysis across charity categories
- Search for external data sources:
 - Identify national vs state vs local charities
 - Identify better metrics for “charity benefit”
 - Historical data

Questions?

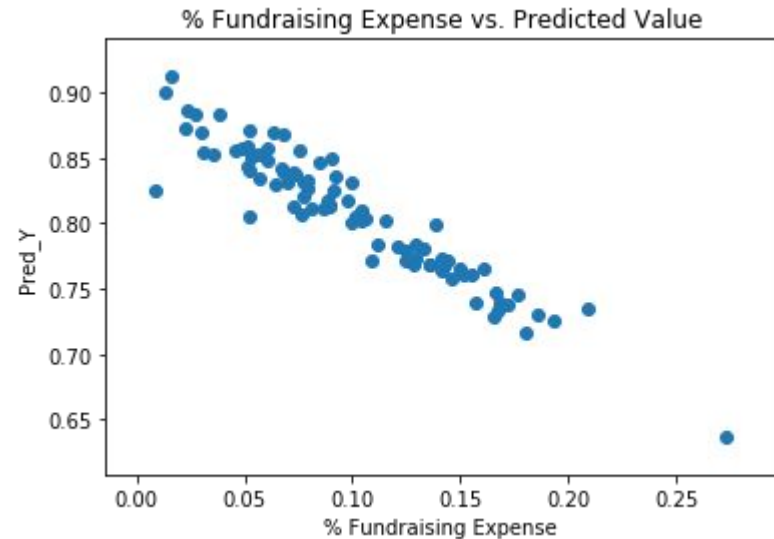
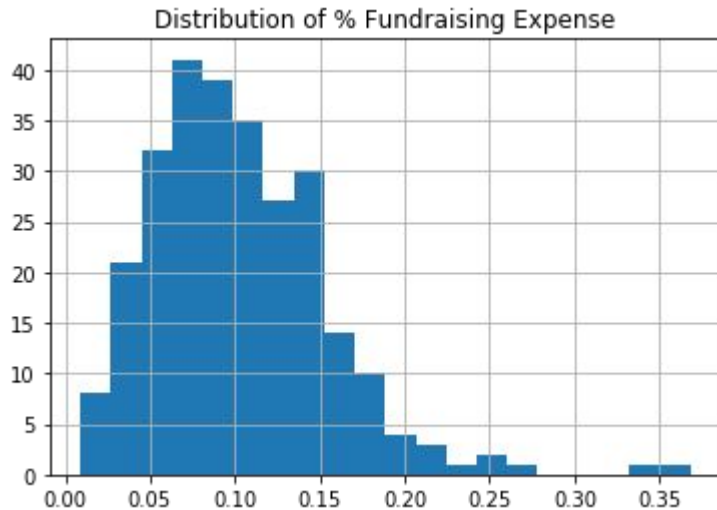
Appendix



What is the Transparency Score?

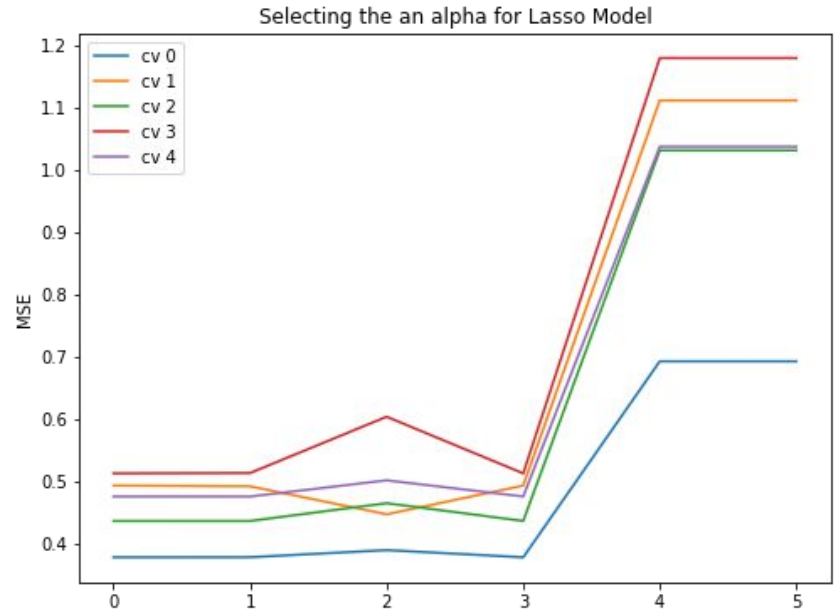
Accountability & Transparency Performance Metrics	
Information Provided on the Form 990	
Independent Voting Board Members	<input checked="" type="checkbox"/>
No Material diversion of assets	<input checked="" type="checkbox"/>
Audited financials prepared by independent accountant	<input checked="" type="checkbox"/>
Does Not Provide Loan(s) to or Receive Loan(s) From related parties	<input checked="" type="checkbox"/>
Documents Board Meeting Minutes	<input checked="" type="checkbox"/>
Provided copy of Form 990 to organization's governing body in advance of filing	<input checked="" type="checkbox"/>
Conflict of Interest Policy	<input checked="" type="checkbox"/>
Whistleblower Policy	<input checked="" type="checkbox"/>

Analyzing % Fundraising Expense

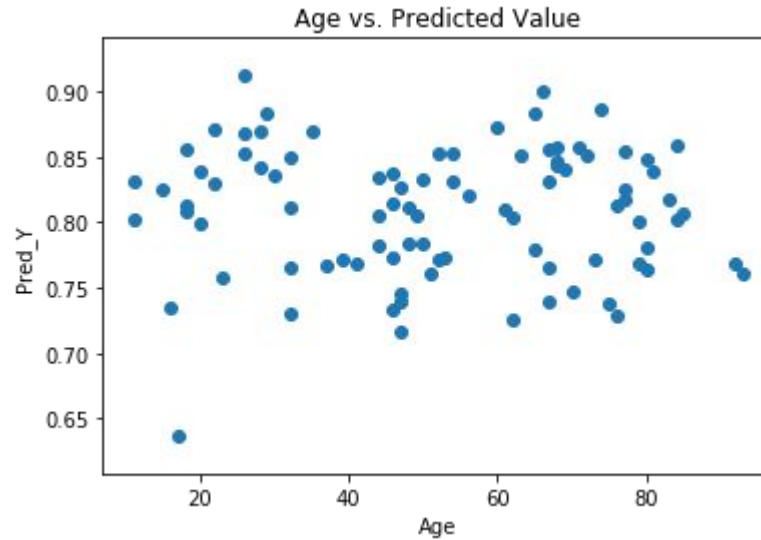


Lasso Model

- Applied Standard Scaler to X and Y
- Experimented with alphas
- Built Lasso model with cross validation



Age is not a good predictor





Model MSE

0.0018

Pair Plot

