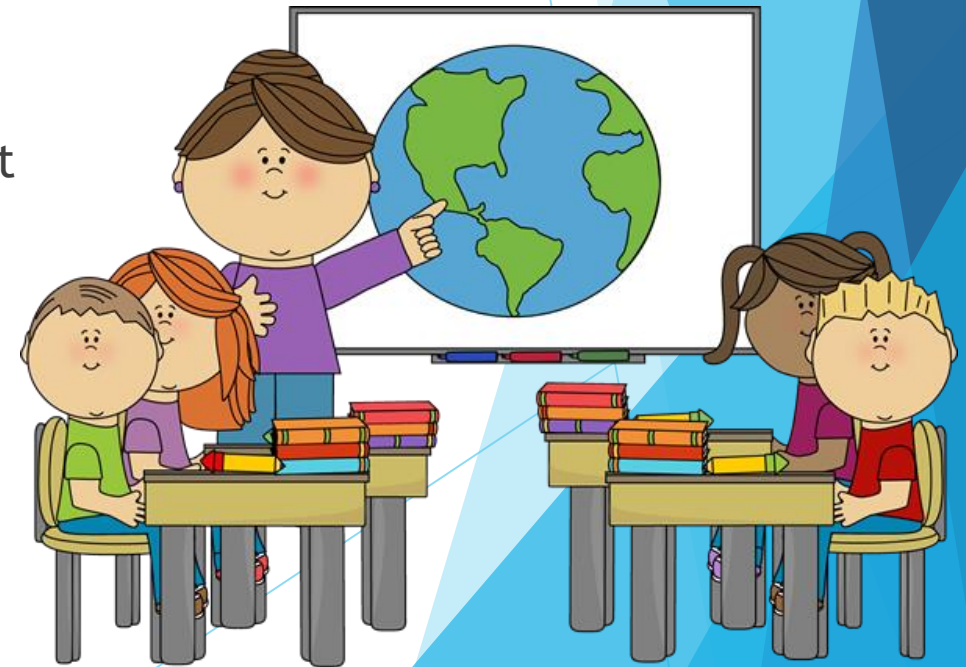# Predicting Classroom Project Funding

Stefanie Smith

Foundations of Data Science

DonorsChoose.org

- Across the country, many public school teachers use their own money to buy supplies for their classrooms, including basic essentials like notebooks and pencils.

- If schools and teachers cannot afford these supplies, students may miss out on learning opportunities.

- DonorsChoose.org was established to help teachers get the resources they need for classroom projects.

- Through the DonorsChoose.org website, teachers can request materials for their classrooms.

- Donors can browse through requests, and select a project they would like to support financially.

Project Requests

▶ A typical project request on DonorsChoose.org will include:

- Title
- Need statement
- Essay
- Teacher info
- School info
- Location
- Grade level
- Poverty level

New Kindergarten Materials to Start the New School Year!

My students need chart paper, printer ink, Crayola crayon molds, and Dice in Dice!

My Students

My students are very eager little learners and have a passion for learning new and exciting things! They come from many different economic backgrounds with a high free and reduced lunch rate, but we are always looking for more resources to help them grow and achieve new levels of knowledge!

My students are hard workers and love coming to school each day! They love discovering new books and ideas, and I'm so happy to be able to be the one to help them discover these new things!

3 DAYS LEFT!

Mrs. Matteson
Francis Vigo Elementary School
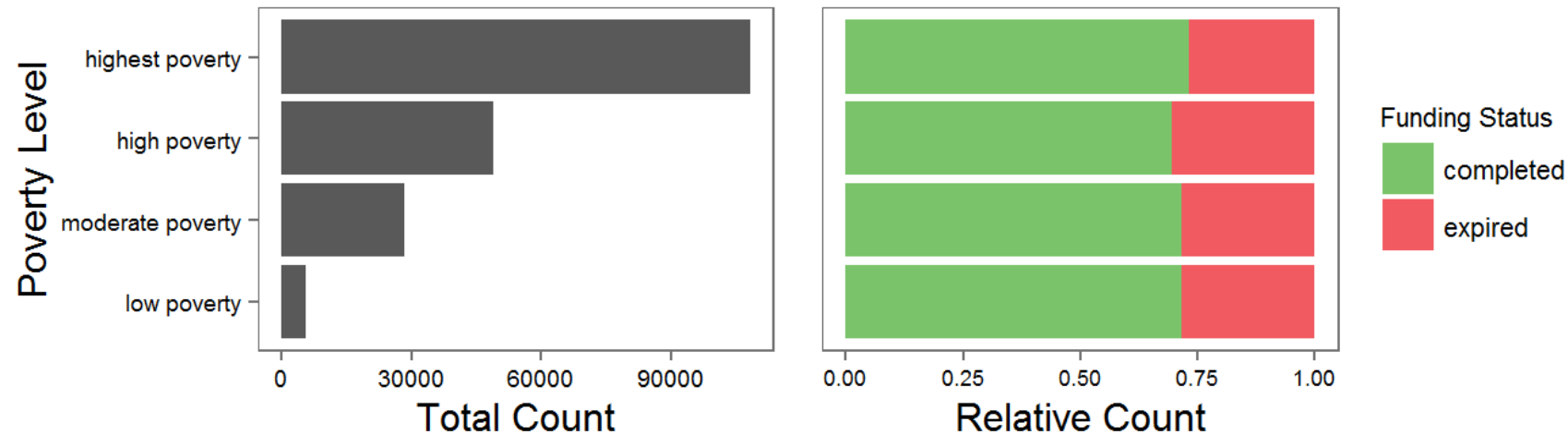Vincennes, IN
Grades PreK-2
Highest Poverty

Objective and Overview

- In 2015, 72% of classroom projects posted on DonorsChoose.org were successfully funded.

- By analyzing data available from DonorsChoose.org, the goal of this capstone project was to understand what types of projects receive full funding.

- The analysis was limited to data from 2015, and included 190,000+ projects.

- Exploratory data analysis was conducted, and a classification tree was developed to gain insight into the properties of projects that impact funding.

- The results from this analysis can be used to help teachers improve their chances of success.
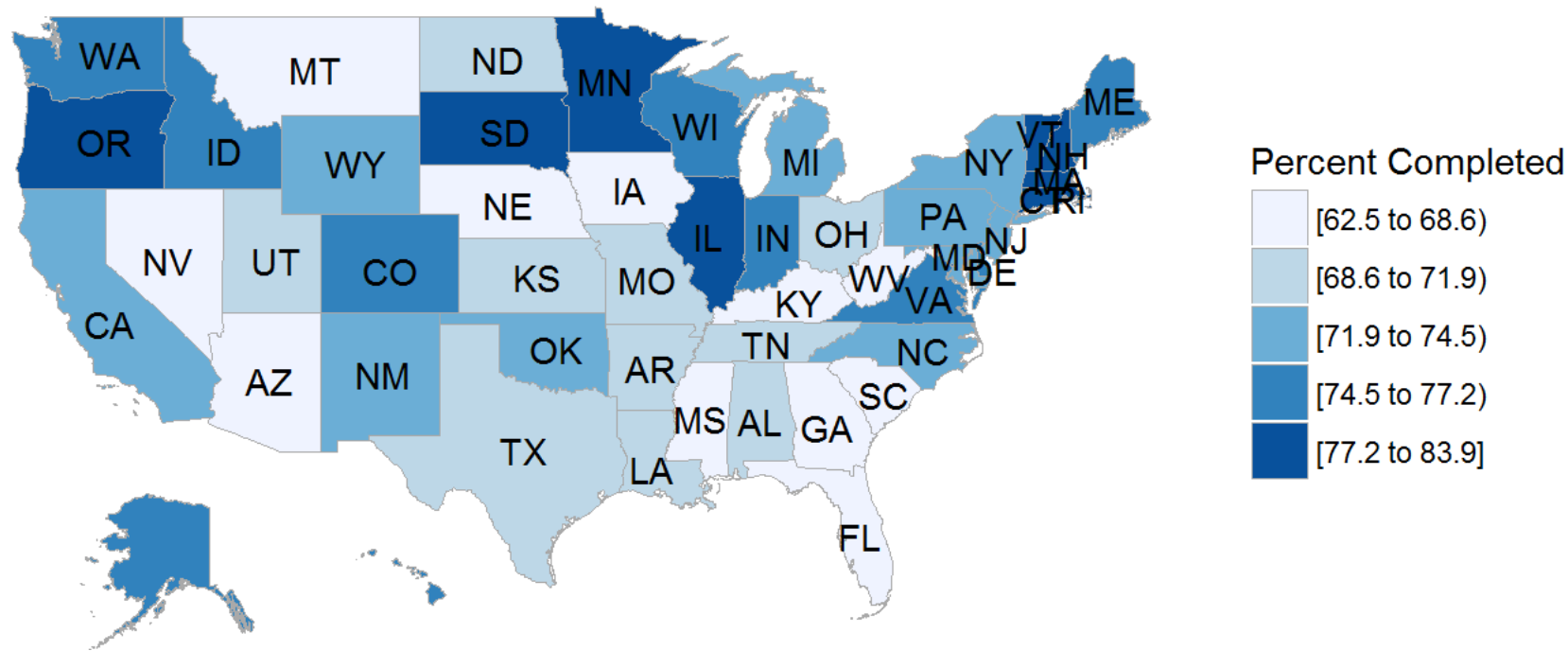
Impact of Poverty Level on Funding

▶ Every project posted on DonorsChoose.org is categorized by poverty level, which refers to the percentage of students at a given school who qualify for free or reduced-price lunch, and is considered a measure of economic need.

▶ Exploratory data analysis revealed that projects from "highest poverty" schools (where 65% or more of its students receive these lunches) have a slightly better success rate compared to the other poverty levels.
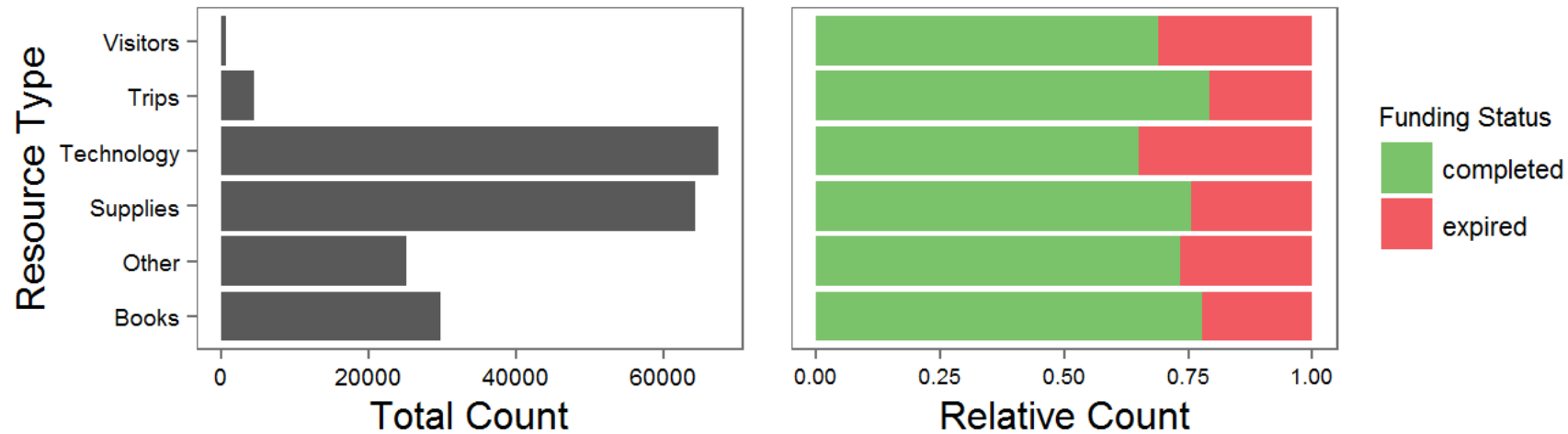
Impact of School Location on Funding

▶ Project success rates were determined for every state across the country.

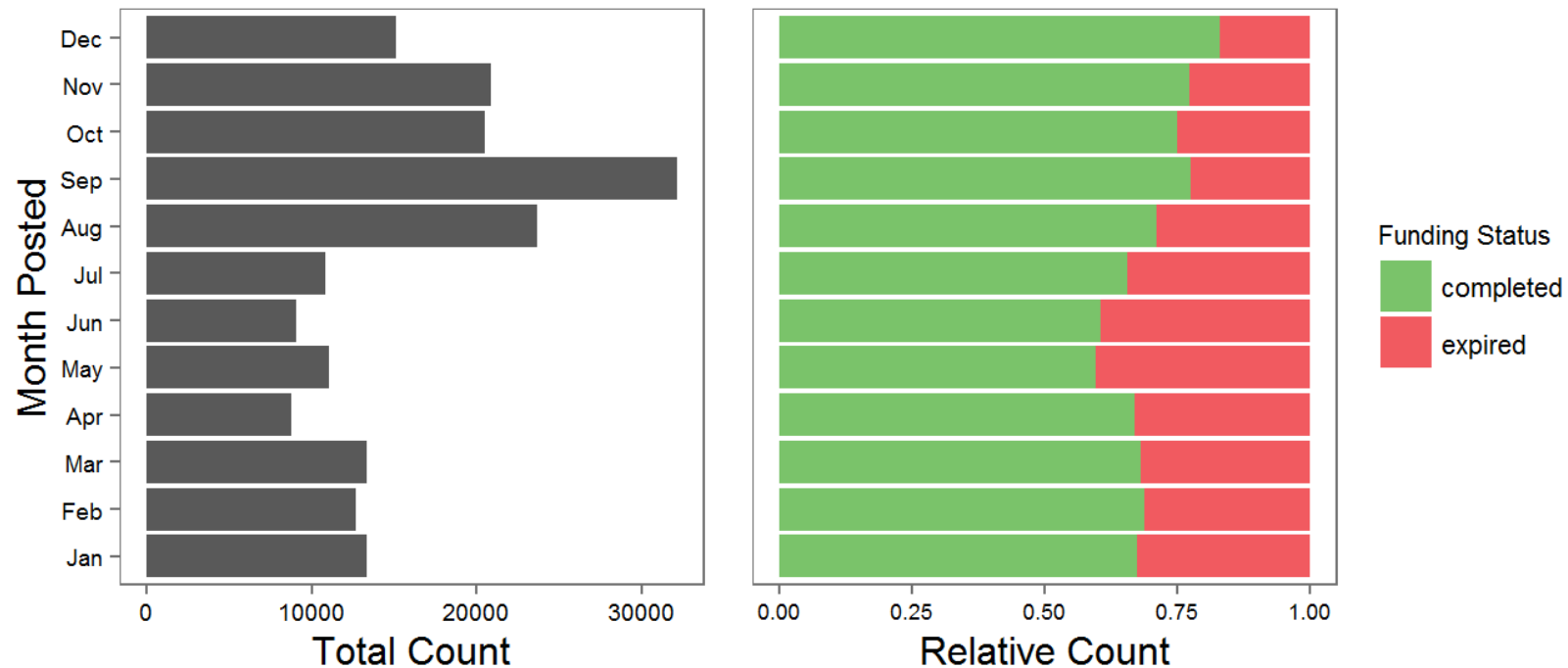▶ Success rates varied from 62.5% (South Carolina) to 83.9% (New Hampshire).

Impact of Resource Type on Funding

▶ Every project on DonorsChoose.org is categorized by the type of resource requested.

▶ Trip-based projects had the highest rate of success.
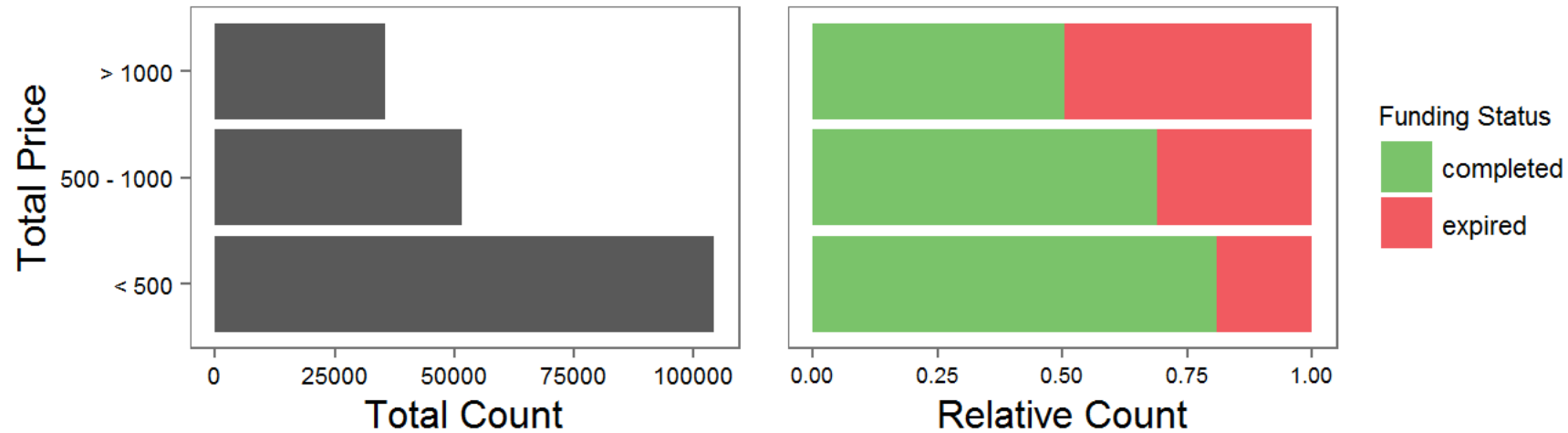
Impact of Date Posted on Funding

▶ In 2015, a large number of projects were posted in September, which is typically the start of the school year.

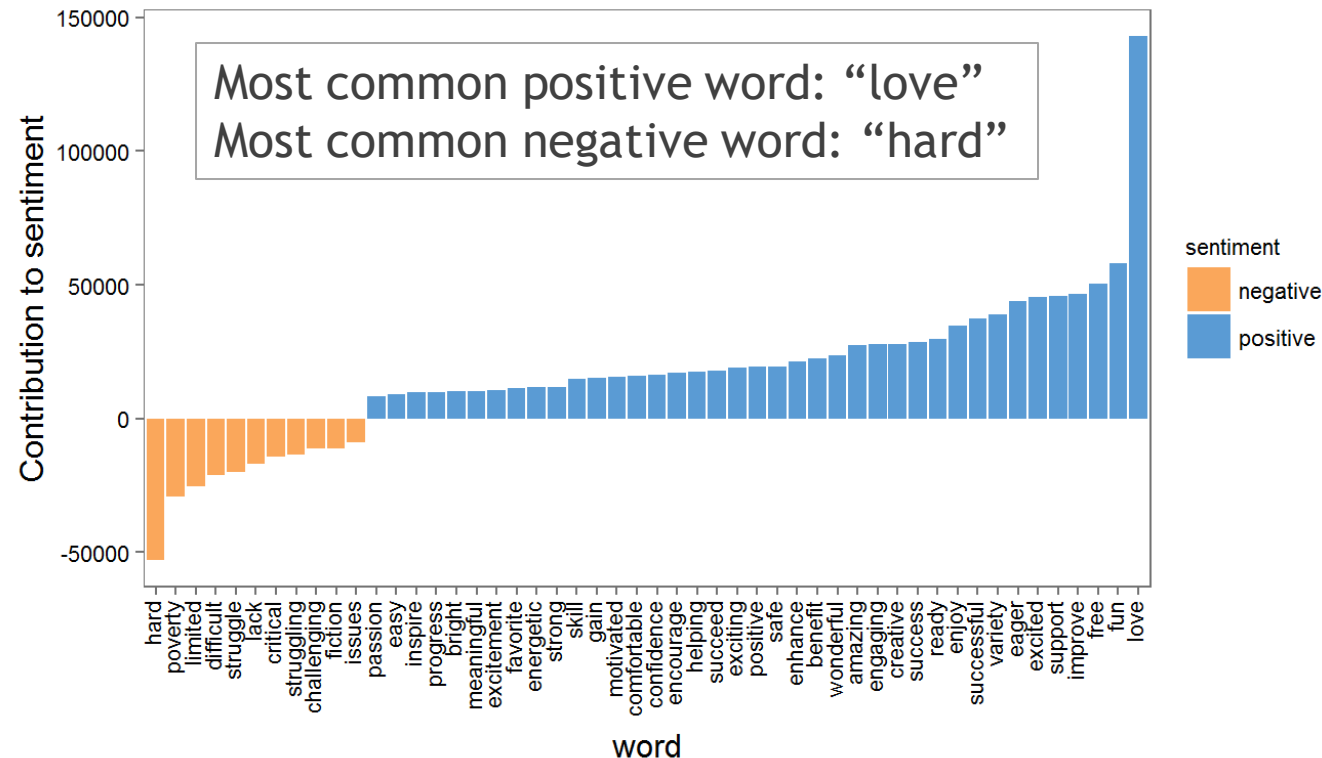▶ Projects posted in December had the highest rate of success.

Impact of Project Cost on Funding

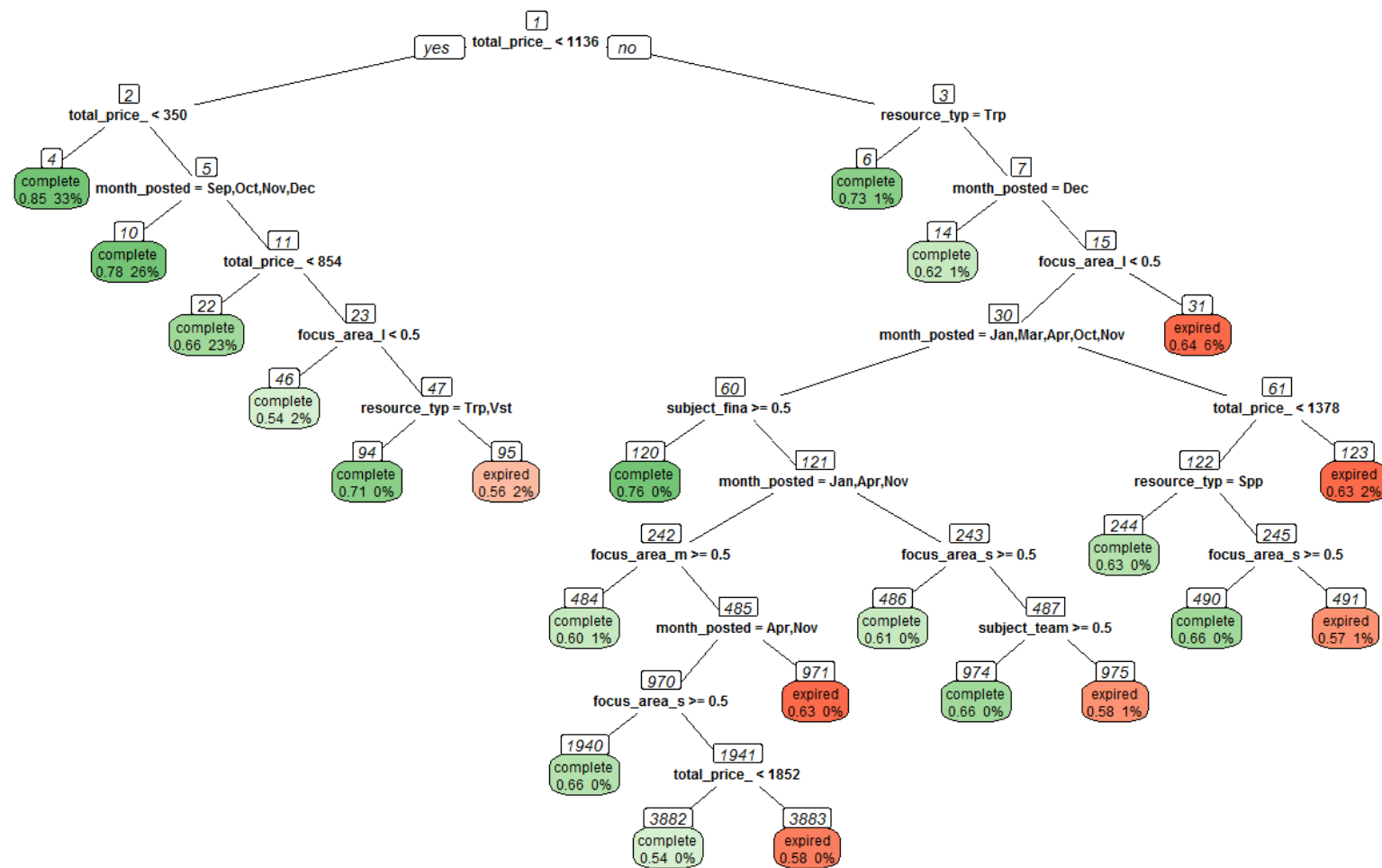▶ Exploratory data analysis revealed that lower cost projects have a better rate of success.

Sentiment Analysis of Project Essays

▶ The text from every essay posted on DonorsChoose.org was analyzed, and the total number of positive and negative terms was calculated.

▶ Sentiment analysis revealed that positive terms are used more frequently than negative ones.

Most common positive word: "love"
Most common negative word: "hard"

Building a Classification Tree

- A classification tree was built using the CART method to predict a project's funding status (completed or expired).

- The independent variables consisted of factors that are within a teacher's control, including:

  - Resource type

  - Total price

  - Focus area and subject

  - Essay length

  - Essay sentiment scores

  - Month posted

- A training set was used to build the model (70% of the dataset), and a test set was used to evaluate the model.

- The resulting tree was pruned using the 1-SE method.

Classification Tree

Interpreting the Tree

- In 2015, the overall project success rate was 72%.

- Any leaf node with a success rate greater than 72% was considered for analysis.

- Highlights from the analysis are summarized in the table below.

Leaf Node	Project Attributes	Success Rate
4	Total Price < $350	85%
6	Total Price > $1136 Resource Type = Trips	73%
10	$350 <= Total Price < $1136 Month Posted = Sept – Dec	78%

- Teachers can improve their chances of success by developing a project that matches any of these leaf nodes.

Recommendations to Teachers

▶ The following recommendations are proposed based on the results from the classification tree:

1. For best chances of success, keep the project costs under $350.

2. If the project will cost more ($350 - $1136), then be sure to post the project early in the school year (September to December).

3. Avoid letting the costs get above $1136, unless considering a trip-based project.

Future Work

- This capstone project focused on the project and essay datasets from DonorsChoose.org.

- Additional insight may be gained from the other DonorsChoose.org datasets.

- Donation data (including donor city, state, and donation amount):
  - Do donors typically donate to teachers in their local area?
  - Any differences between repeat donors and 1-time donors?

- Resource data (breakdown of all materials/resources requested for a project and the corresponding prices):
  - Are "highest poverty" schools requesting different types of resources?
  - Do successful projects typically request many low cost items, or fewer high price items?