Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

CASE STUDY

The Gabriel Hansen Foundation (predictive)

Copyright © 2019 by DecisionPro Inc.

This document is primarily intended to be used in conjunction with the Enginius software suite. To order copies or request permission to reproduce materials, go to http://www.enginius.biz. No part of this publication may be reproduced, stored in a retrieval system, used in a spreadsheet, or transmitted in any form or by any means –electronic, mechanical, photocopying, recording or otherwise– without the permission of DecisionPro, Inc. v200206

Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

Introduction

The Gabriel Hansen Foundation (not its real name) is the fundraising arm of a major European research hospital called the Gabriel Hansen Cancer Institute that specializes in fighting various forms of cancer. With a staff of 300 full-time researchers, 550 resident physicians, and 1,200 nurses, it is one of the largest specialized hospitals in the world. In addition to its regular hospital activity (diagnosis, treatment, recovery), the Gabriel Hansen Cancer Institute also conducts advanced medical research and clinical trials. The Institute houses 35 different research teams, and its medical research budget alone is 75M€ per year (about $90M). Resident physicians are also specialized researchers who allocate much of their time to medical research, analysis and experiments. Direct access to patients is a great advantage for the researchers, and the patients benefit from access to the latest medical advances and clinical trials. The Institute also houses topnotch research facilities, and has gained a reputation as a world renowned hospital in recent years.

But medical research, clinical trials and medical equipment cost a lot of money. About twenty years ago, the Institute decided to focus significant effort on generating private donations to supplement their regular revenues and other sources of funding, and to professionalize their fundraising activity. To that end, they created the Gabriel Hansen Foundation.

The Gabriel Hansen Foundation is a separate legal entity; a nonprofit organization whose mission is to raise money to finance the Gabriel Hansen Institute's research activities. But after a few years of rapid growth, the amount of funds the Institute was able to raise flattened out, while the Institute's needs continued to grow. The Gabriel Hansen Foundation is under intense pressure to collect more without an increase in spending. Foundation management believed that one of the ways to achieve such a goal would be to optimize and rationalize its direct marketing strategy.

Current direct marketing strategy

The Gabriel Hansen Foundation relies heavily on direct mail as a fundraising strategy. The Foundation has explored other tactics recently, with varying success, such as encouraging donors to enroll into their automatic deduction (i.e., monthly donation) program, or to raise money through fundraising events or peer-to-peer fundraising. Still, direct marketing remains the most effective fundraising method they have found to date, and constitutes about 84% of their current fundraising revenue.

Donor segmentation

The Gabriel Hansen Foundation segments its donor list in three simple groups exclusively based on the recency of their last donation:

- Active donors — Individuals who have made at least one donation within the last 3 years (N=458,600).
- Cold donors — Donors whose last donation was made 4 or 5 years ago (N=204,600).
- Inactive donors — Individuals whose last donation was made 6 years or more ago (N=unknown).

Typically, direct marketing fundraising operates in three sequential steps: (1) acquisition, (2) solicitation, and (3) abandonment.

Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

Acquisition

The Gabriel Hansen Foundation "acquires" new donors through various channels. Some people hear about the Institute activity and decide to make a donation on their own. Sometimes, some cancer patients lose the battle and pass away, in which case close relatives might encourage friends, colleagues and family members to make a donation to the Gabriel Hansen Foundation in the name of the deceased (i.e., rather than buying flowers). But the largest source of donor acquisition is through direct marketing campaigns. The Gabriel Hansen Foundation buys, rents, or exchanges lists of potential donors with other charities or list providers, and asks the prospective donors on these lists to make a donation to the Gabriel Hansen Institute. The return rate is usually low (typically between .75% and 1.20% based on the source and the specific appeal used), and associated campaigns provide negative returns much of the time.

Once a donor has made a first donation, however, his or her address is added to the Foundation's database, and he or she is regularly solicited throughout the year.

Solicitation

The Gabriel Hansen Foundation sends 6 solicitation mails per year to all its "active" donors. A donor is considered to be active if he or she has made at least one donation within the last 3 years. Thus, someone who has made a donation to the Gabriel Hansen Foundation will receive a minimum of 18 solicitations over the course of the next 36 months, and the process will start all over once that individual makes a new donation.

Each solicitation campaign has a fixed cost of about 7,500 EUR, regardless of volume. This cost includes database extraction, file preparation, address duplication checks, creation of the solicitation material, copy-editing, etc.

In addition, each mailing piece sent costs between 75 cents and 1.40 EUR, for an average of 90 cents. This marginal cost includes the personalized printing of the letter, accompanying material (e.g., brochure), envelope, return envelope, stamp, etc.

Fundraising campaign activity varies during the year, with most of the activity occurring near the end: between 50 and 65% of donations occur during the last three months of the year.

Till now, all donors received the same number of solicitations regardless of their profile, average donation amount, proven loyalty, etc., as long as they have made their last donation within the last three years.

Abandonment

If after three years of regular solicitations, a donor has not renewed his or her support and has not made an additional donation, the donor is abandoned and considered “cold”, then “inactive”. Foundation management determined that to continue soliciting cold and inactive donors would be very costly, while leading to limited financial returns.

Once donors are abandoned, their addresses can be exchanged with other charities during donor-acquisition campaigns.

Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

Cold donors (and a few inactive ones) can also occasionally be included in "re-activation" campaigns, conducted mostly over the phone, which are treated as (re-)acquisition campaigns.

Optimizing direct marketing

Predicting donors' responses to solicitations

Some donors offer a great fundraising potential, while others offer much more limited prospects.

A donor who has made regular and generous donations to the Gabriel Hansen Foundation over the last 15 years, without discontinuity, is much more likely to make future significant donations than a new donor who has made a first, paltry donation after the passing away of a distant cousin.

Hence, Foundation management decided to explore how predictive modeling could enhance direct marketing profitability. At this stage, management is only exploring the possibility of using the scoring (i.e., predictive) model in production, but no real tests have been conducted yet. The idea would be to identify which donors should be solicited for each campaign, and which should not be solicited at all, or only occasionally, hoping that doing so would allow the Gabriel Hansen Foundation to identify donors with limited financial value, and hence save money on ineffective (and costly) solicitations.

Scoring model

This case study takes place in January. In about a week, management will have to decide whether to use the scoring approach for their upcoming March campaign. Since letters and envelopes have to be ordered and printed in advance, the donor selection decision has to be made weeks before the actual campaign is launched.

To calibrate the scoring model, the Gabriel Hansen Foundation's analyst extracted a representative sample of 2,313 donors who were solicited during the March campaign a year ago. All the donors who have made at least one donation, regardless of the amount, during the 3 years prior the launch of the March campaign had been solicited at the time, for a total of about 462,600 active donors. Consequently, each donor in the sample represents 200 donors in the database, and financial results have to be multiplied by 200 to estimate the overall economic impact of the scoring model.

Each donor is described by the following variables

- Frequency (# donations) Number of donations made at the date of the March campaign. The minimum is one.
- Recency (years) When the donor made the last donation. A value of 1.5 means a year and a half, or 18 months. All the active donors were solicited during last year's March campaign; they made their last donation within the 3 years prior the campaign (recency was the only selection criteria), and consequently, donors' recency vary between 0 and 3.00.
- Seniority (years) When the donor made the first donation to the Foundation. (If Frequency equals 1, Recency and Seniority are identical.)
- Average donation (EUR) The average amount donated per contribution in the past.

Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

- **Maximum amount** (EUR) The maximum amount ever donated. Again, if the donor has made just one donation so far, Average and Maximum donation amounts coincide.

To better capture nonlinear effects, the log-transform of some of those variables have also been included.

Each donor is also qualified by his or her:

- **March donation** (EUR) Measures the amount that each solicited donor gave following last year's March campaign. If equal to zero, the donor did not respond to the solicitation. March donation will serve as the target (or dependent) variable of the scoring model.

Calibration

In the data set provided with the case study, the "calibration" data contains a sample of 2,313 donors (a year ago, the total database contained 462,600 active donors). These donors, whose predictors were computed as of a year ago, and whose response to the March solicitation has been observed, will be used to calibrate the predictive model.

Predictions

The second data block, called "Prediction data (this year, active donors)", contains a sample of 2,293 donors. These donors are *currently* active donors (the number of active has slightly shrunk and is equal to 458,600). Their predictors have been computed recently and their response to the upcoming March campaign is unknown and has to be predicted.

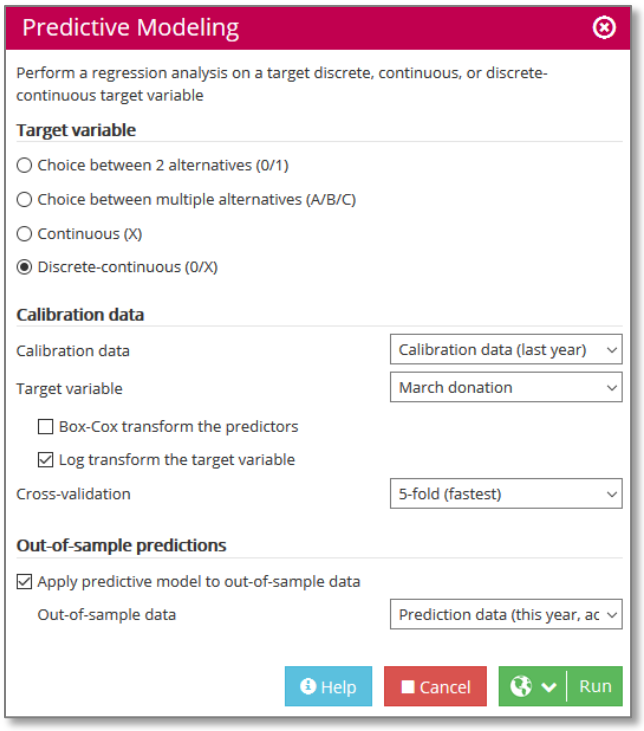
Questions

Question 1
Calibrate a predictive model using the "Calibration data (last year)" data, and apply that model to the "Prediction data (this year, active donors)" data set.

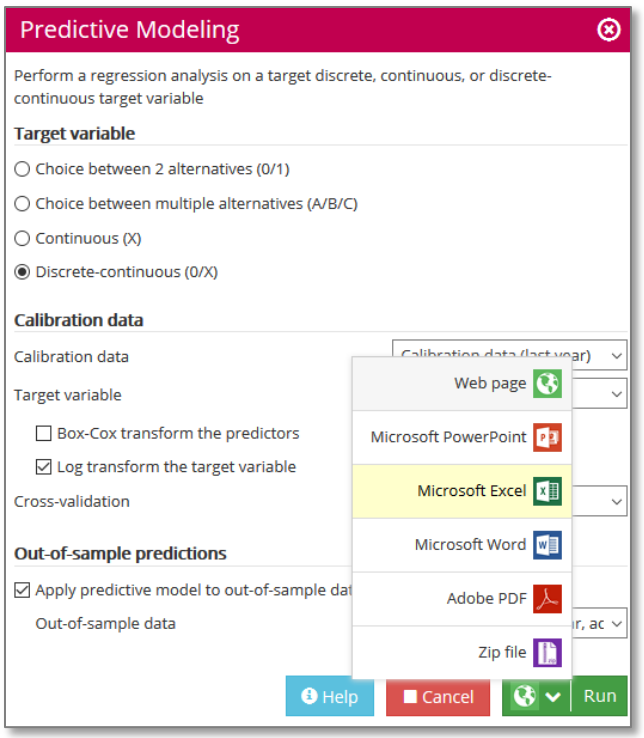
Explain the signs (+ or -) of the parameter estimates. What do they mean?

Make sure you use a discrete-continuous model. Since some predictors have been transformed already (i.e., their log-transforms have been included as predictors), you do not need to transform them again. However, since donation amounts (hence the target variable March donation) are highly skewed, you should apply a log-transform to the target variable.

Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.



Hint: For the next questions, export the results in Excel (right next to the "Run" button, click on the Earth logo, and select Microsoft Excel).



Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

Question 2
Using the predictions made by the model on the "Prediction data (this year, active donors)" data set, if the Gabriel Hansen Foundation did not change its direct marketing strategy at all, and sent the upcoming solicitation for the March campaign to all its active donors, what would be the expected gross margin (fundraising), direct marketing costs, and net revenue?

Note that the marginal cost of a solicitation for the March campaign is 1,10 €. The fixed costs of the campaign (endured regardless of the volume of solicitations) remains at 7,500 €.

Question 3
If the Gabriel Hansen Foundation did not solicit all its active donors, but only those active donors who are *expected* to be profitable, what would be the impact of the scoring model on gross margin (fundraising), direct marketing costs, and net revenue?

Remember that a solicitation is deemed profitable if the revenue expected to be generated by that solicitation is greater than its marginal cost.

The data block "Prediction data (this year, cold donors)" lists the donors who have a recency of 4 or 5 years, that is, individuals whose last donation has been made between 37 and 60 months ago. The marketing department of the Foundation label these "cold donors". Continue to calibrate the model on the same calibration dataset, but this time, apply it to this list of cold donors.

Question 4
If the Gabriel Hansen Foundation solicited all its cold donors during the upcoming March campaign, would it be profitable? Is it a good decision not usually to solicit them?

(Remember that the fixed costs should not be taken into account in these computations, otherwise you would double count them.)

Question 5
If the Gabriel Hansen Foundation *selectively* solicited only those cold donors expected to be profitable, what would be the impact on the number of solicitations sent? Gross margins? Costs? Profitability of the campaign? To what extent should you trust these predictions?

Licensed to vincent wilmet, essec (vincent.wilmet@essec.edu). Do not copy or distribute.

Question 6 (advanced question)

What suggestions could you make to improve the scoring model (e.g., additional predictors that should be included, additional steps to take into account)?

Question 7 (advanced question)

Based on the results of these simulations, the management of the Gabriel Hansen Foundation wonders whether it should generalize this scoring approach to each and every campaign. What pitfalls would you anticipate, and what potential solutions would you recommend?