



Gamify your Curriculum with Cortex

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Gamify your curriculum with low/no-code predictive analytics
Online | March 31, 2022

ERPsimLab
HEC MONTRÉAL

Serious games to learn enterprise
systems and business analytics

Your Speakers Today



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Agenda

1. Introduction
2. What is Cortex?
3. The Scenarios
4. Demo and Get started
5. Teaching with Cortex
6. Q&A

What is Cortex?



Image reference: <https://referralcoach.com/bridge-the-referral-gap/>

Cortex Analytics Simulation

Rank	Player	Operating surplus	Expenses	Donors contacted
1	Player 1	26337515.00	116000.00	58500
2	Player 2	26209155.00	103340.00	52170
3	Player 3	23411465.00	324920.00	77160
4	Player 4	23112470.00	70730.00	35865
5	Player 5	23062202.00	32148.00	16574
6	Player 6	21561163.00	55292.00	28146
7	Player 7	21012684.00	5952296.00	546108
8	Player 8	19880555.00	30.00	515
--	Baseline --	19872990.00	0.00	0
9	Player 9	19147758.00	8333372.00	744531

- Virtual or in-class instructor tool
- Turn-key solution, includes case study, dataset, online leaderboard, tutorials
- Teaches predictive modeling concepts in an exciting and hands-on environment.

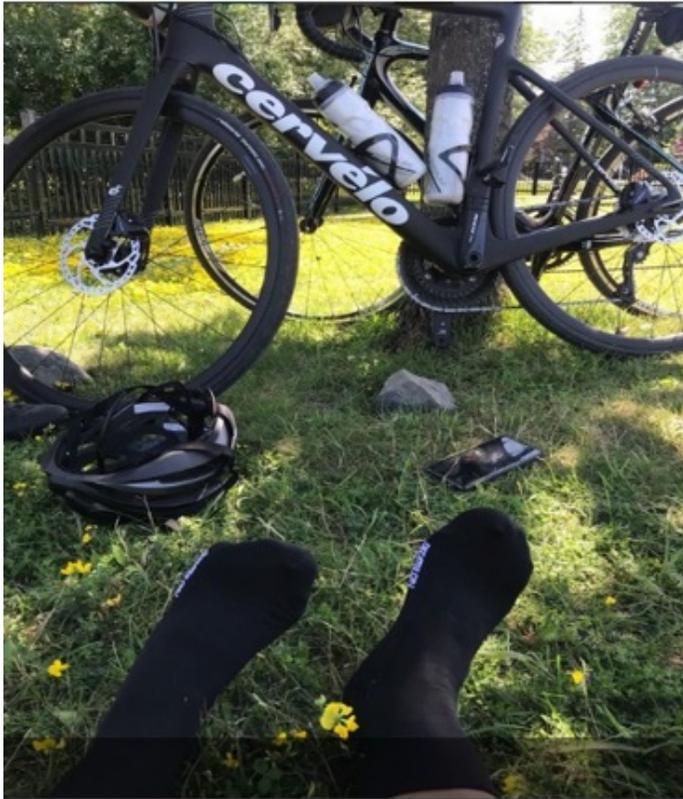
POWERED BY



IN COLLABORATION WITH

HEC MONTRÉAL

The Benefits of Gamification



Observed Benefits

- Increased engagement
- Desire from students to know more
- A surge in the number of hours willingly spent by students for the course
- Risen awareness of students in the feedback session

The Scenarios

Scenarios Features

	Fundraising Scenario	Credit Risk Scenario	Retention Scenario
Level	Beginner	Intermediate	Advanced
Datasets	✓	✓	✓
Case study	✓	✓	✓
Instructional Videos	✓	✓	
Pre-built diagrams	✓		
Teaching notes	✓		
Software	EM, Studio, Python	EM	EM

Fundraising: Turnkey Solution

Fundraising Scenario

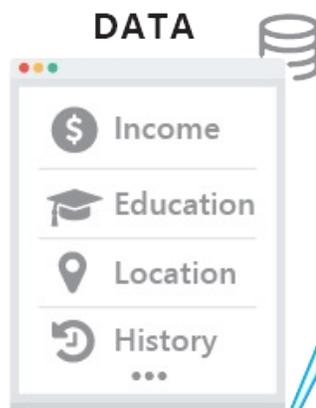
Foundation targeting potential donors

GOAL

Maximize the net raised funds



CALLING COST



DECISIONS

How many?
Who?
...

1 million potential donors

Credit Risk: Intermediate Level

Credit Risk Scenario

Financial institution processing car loan applications

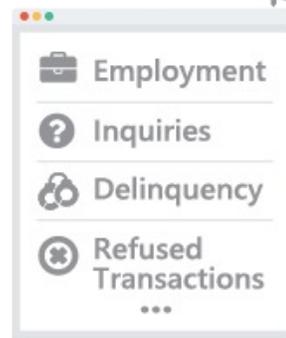
GOAL

Maximize Net Profit
after 2 years



THE PLAYER
(Lender)

DATA



DECISIONS

How many to accept?
Who to accept?
...

1 million potential borrowers



Retention: Advanced Level

Retention Scenario

Telecom company looking to retain customers

GOAL

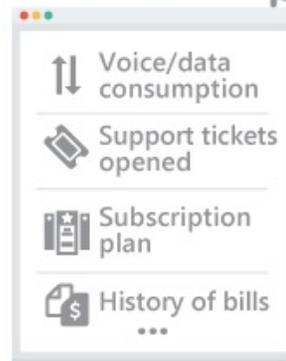
Maximize Net Profit after 2 years



THE PLAYER

Customer Relationship

DATA



DECISIONS



How many families and which ones to invite?

1 million existing subscribers



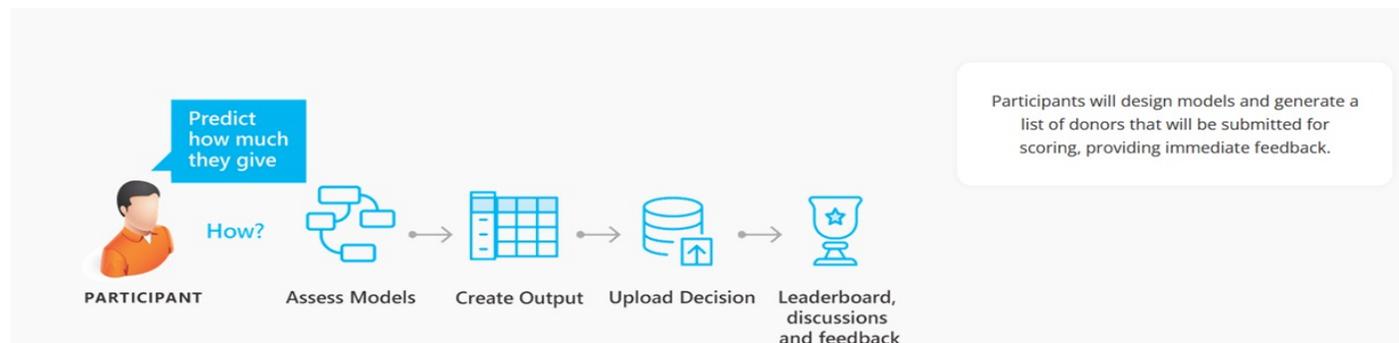
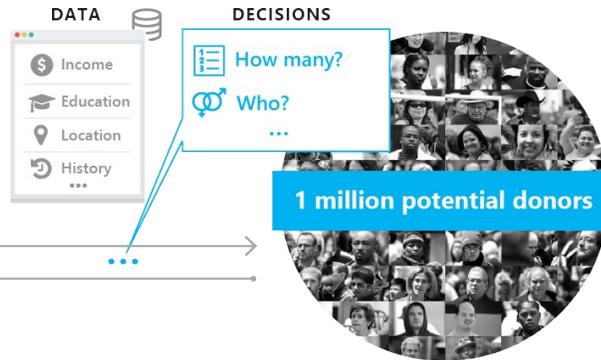
A Closer Look at the Fundraising Scenario

Fundraising: Turnkey Solution

Fundraising Scenario

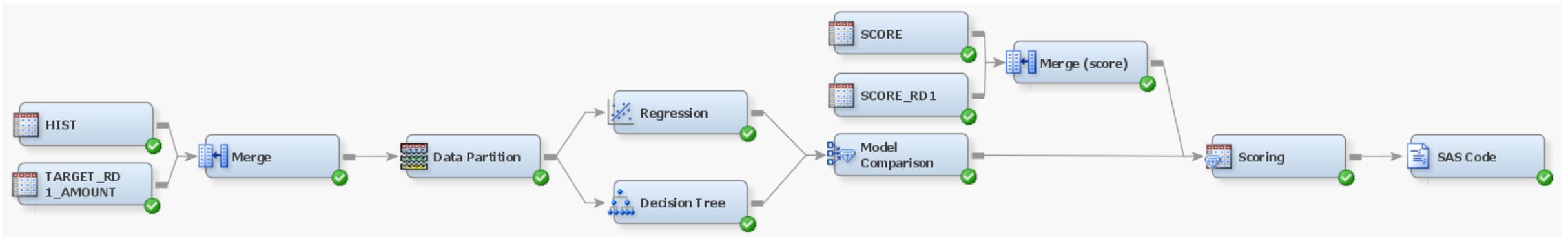
Foundation targeting potential donors

GOAL
Maximize the net raised funds



Variable Name	Description
ID	Member number (unique ID)
LastName	Last Name
FirstName	First Name
Woman	Sex (1=woman, 0=man)
Age	Age (years)
Salary	Annual salary in USD
Education	Highest education level
City	Type of neighborhood
SeniorList	Seniority for being on the VIP list
NbActivities	Number of participations to annual meeting
Referrals	Number of referrals
Recency	Number of years since last gift
Frequency	Number of donations
Seniority	Number of years since first donation
TotalGift	Total Donation since a member
MinGift	Minimum donation since a member
MaxGift	Maximum donation since on the VIP list
Contact	Direct sollicitation this year
GaveLastYear	Did the individual give last year
AmtLastYear	Amount given last year
GaveThisYear	Did the individual give this year
AmtThisYear	Amount given this year

Round 1 - SAS EM: Predict the amount given in the current year



Players Ranking | Uploads Ranking | My Uploads | Interim | "Real Life"

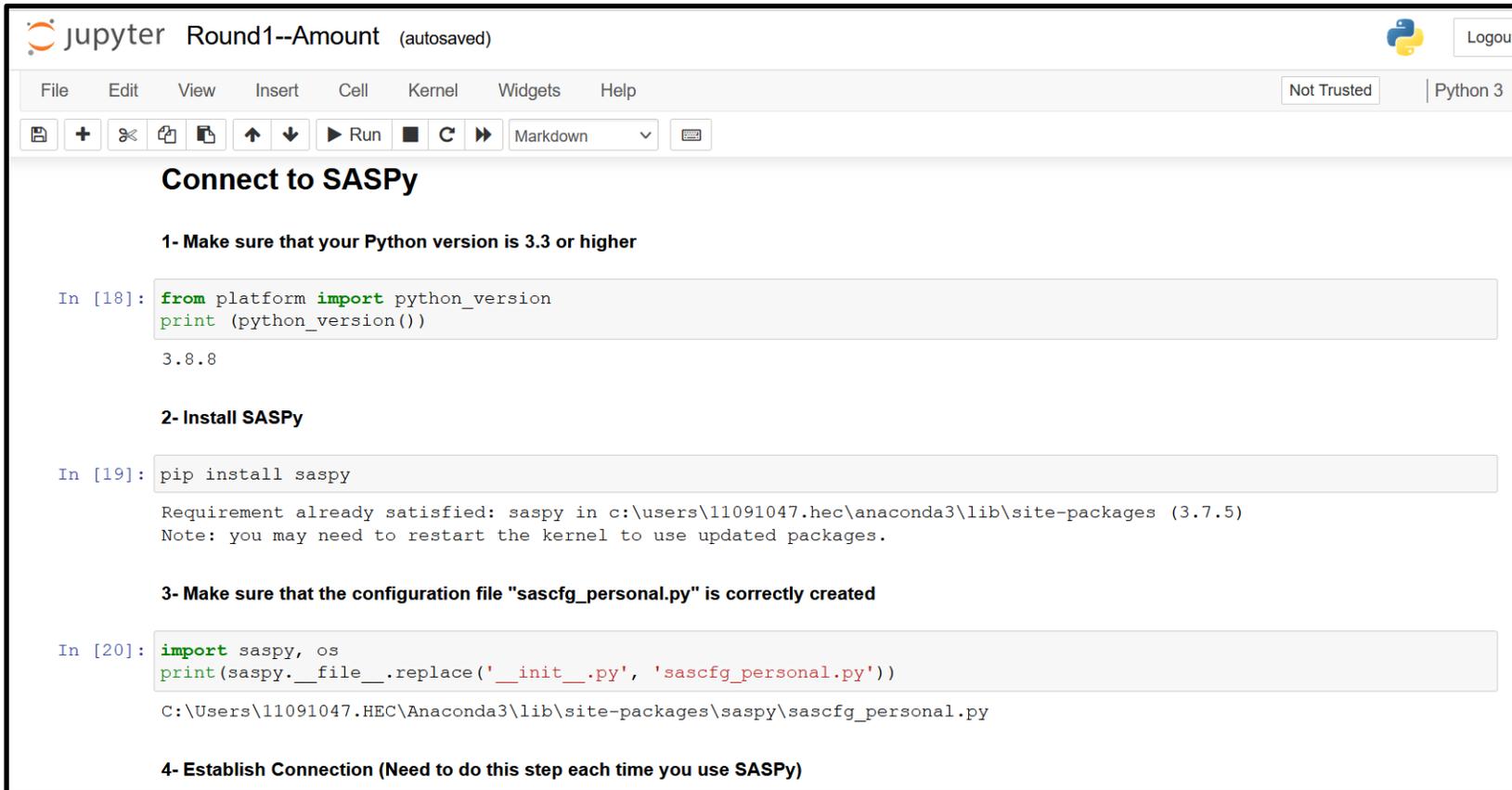
Rank	Player	Operating surplus	Expenses	Donors contacted	Method	Uploads #	Selected
	-- Baseline --	\$7,602,655.00	\$0.00	0	-- Baseline --	0	Selected

Round 1 - SAS Studio: Predict the amount given in the current year

The screenshot displays the SAS Studio interface. On the left, the 'Server Files and Folders' pane shows a tree view of the file system. The path is: odaws04-usw2 > Files (Home) > Cortex > my_shared_file_links > u39842936 > Cortex Code Files. The file 'Round1--Amount.sas' is highlighted with a red box. On the right, the 'CODE' pane shows the following SAS code:

```
1 *****  
2                                     Warning!  
3     Please note that you need to change the user ID (u58717790) to your own user ID!  
4     To do so, use CTRL+F, and find and replace all the instances of the user ID.  
5 *****  
6 *****  
7 *****  
8 * Create libraries  
9 =====;  
10 libname cortex '/home/u58717790/my_shared_file_links/u39842936/Cortex Data Sets';  
11 libname results '/home/u58717790/results';  
12 *****  
13 *****  
14 *****  
15 * Merge datasets 'hist' and 'target_rd1'  
16 =====;  
17 DATA model_rd1;  
18     MERGE cortex.hist cortex.target_rd1;  
19     BY ID;  
20 run;
```

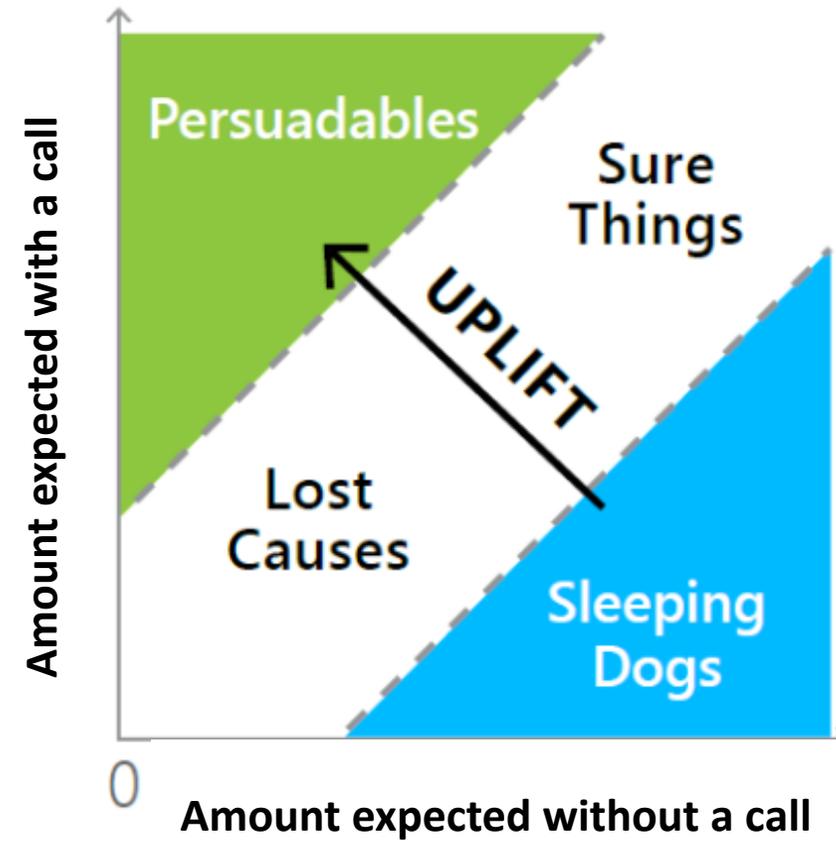
Round 1 - SAS Python: Predict the amount given in the current year



The screenshot shows a Jupyter Notebook titled "Round1--Amount (autosaved)". The interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help), a toolbar with icons for file operations and execution, and a status bar indicating "Not Trusted" and "Python 3". The notebook content is organized into four numbered steps:

- 1- Make sure that your Python version is 3.3 or higher**
Code: `from platform import python_version`
`print (python_version())`
Output: `3.8.8`
- 2- Install SASPy**
Code: `pip install saspy`
Output: `Requirement already satisfied: saspy in c:\users\11091047.hec\anaconda3\lib\site-packages (3.7.5)`
`Note: you may need to restart the kernel to use updated packages.`
- 3- Make sure that the configuration file "sascfg_personal.py" is correctly created**
Code: `import saspy, os`
`print(saspy.__file__.replace('__init__.py', 'sascfg_personal.py'))`
Output: `C:\Users\11091047.HEC\Anaconda3\lib\site-packages\saspy\sascfg_personal.py`
- 4- Establish Connection (Need to do this step each time you use SASPy)**

Fundraising Round 2



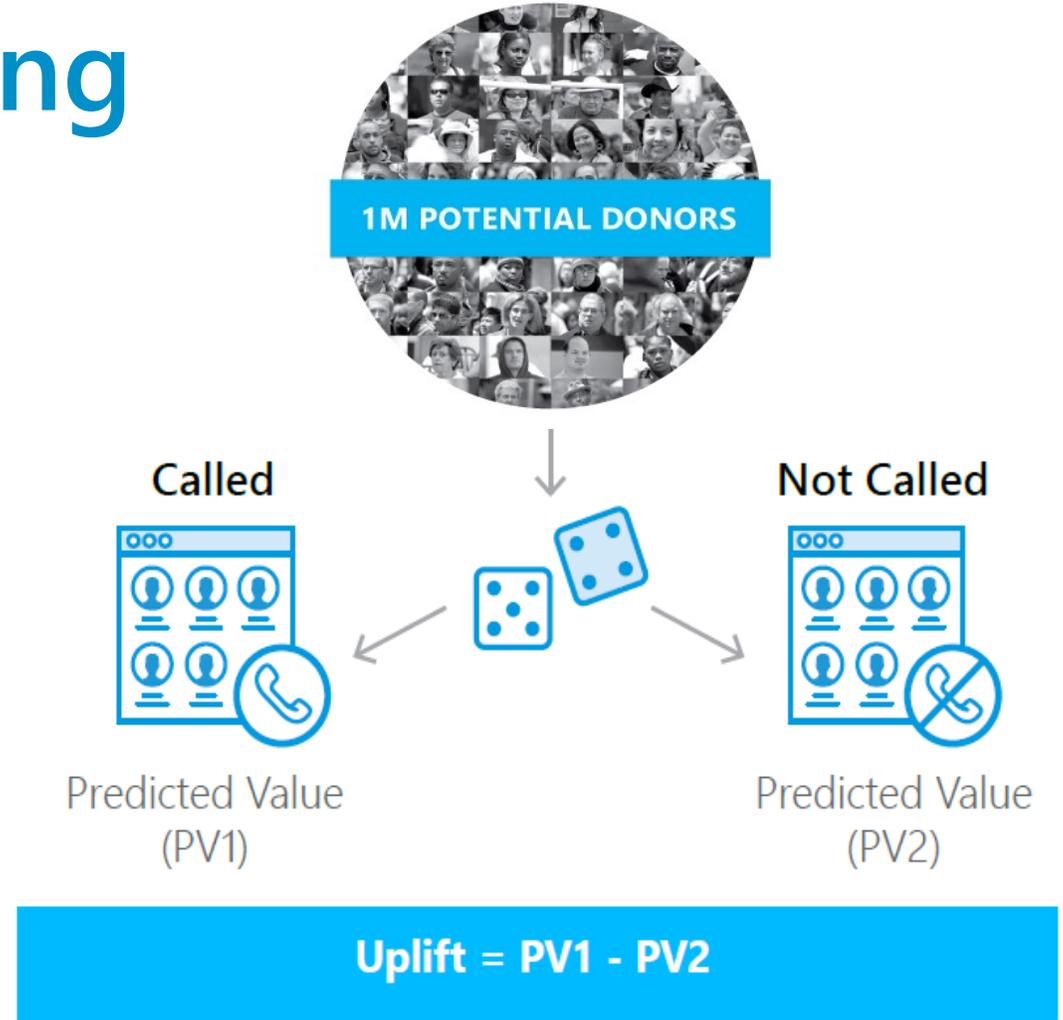
Task: Calculate the incremental value of a call

Round 2: Uplift modeling

There are many approaches to 2-stage modeling, but in most cases these steps are required:

- 1** Predict the value if a person receives a treatment (here called or contacted)
- 2** Predict the value if a person does not receive a treatment (here not called or not contacted)
- 3** Compute the difference between both (i.e. the uplift generated by the treatment or targeted action: here the call)

The Idea is to contact people who yield higher uplift (value) when called.



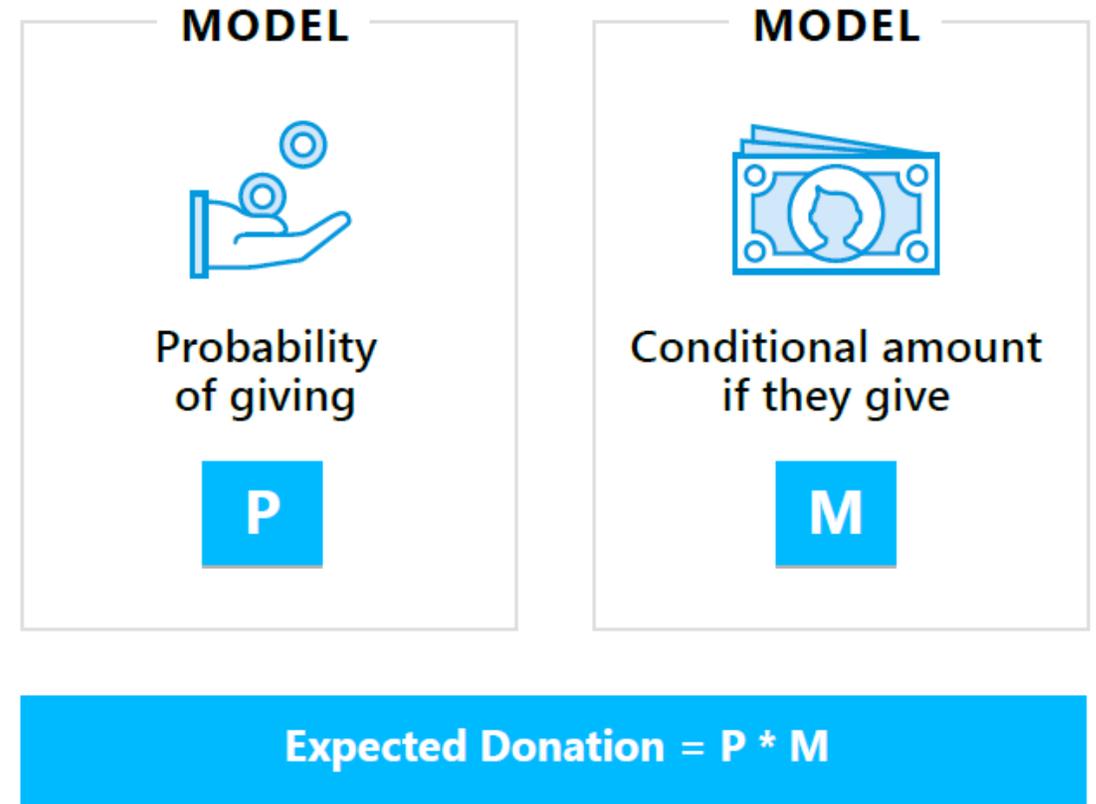
Task: Calculate the incremental value of a call

Round 2: Two-stage modeling

One way to improve your predictions is to adopt a two-stage modeling approach

To do so:

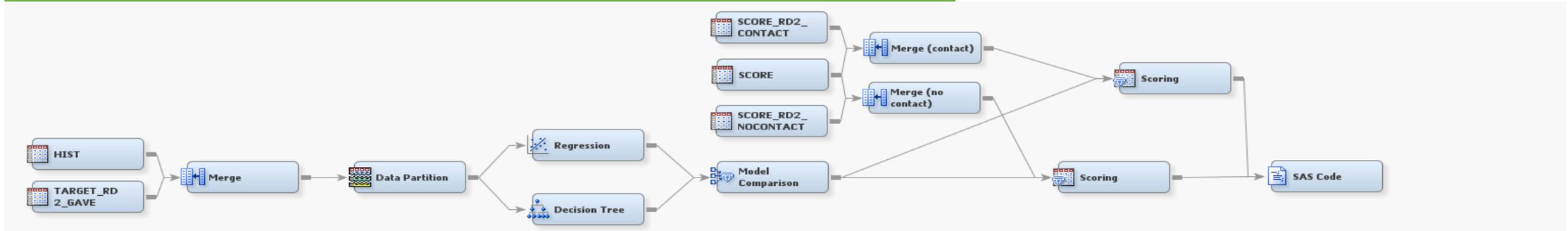
- 1** Fit a model to determine the probability **P** that an individual will give
- 2** Keeping only the data of those who gave, fit a model for **M** (the amount gave)
- 3** Use both models to make predictions on the population
- 4** Compute **P*M** to determine the 'expected donation' of each individual



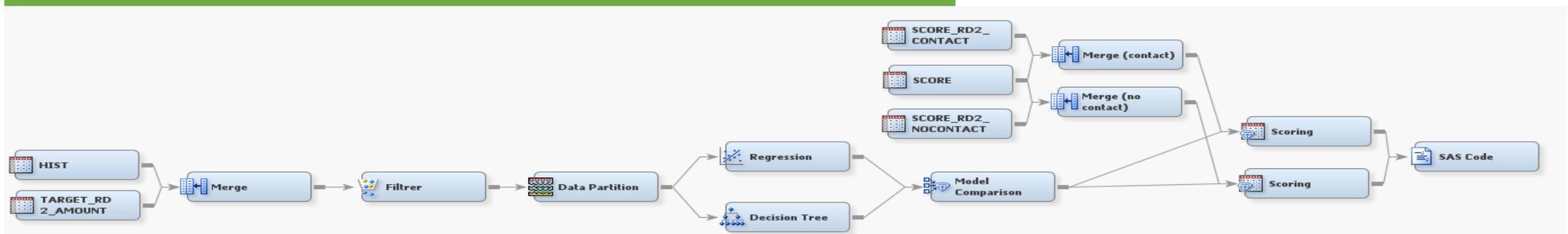
Tasks: Predict the Probability and Conditional Amount

Round 2: Uplift Modeling

Stage 1: predict the probability of giving



Stage 2: predict the conditional amount



Game Demonstration

How to get started with Cortex

Get Started with Cortex

Discover what Cortex has to offer, learn how to play the game, know how to manage the game for your students and get ideas on how to incorporate Cortex into your curriculum.

Register at
erpsim.hec.ca/cortex/training

Online Course

Complete the
Online Course
in self-study mode



Session with our team

Register for a
one-on-one session with our
team. We'll answer all your
questions!



Receive your instructor digital
badge and start using Cortex
right away!

Purchase Options

	Cortex using SAS [®] Enterprise Miner	Cortex Desktop	Cortex using SAS and Python
Game Materials and Leaderboard	✓	✓	✓
Available Scenarios	Fundraising, Credit Risk, Customer Retention	Fundraising, Credit Risk, Customer Retention	Fundraising
Software Access	20 hours of software in the cloud	Bring your own install of SAS Enterprise Miner	SAS OnDemand for Academics and Python
Price	\$100	\$50	\$35

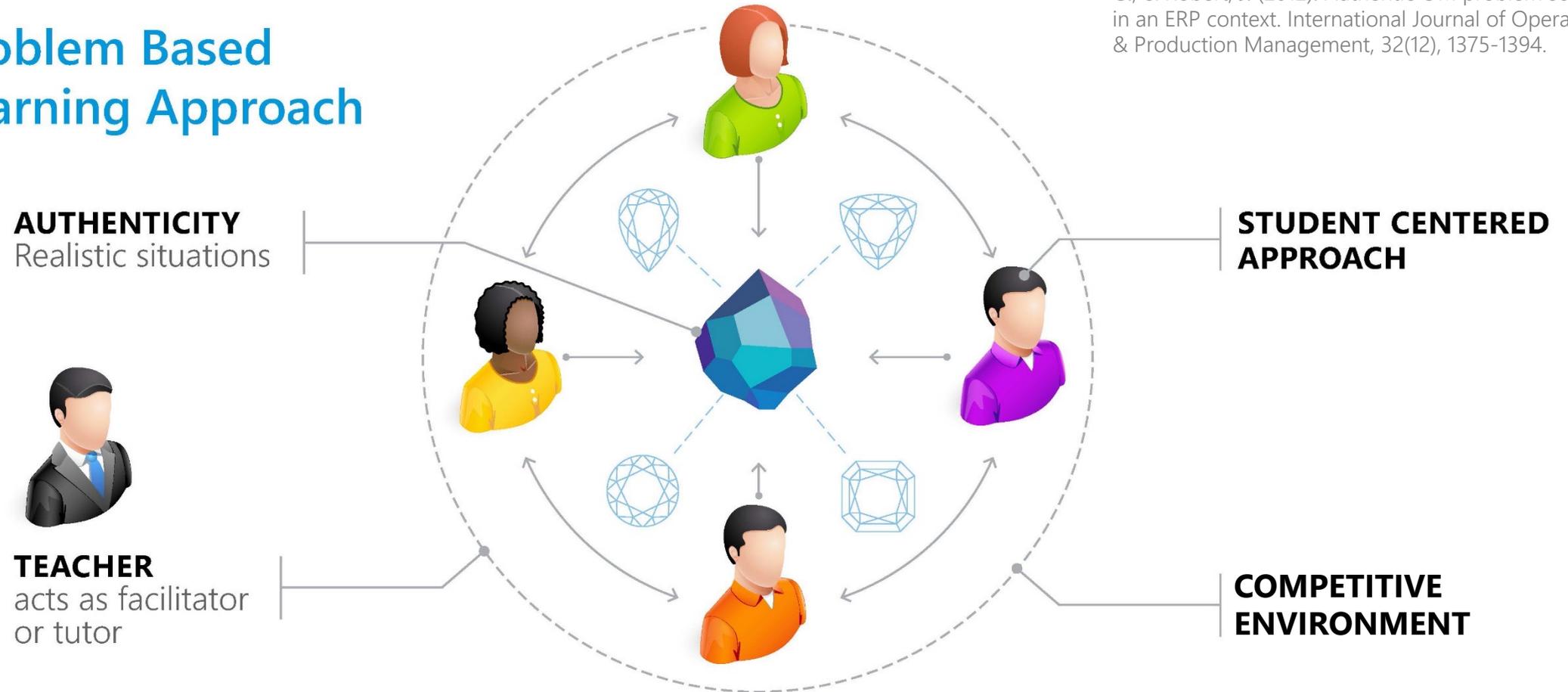
https://www.sas.com/en_us/learn/academic-programs/resources/cortex-analytics-simulation-game.html

Teaching with Cortex

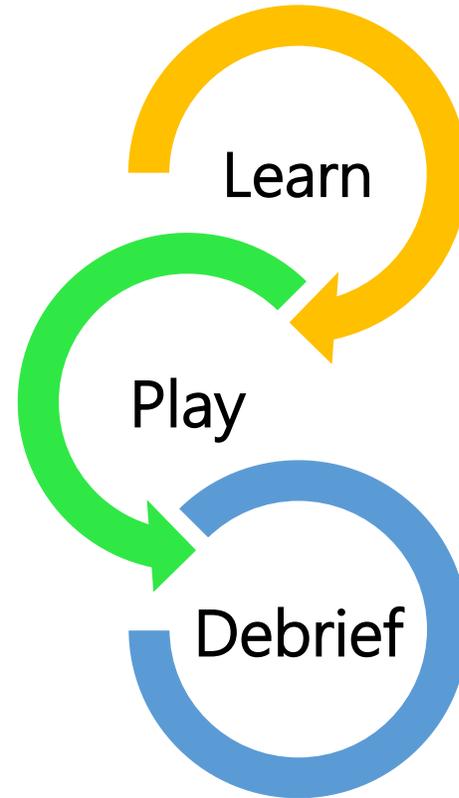
Active Learning

Problem Based Learning Approach

Léger, P. M., Cronan, P., Charland, P., Pellerin, R., Babin, G., & Robert, J. (2012). Authentic OM problem solving in an ERP context. *International Journal of Operations & Production Management*, 32(12), 1375-1394.



How to play the game?



Thank You!

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Email: cortex@hec.ca

Questions