

FINANCIAL BEHAVIOR AND THE INTERNET OF THINGS

Project Goals

- Identify Internet of Things (IoT) use cases for customized banking services
- Identify sources of IoT data, find methods to synthesize IoT unstructured data with existing structured databases

Resources Used

- TD Bank brand and product attributes
- Epsilon dataset

Major Challenge

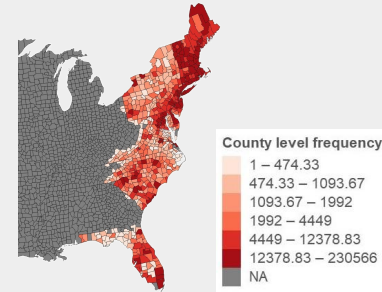
- Lack of relevant available IoT data

Market Research

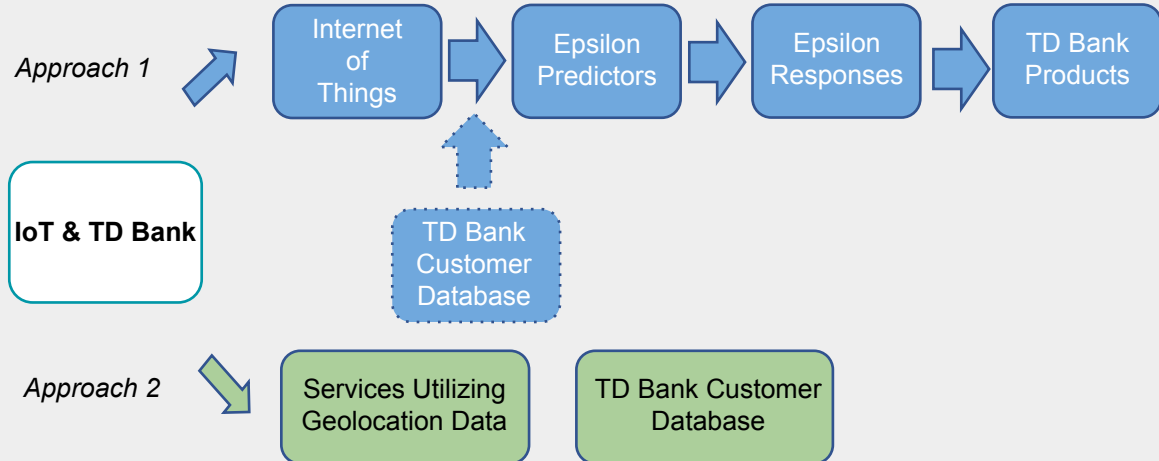
- Most IoT databases are privatized, but monetized IoT business solutions and platforms are available
- In personal finance and retail banking, IoT can be used to monitor usage of financial products, personalize customer experience, and enhance fraud prevention

Epsilon Dataset

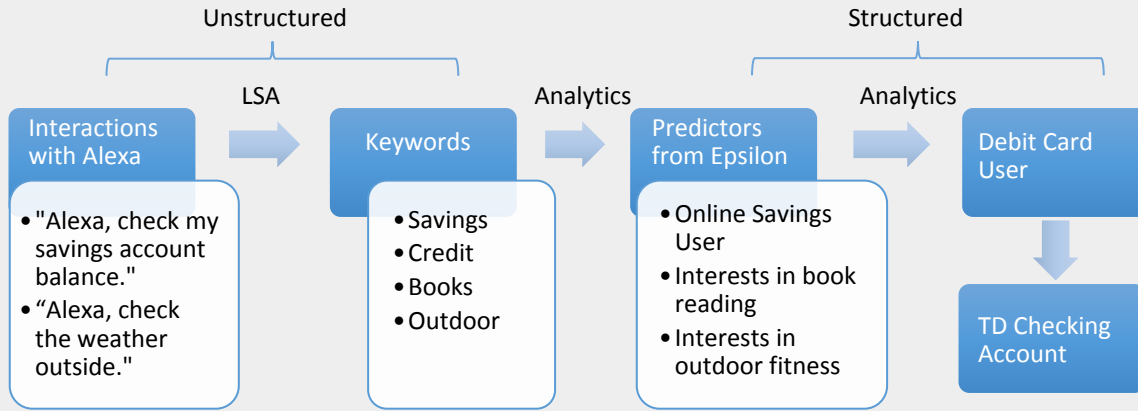
- 5 million households and 645 attributes on household demographics, interests, lifestyles, life events, consumer behavior
- 34% attributes have more than 80% missing values
- High marginal correlation among many variables



Project Framework



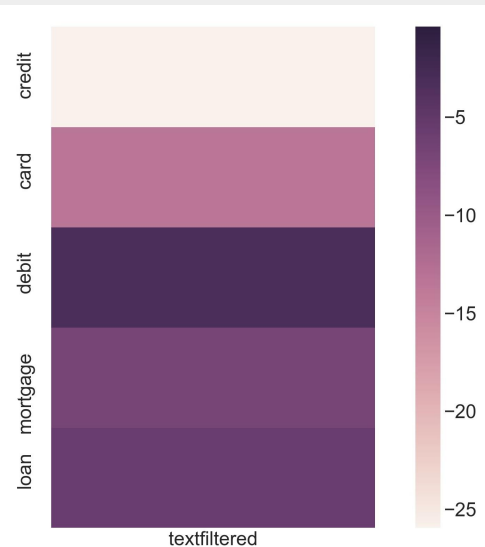
IoT Use Case: Amazon Alexa with Debit Card User Example



TD Product Response Selection

- Identify Epsilon variables relevant to major TD banking products (checking, savings, credit card, mortgage, home equity loan, unsecured loan)

Response Variable	TD Bank Product
<i>Debit Card User</i>	<i>Checking Account</i>
In the Market to Purchase a Home	Mortgage
Student Loan Customer	Unsecured Loan
Online Savings User	Savings Account



Connecting IoT to Epsilon Predictors

- Use term frequency (tf-idf) and latent semantic analysis on an Alexa user history to identify if a person is likely to have a certain lifestyle
- Substitute Alexa history for "Personal Finance for Dummies"
- "Credit" has a very high frequency and should pass a cut-off set to identify if the frequency is high enough to suggest something about the user
- Develop Alexa Skill for TD to deliver basic financial services and collect information on lifestyles and interests

Predictor Selection and Modeling

- Approach 1: use Bayesian Additive Regression Trees (BART) for variable selection and construct small models with predictors given
- Approach 2: conduct full regression and prediction with BART, evaluate predictions by household niche
- Sample response: Debit Card User

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[1] "MT...Online.Insurance.Buyer"
[2] "MT...Term.Life"
[3] "Credit.Card...Any.Credit.Card_Y"
[4] "MT...Insurance.Switcher"
[5] "MT...Quantum.Upgrade.Customers"
[6] "MT...Credit.Card.Revolvers"
[7] "Advantage.Length.of.Residence"
[8] "MT...Plan.to.Purchase.Home.Security.Systems"
[9] "Books...Books.Reading_Y"
[10] "Books...Books.Reading_N"
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