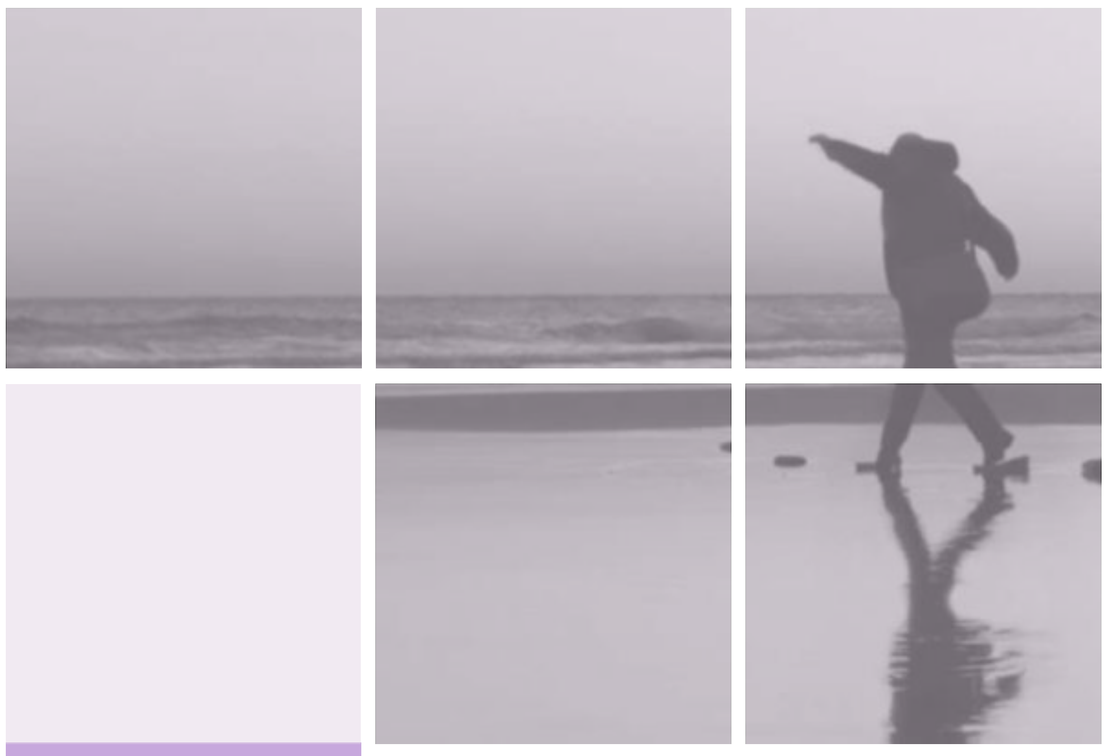

# Natural Language Processing for Customer Experience Evaluation

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accenture

## PROJECT OVERVIEW

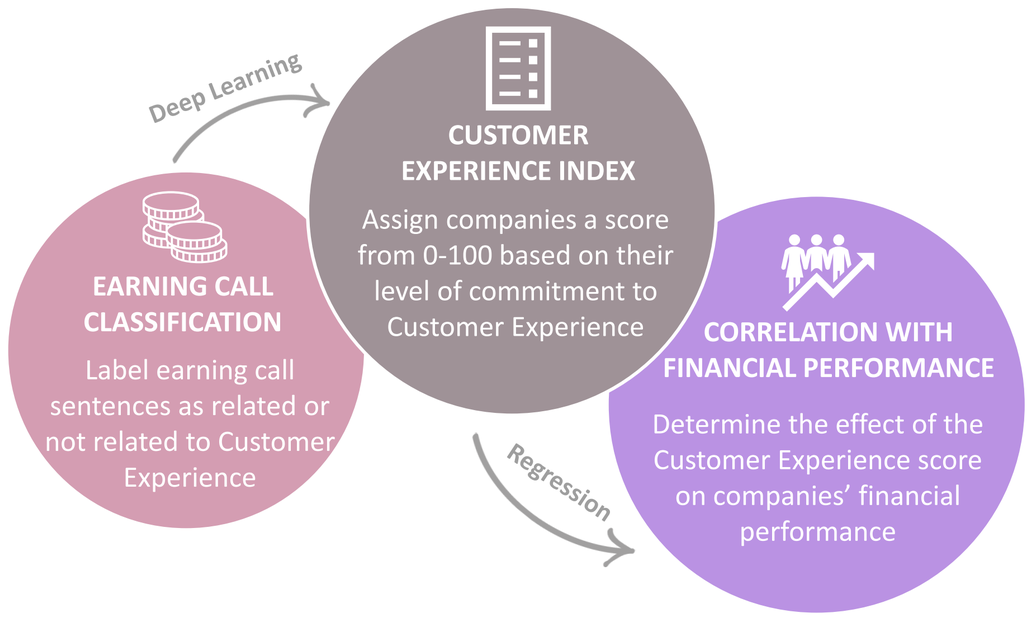
### PROBLEM STATEMENT

CEOs all over the globe and across industries are recognizing the need to generate value in a multidimensional way. Existing business metrics for success focus primarily on revenue and shareholder returns, which do not offer a view into how business can create value for all stakeholders. In view of these trends, we aimed to develop a new metric measuring Customer Experience to help businesses deliver value for all stakeholders.

### GOALS

1. Develop an NLP algorithm that counts the number of Customer Experience related sentences in earning calls
2. Define normalization method that defines companies' Customer Experience Index over time
3. Develop an analytical approach that links the Customer Experience score to companies' financial performance

### DATA WORKFLOW




## DATASET

### INPUTS

**Scope of Text Data**

- **G2000+ COMPANIES** — Largest 2000+ companies in the world
- **EARNING CALLS** — Presentations and Q&A responses
- **TIME PERIOD** — 2015-2021
- **INDUSTRIES** — 15+ industries
- **DATA SIZE** — 1M+ earning calls; 17M+ sentences; Imbalance: <1% related to Customer Experience

### WHY CUSTOMER EXPERIENCE?

Customer experience is an important aspect of company success, effecting market share, growth, and reputation. It is also very difficult to track, as customer preferences are constantly changing over time. The Customer Experience dimension was chosen due to its critical role in company success as well as modelling challenges.

### DEVELOPMENT

To develop an effective and optimized deep learning model, we needed a labelled dataset. Manually creating a labelled dataset would requires over 45 days of work for one person. To save time, we automated the process using the following steps:

**SME SENTENCES**
Obtain manually labelled sentences from subject matter experts related to Customer Experience
**36 sentences**

**EARNING CALLS**
Use cosine similarity to systematically identify and extract new sentences that are >80% similar to those given by subject matter experts. These sentences will be used as inputs for the next step
**~1440 sentences**

**AUGMENT SENTENCES**
Use Hugging Face and NLPAug to increase the number of sentences through:

- **Back translation –** Translating sentences from English to a foreign language, then back to English. This step creates 2 additional sentences
- **Synonym replacement -** Randomly selecting words in a sentences and replacing them with synonyms. This step creates 3 additional sentences

Using augmentation, every input sentence generated 5 new ones
**~7094 sentences**

## MODELLING

### EARNING CALL CLASSIFICATION
### DEEP LEARNING

Deep learning models provide better level of precision and can support business stakeholders by delivering more accurate data-driven insights. As a result, we developed a FLAIR deep learning classifier to guarantee the proper optimization, achieved through these steps:

**01 Embedding**
Use the LSTM document embedding model from the Flair deep learning framework, which combines contextual and non-contextual embedding

**02 Dataset**
1) Down-sample the negative class sentences to counter the imbalance between the negative and positive class sentences

2) Use stratified sampling to make sure the balance between positive and negative class is maintained in the training, validation and test data

**03 Deep Learning Classifier**
Build the customer experience classifier using the Flair deep learning framework with hyperparameter tuning

**04 Application**
Classify on G2000+ company transcripts in all industries ranging from 2015 to 2021

**Model Accuracy: 99.62%**

### CUSTOMER EXPERIENCE INDEX

**Sentence Classification**
Use the deep learning classifier to classify ~17M transcript sentences of the G2000 companies

**Customer Experience Score**
Based on the number of customer experience sentences per document per company, use min-max standardization to get the customer experience score for each company

### ECONOMIC IMPACT
### LINEAR REGRESSION MODEL

**CX Index**

Based on the number of customer experience sentences per document per company, we standardized to get the customer experience score for each company, ranging from 0-100

**Influence on Financial Performance**

$$Performance\ Metrics = \beta_0 + \beta_1 * (\boldsymbol{CX\ Index}) + \beta_2 * (Controls) + \varepsilon$$

The Customer Experience Index is used as an input for the financial performance metric model, which allows comparison between industry peers and quantify the economic value of Customer Experience. This is critical for executives to drive strategic business insights, as a numeric score allows them to identify where their organization needs improvement in the dimension of Customer Experience.

*Index Creation*

**Why are we creating it?**

Help CEOs understand how well their organization is leveraging Customer Experience for further growth

## IMPACT

Our approach suggests a novel way of viewing and measuring company success through the lens of Customer Experience. Using Natural Language Processing, we have created a metric which was previously unquantified and have created a strong foundation for future work on the topic. This project ultimately supports Accenture's efforts through 3 main aspects:

### NEW PROCESS

Creating a new project that can be repurposed for other (aspects of the work beyond CX) dimensions

### DNA

Foundational model for further development and adoption for other metrics as well as future use with clients

### SUPPORTING CHANGE

Supporting critical broader effort to anticipate and manage change across industries