Problem Statement
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Description of Dataset
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Proposed Model
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Results and Discussion
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Sentiment Analysis on Yelp Reviews

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Technical Development in NLP

- Traditional NLP systems
  - Input and output text length
  - Nuanced content understanding
- Transformer based models
  - More token length
  - enhanced understanding capability

Need for Granularity in Sentiment Classification

The conventional approach of categorizing sentiments into simple binaries of positive and negative **fails to capture the full spectrum of human emotions**.

Project Goal

Elevate both technical and granularity-based tools to enhance today's data-driven
market landscapes' relevance and utility.

Benefit and Challenge

- **Benefit**: allows for a more granular understanding.
- **Challenge**: Training models is inherently more complex.

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Dataset Overview

- **Composition**:
    - **Training Samples**: 650,000 reviews
    - **Testing Samples**: 50,000 reviews
- **Label**: from 1 to 5, where 1 represents the most negative and 5 the most positive sentiment.

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RoBERTa Model

- A robust enhancement over the original BERT architecture.
- Excludes the Next Sentence Prediction (NSP).

Our optimization

- Fine-tune RoBERTa for sentiment analysis.
- Larger mini-batches and higher learning rates than BERT.
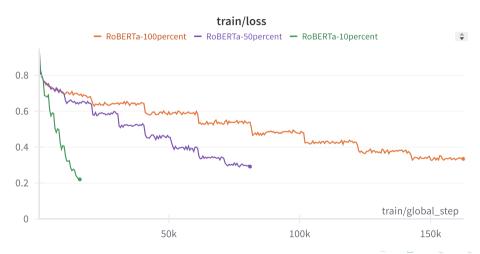- More iterations and more extensive data sets.

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Results

Model	Accuracy	Precision	Recall	F1-score
Base Model	<u>17.80%</u>	<u>21.71%</u>	<u>49.72%</u>	<u>30.22%</u>
1% dataset	65.00%	90.03%	70.04%	78.79%
10% dataset	71.20%	90.82%	76.72%	83.18%
50% dataset	73.00%	**92.17%**	77.83%	84.39%
100% dataset	**75.40%**	91.73%	**80.90%**	**85.97%**

Table 1: Finetuned models (with 1%, 10%, 50%, and 100% of the dataset to train) testing results compared with the base model. Highest bolded, lowest underlined.

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Discussion: Training Loss over Training Steps

train/loss

RoBERTa-100percent — RoBERTa-50percent — RoBERTa-10percent