

# Multimodal Sentiment Analysis Using Multiple Labels from Different Modalities

CHEN YUJUN

## Abstract

With the extensive amount of social media data in different modalities, particularly text and images, unimodal sentiment analysis that uses only text modality is not sufficient to determine sentiment polarity. Although multiple modalities are unitedly considered in multimodal sentiment analysis by combining features from such modalities, a unified multimodal label is merely adopted. Moreover, a unimodal label for each modality has not been fully explored in the multimodal sentiment analysis. In this work, we propose a method for multimodal sentiment analysis that employs multiple labels, including multimodal labels and individual unimodal labels, from different modalities. Concretely, we construct multimodal modules to manipulate multimodal features jointly, and unimodal modules to handle unimodal labels independently. We conduct experiments on two publicly available multimodal datasets, MVSA-Single and MVSA-Multiple, as well as compare with existing methods to verify the effectiveness of our method on a fair evaluation scheme.

**Keywords**— Multimodal Sentiment Analysis, Intra-modal Sentiment Analysis, Inter-modal Sentiment Analysis, Representation Learning, Natural Language Processing

# Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Related Work</b>	<b>5</b>
2.1	Multimodal Sentiment Analysis . . . . .	5
2.2	Pre-trained Models for Multimodal Sentiment Analysis . . . . .	5
2.2.1	BERT and RoBERTa . . . . .	5
2.2.2	CLIP . . . . .	6
2.3	Modal Fusion . . . . .	6
<b>3</b>	<b>Methodology</b>	<b>7</b>
3.1	Modal Feature Extraction . . . . .	7
3.1.1	Image- and Text Features Extraction . . . . .	8
3.1.2	Multimodal Feature Extraction . . . . .	8
3.2	Multi-task Learning . . . . .	8
3.2.1	Multimodal Classification Task . . . . .	8
3.2.2	Unimodal Classification Task . . . . .	9
3.3	Loss function . . . . .	9
<b>4</b>	<b>Experiments</b>	<b>10</b>
4.1	Dataset . . . . .	10
4.2	Evaluation metrics . . . . .	10
4.3	Training Details . . . . .	11
<b>5</b>	<b>Results</b>	<b>12</b>
5.1	Comparison of Parameters . . . . .	12
5.2	Comparison of Models . . . . .	12
5.3	Effects of Weight Adjustment . . . . .	14
<b>6</b>	<b>Conclusion</b>	<b>15</b>
	<b>References</b>	<b>16</b>