

# CS550/DSL501: Machine Learning (2024–25–M)

## Statement of Purpose Strikers

Akshat Kumar	12240080
Anand Vardhan	12240140
Aditya Prakash	12240040
Shashank Pant	12241700

## 1 Problem Statement

### Problem Overview

This project aims to develop a machine learning model, referred to as **CauESC** (Causal Aware Model for Emotional Support Conversation), which enhances conversations with emotional support by recognizing emotional causes and effects. This model seeks to improve the responses generated in dialogue systems for emotional support.

## 2 Motivation

### Motivation for the Project

Emotional support conversation models that already exist encounter two major issues:

- They ignore the emotional causes behind the seeker's distress, which is very important for a detailed analysis of the person's emotional state.
- They emphasize only the seeker's mental state without considering the emotional dynamics(changes in mental state with every message) between the seeker and the support giver.

### 3 Objectives

#### Project Objectives

The primary objectives of our project are:

1. Introduce the CauESC model, which looks into the internal effects and causes of emotions in psychological dialogues.
2. Develop an attention mechanism that mimics human thought processes to analyze the consequences of emotional causes.
3. Propose a separate, well-rounded approach to comprehending and formulating multiple-strategy solutions.
4. Achieve state-of-the-art strategy selection and response generation performance based on the ESConv dataset.

### 4 Relevant Study

#### Relevant Findings

Key findings and studies influencing the CauESC model:

- The model incorporates an emotion cause detector and attention mechanism to focus on distress causes.
- To comprehend and relate the intra- and inter-effects brought on by emotional reasons, it uses COMET (Bosselut et al., 2019).
- The model employs a novel decoder design that strikes a compromise between integrating strategies and independent strategy comprehension.

### 5 Proposed Solution

#### Solution Proposal: CauESC Model

The CauESC model comprises three main components:

1. **Cause Aware Encoder:** Recognizes the emotional causes and captures the emotional effects/dynamics.
2. **Causal Interaction Module:** Develops fine-grained emotion understanding by reasoning through cause-effect dynamics.
3. **Independent-Integrated Strategy Executors:** Balances the independent and integrated strategies for cause-to-effect guided response generation.

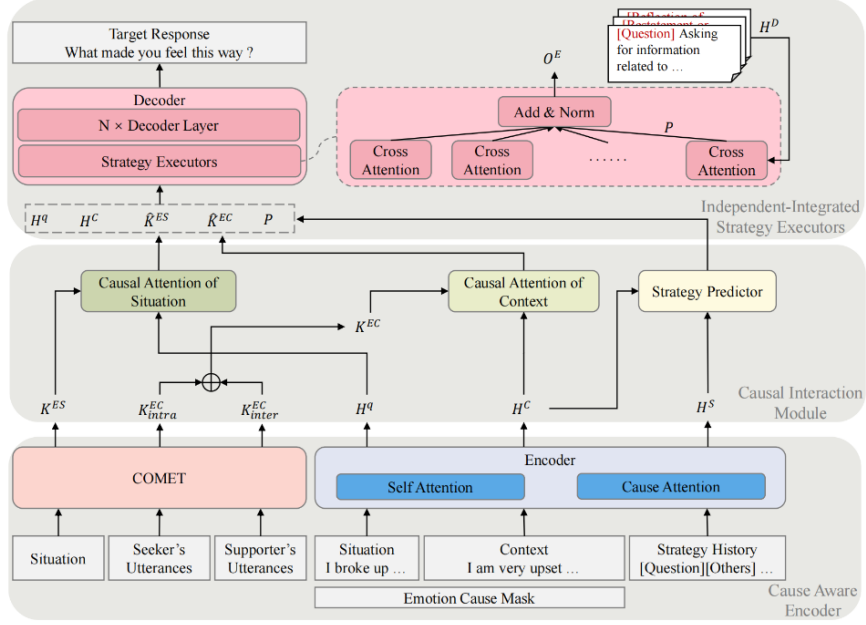


Figure 1: The architecture of the proposed CauESC model, which consists of a Cause Aware Encoder, a Causal Interaction Module, and Independent-Integrated Strategy Executors. The gray dotted lines indicate the details of the corresponding modules.

## References

### Links

<https://arxiv.org/pdf/2401.17755>

### GitHub Repository Link