# To Improve Is to Change: Towards Improving Mood Prediction by Learning Changes in Emotion

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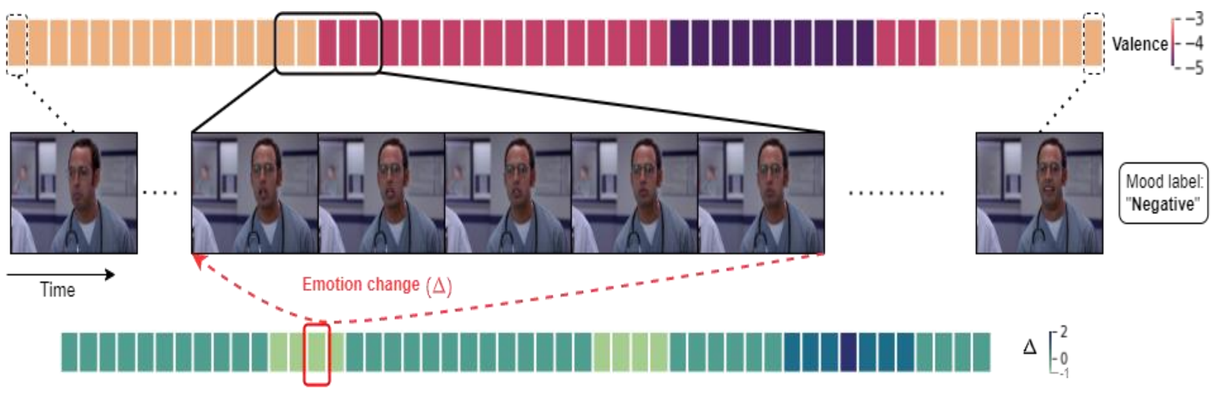
## MOTIVATION

- The terms *mood* and *emotion* are distinguished based on their duration, intensity and attribution.
- To date, hardly any computational models have (a) examined mood recognition, and (b) modelled the interplay between mood and emotional state in their analysis.
- We propose a framework that utilises both dominant emotion (or *mood*) labels, and emotional change labels (Δ labels) to examine mood.

## INTRODUCTION

- ***Emotion***: short-term affective state
- ***Mood:*** longer-term affective.
- Research focus in affective computing: inferring emotional states.
- Examining mood prediction and the interplay between mood and emotion is neglected.
- We use the AFEW-VA dataset to derive:
  - *dominant emotion labels:* emotion persisting for most consecutive frames (termed *mood* labels)
  - *delta* or emotion change labels: change in emotion over a fixed window size.



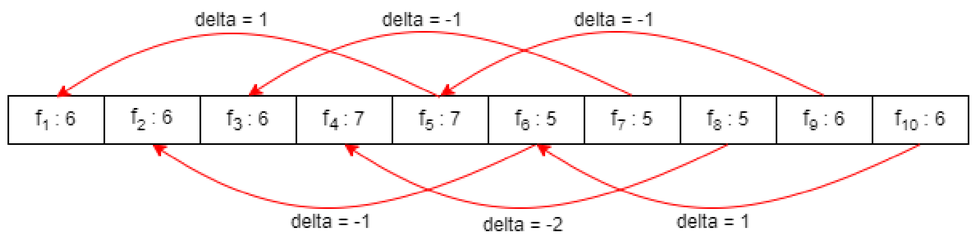

Emotion changes in an input video sample having a negative mood label. The top colour bar denotes per-frame valence values for the video, while the bottom colour bar depicts emotional valence change (Δ) labels over a window of five frames.

## CONTRIBUTION

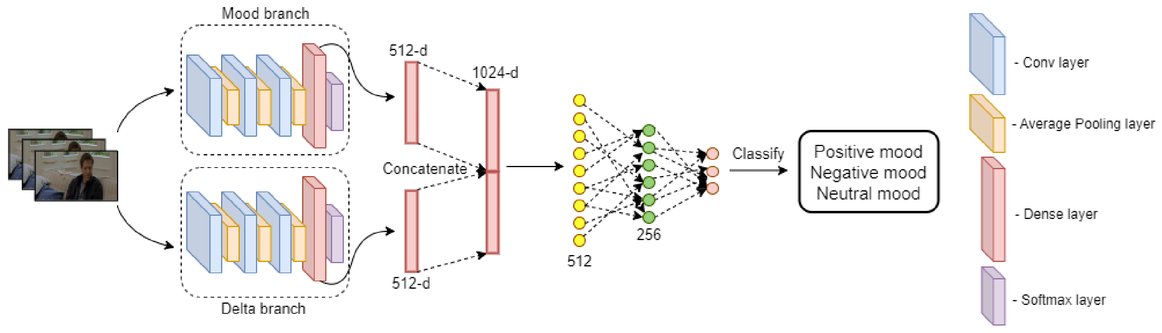
- Examining mood prediction from a computational perspective, incorporating both mood and emotional information.
- Incorporating emotional change information is beneficial and can produce a significant improvement in mood prediction performance.

## METHODS

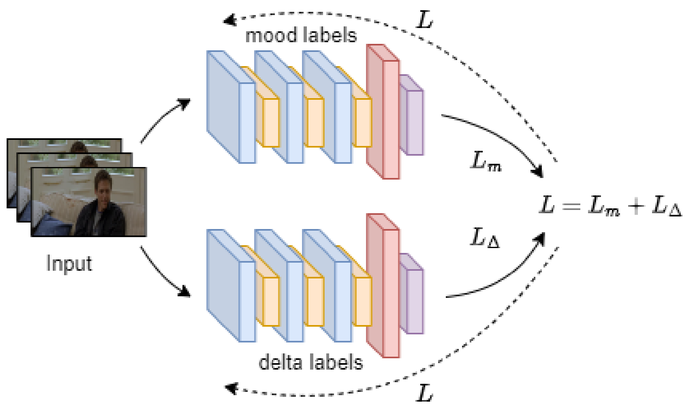
- Dataset used: AFEW-VA
- Dominant emotion labels and Δ labels: Positive (+1), Neutral (0), Negative (-1)



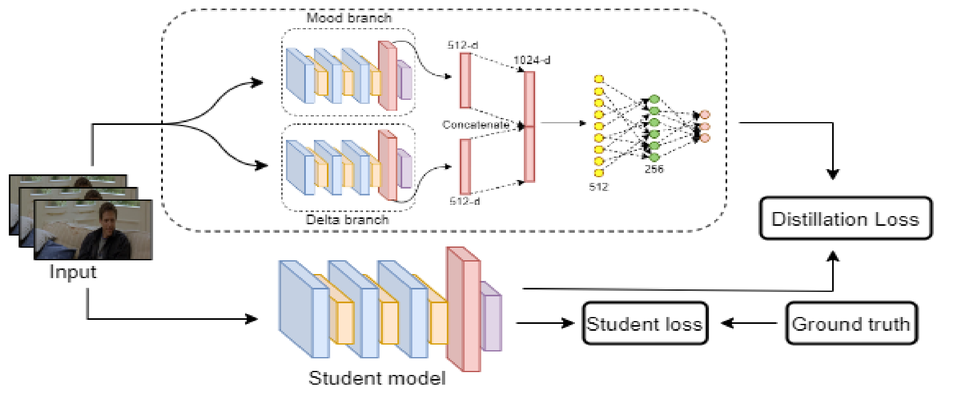

Computation of Δ labels




2-CNN+MLP (Multimodal)

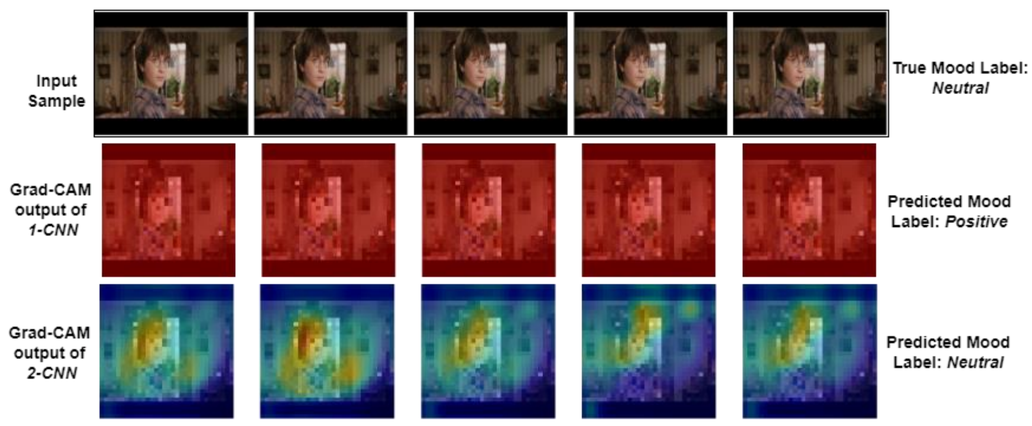



2-CNN (Multimodal)




Teacher-Student Network

| Model | 1-CNN | | 2-CNN | 2-CNN + MLP | TS-Network | |
|---|---|---|---|---|---|---|
| Label | Mood | Delta | Mood | Mood | Mood (student without teacher) | Mood (student with teacher) |
| Accuracy ($\mu \pm \sigma$) | 0.35 ± 0.10 | 0.53 ± 0.11 | 0.73 ± 0.06 | 0.87 ± 0.15 | 0.35 ± 0.10 | **0.89 ± 0.09** |




GradCAM maps depicting improved mood prediction when Δ is learnt by focusing on relevant face parts.

## CONCLUSION

- We explore the potential of temporal emotion change for mood prediction.
- The experimental results demonstrate that learning the emotion change greatly improves mood prediction.

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