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Speech Emotion Recognition Applied to Real-World Medical Consultation

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Introduction

- A **satisfying cognitive interaction** led to increased physician trust and expertise perception.
- Surgeons who have been sued are judged more **dominant and less concerned** in their **voice**.(non-verbal)
- Masks cover **emotional transmission**.

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Introduction

- What is **"Emotions"?**

Valence

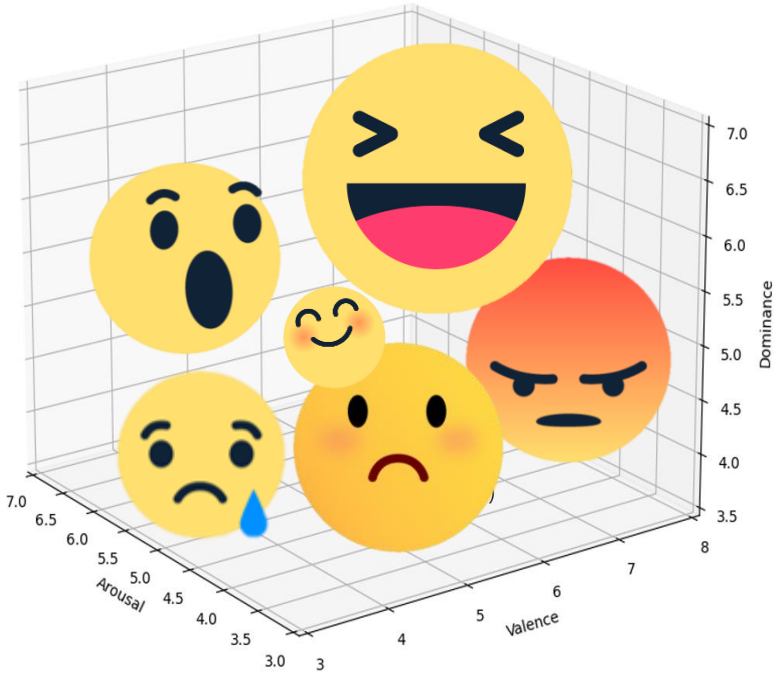
Negative ⟷ Positive

Arousal

Calm ⟷ Excited

Dominance

Low ⟷ High



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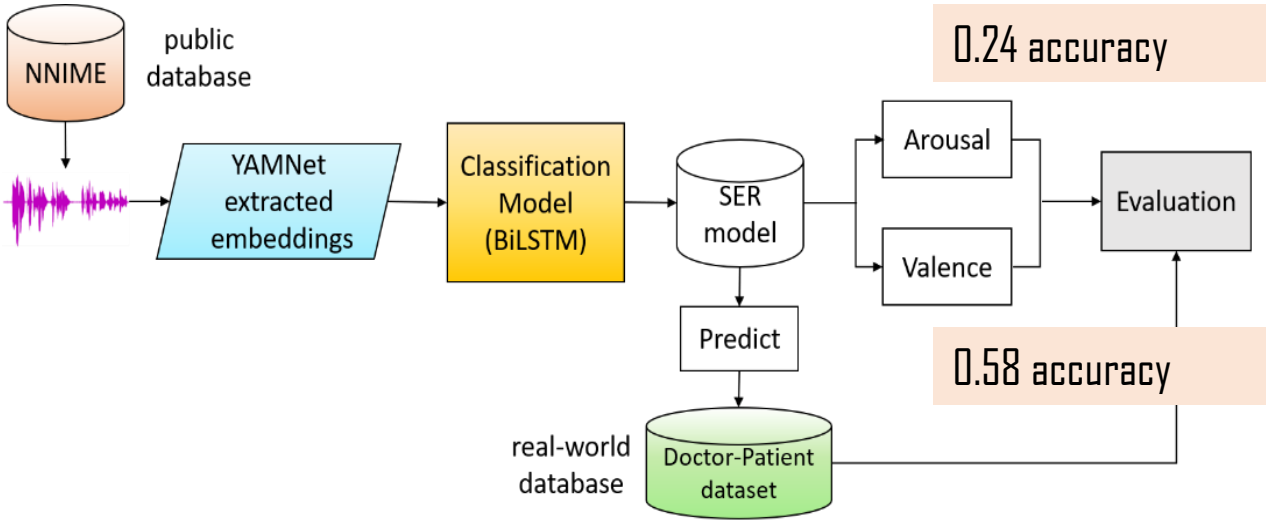
Study Objectives

- a **deep learning** model specialized in **doctor-patient communication**
- Education in **medical simulation**

Acting dataset→Real clinical recordings



Doctor-Patient interaction Corpus

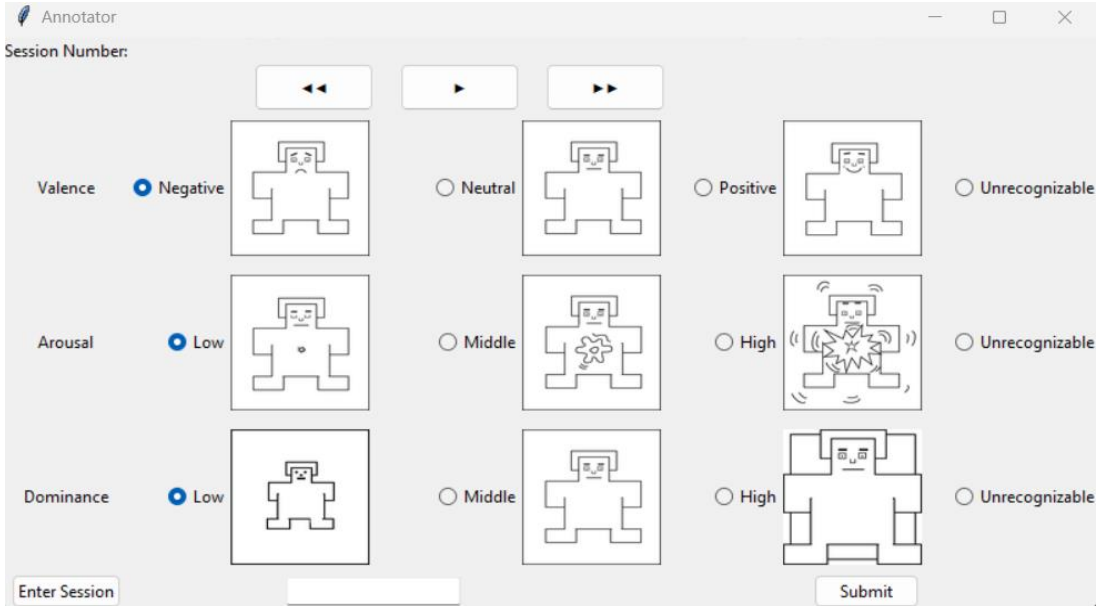
- Dermatology clinic room
- **4 doctors**(2 females, 2 males)
- **304 conversations** (different patients)
- 11,264 segments
- Average 4.67 s

(the Doctor's speech)

(the Patient's speech)

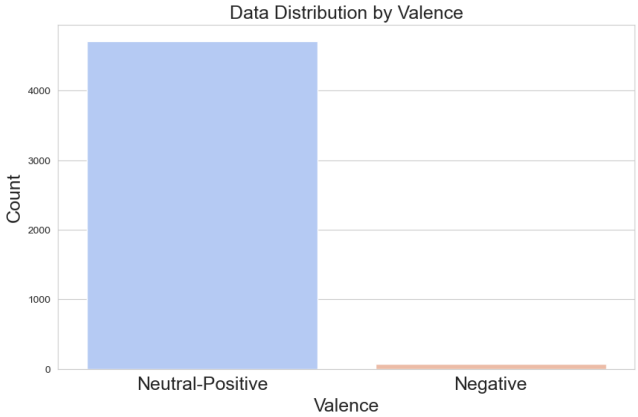
Doctor-Patient interaction Corpus

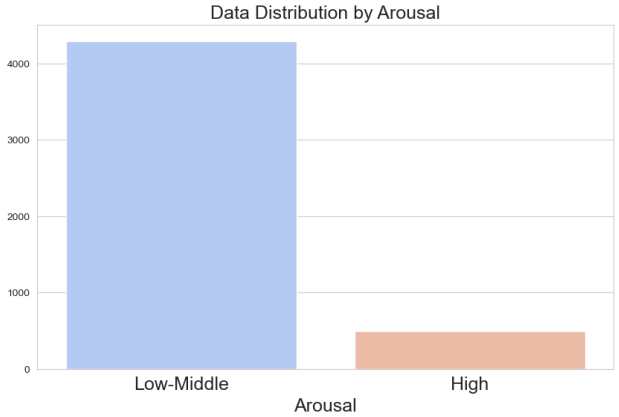
- 3 categories
- 304 sessions
- 3 annotators

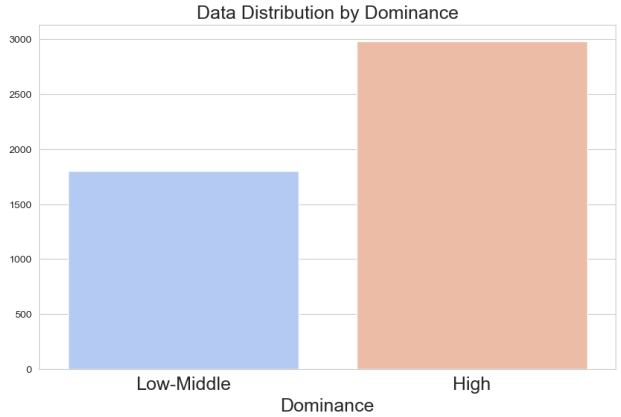


Doctor-Patient interaction Corpus

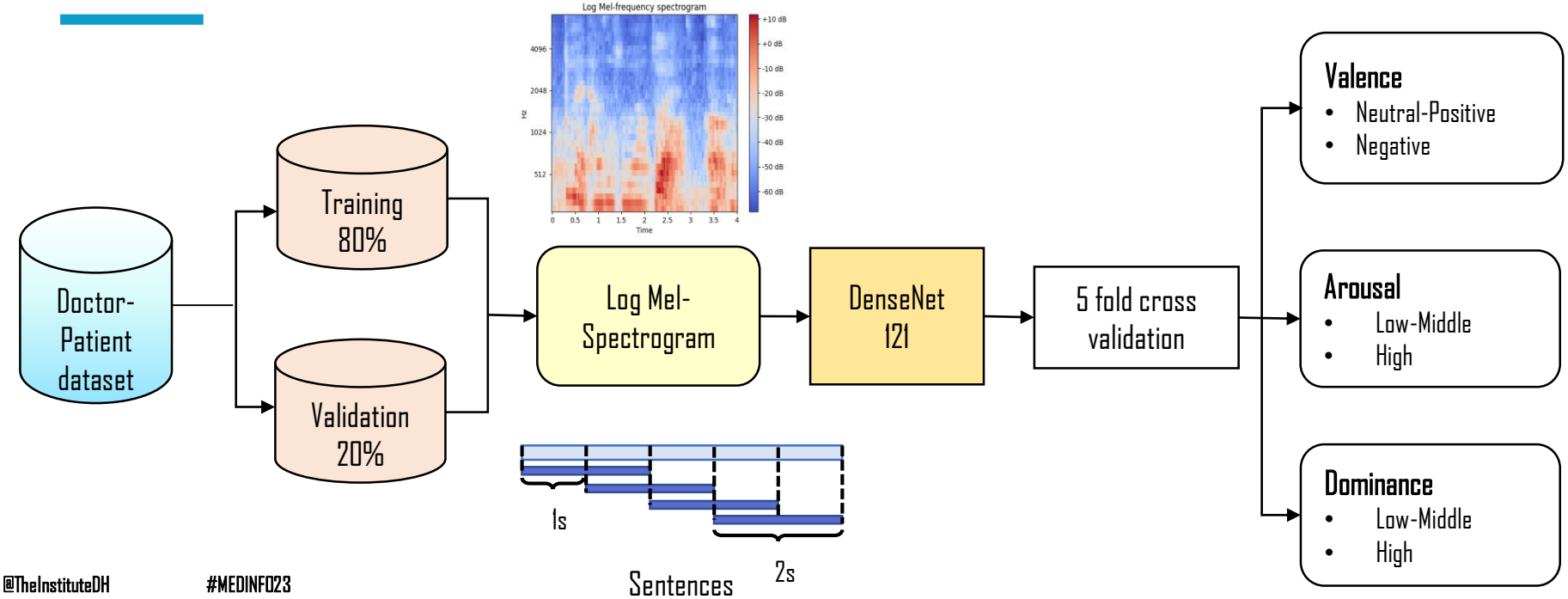
- Data Imbalance problem
- 3-class⟶2-class







Doctor-Patient emotion prediction



Speech emotion prediction - DenseNet121

Model	Duration	Validation AUROC
Valence	4s	0.76
	5s	0.73
	6s	0.82
Arousal	4s	0.81
	5s	0.80
	6s	0.81

Model	Duration	Validation AUROC
Dominance	4s	0.75
	5s	0.77
	6s	0.77

Speech emotion prediction – Testing 5281 segments

Model	Accuracy	Testing AUROC	Sensitivity	Specificity	Precision	Recall
Valence	0.54	0.51	0.55	0.54	0.01	0.55
Arousal	0.68	0.84	0.85	0.67	0.18	0.85
Dominance	0.69	0.76	0.69	0.69	0.77	0.69

*At the optimal threshold

Discussion

- Human annotation cannot be completely separated from semantics
- Predicted length of time
- Obvious emotions are scarce
- Speaker diversity and multilanguage

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