Huang-Cheng Chou

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SUMMARY

Research interest: speech emotion recognition, multimodal deception detection

EDUCATION

- **The University of Texas at Dallas (UTD)** Texas, USA
  Visiting Scholar in the Electrical and Computer Engineering Department *Mar. 2021 – anticipated in August 2022*
  Advisor: Prof. Carlos Busso, Multimodal Signal Processing Laboratory (MSP lab)
  Research Area: model subjectivity and ambiguity of emotional annotations in speech emotion recognition

- **National Tsing-Hua University (NTHU)** Hsinchu, Taiwan
  Ph.D. Candidate in the Electrical Engineering Department; GPA: 3.82/4.0 *Feb. 2016 – anticipated in Feb. 2024*
  Advisor: Prof. Chi-Chun Lee, Behavioral Informatics & Interaction Computation Laboratory (BIIC lab)
  Research Area: automatic speech emotion recognition, automatic deception detection, group & team dynamics

- **NTHU** Hsinchu, Taiwan
  B.S. in the Electrical Engineering Department; GPA: 3.04/4.0 *Sep. 2011 – Feb. 2016*
  Advisor: Prof. Chi-Chun Lee, Behavioral Informatics & Interaction Computation Laboratory (BIIC lab)
  Independent Study: recognize the resonance of positive emotion perception from the crosstalk recordings

RESEARCH & WORK EXPERIENCE

Research interest:
Speech emotion recognition and automatic deception detection

- **Research in Speech Emotion Recognition (SER)|MSP Lab@UTD| BIIC Lab@NTHU** Jul. 2015 – present
  PhD works ***Speech***
  - **Abstract**: Implantation of algorithms and deep learning approaches to improve performance of SER models based on public benchmark corpus and real-world audio data
  - Predicting Inter-annotator Agreements to Improve Calibration and Performance of Speech Emotion Classifiers (SEC) (IEEE **INTERSPEECH** Doctoral Consortium 2022 (accepted) [1])
    ✓Investigate whether modeling ambiguity in annotator labels – the disagreements that are traditionally rejected as noise – can improve a SEC
  - Exploiting co-occurrence frequency of emotions in perceptual evaluations to train a speech emotion classifier (SEC) (IEEE **INTERSPEECH** 2022 (accepted) [2])
    ✓Utilize the prior knowledge of co-occurrence of emotions to train a SEC model
    ✓Propose an elegant implementation to incorporate the "penalty loss" in the model, which is flexible and can be easily applied to any emotion classification framework using existing label learning approaches
    ✓The evaluation of the proposed method shows important relative improvements in macro F1-score for hard-label learning (17.12%), multi-label learning (12.79%), and distribution-label learning (25.8%)
  - Maximize utilization of ratings for SER (IEEE **ICASSP** 2022 [3])
    ✓6.4% and 16.56% performance gain on 8-class and 16-class emotion classification respectively
    ✓Utilize annotators' typed description of emotion perception by NLP techniques
    ✓First work to evaluate SER models with all data of emotional database (no data is discarded)
  - **Personalized** speech emotion perception recognition (IEEE **INTERSPEECH** 2020 [4])
    ✓Propose per-rater speech emotion perception recognition with soft and hard labels joint training
    ✓Reduce demands of training data into a half for SER models which achieves competitive results

- Joint learning of **subjective labels and individual annotators** for SER (IEEE **ICASSP** 2019 [5])
  - ✓Deploy individual SER models corresponding to unique annotators to improve model performance
  - ✓Model the label uncertainty and annotator idiosyncrasy using individual annotators and crowd modeling
- Mandarin Chinese interactive multimodal emotion corpus collection and emotion recognition (IEEE ACII 2017 [6]) (ACII 2017 Student Travel Grant)
  - ✓The largest Mandarin Chinese (Taiwan) interactive multimodal emotion corpus
- Amplifying a sense of emotion toward drama with a dynamic SER model (ACLCLP ROCLING 2017 [7])
  - ✓Modulate the RGB values of frames in video using the predictions of arousal and valence

- **Research in Automated Deception/Trust Detection (ADD)|BIIC Lab@NTHU (Taiwan)** Jul. 2015 – present
  PhD works & Co-work ***Speech, NLP***
  - **Abstract**: Explore machine/deep learning methods and NLP techniques to develop ADD models based on real-world data
  - Improve ADD models by integrating interlocutor's judgements in conversations (ACL **ACL-IJCNLP** 2021 [8]) (**2021 Merry Electroacoustics Thesis Bronze Award**)
    - ✓Consider human judgements (believe/disbelieve) with three types of speech-language features (acoustic-prosodic, linguistic, and conversational temporal dynamics features) extracted during a conversation for building ADD models
  - Propose ADD models using multiple speech and language communicative descriptors in Dialogs (IEEE APSIPA TSIP 2021, IF = 0.6 [9])
    - ✓Model psychologists' insights and knowledge to improve the performance of detecting deceptions/trusts
  - Develop perceived ADD models using multimodal data in dialog games (IEEE APSIPA ASC 2020 [10])
    - ✓Incorporate personality attributes as an additional input to the deceptions/trusts recognition network
    - ✓Demonstrate additional evidence indicating that human is bad at detecting deceptions/trusts
  - Design and Propose a Conversational Temporal Dynamics Features (IEEE APSIPA ASC 2019 [11]) (**APSIPA ASC Best Regular Paper Award**)
    - ✓Propose a joint learning framework to detect deceptions/trusts by simultaneously considering variations and patterns of the conversation using both interlocutor's acoustic features and their conversational temporal dynamics
  - Daily Deceptive Dialogues Corpus of Mandarin (DDDM) (IEEE **INTERSPEECH** 2019 [12])
    - ✓The largest Mandarin Chinese interactive multimodal deception/trust corpus including speech, transcripts, and personality recordings

- **Research in Physiological Signal Processing|BIIC Lab@NTHU** Hsinchu, Taiwan
  Co-works *Jul. 2018 – present*
  - Develop a rapid and economic in vivo electrocardiogram platform for cardiovascular drug assay and electrophysiology research in adult zebrafish (Nature Scientific Report 2018, IF = 4.857 [13])
    - ✓Design a data analysis system to denoise electrophysiological signals in adult Zebrafish

- **Research in Group & Team Dynamics|BIIC Lab@NTHU** Hsinchu, Taiwan
  Co-works *Jul. 2020 – present*
  - Develop self-assessed emotion classification models from acoustic and physiological features within small-group conversation (ACM ICMI 2021, [14])
    - ✓Propose a graph-structure group-modulated attentive BLSTM to detect individual emotions by calculating in-group dynamics in the acoustics and physiology under small-group conversations
  - Propose a representation measure of physiological synchrony for group belonging and satisfaction recognition using graph LSTM (ACM ICMI 2021 [15])
    - ✓Introduce a physiological synchrony measure method for calculating group-based physiological synchrony representations between group members from Photoplethysmography (PPG) signals

- **Automatic Meeting Summarization System|Industrial Technology Research Institute (ITRI)** Dec.2018 – Dec.2019
  Co-works *Academic Project*

  ✓Propose a summarization system using a deep learning model from spoken sentences to summarizations

- **Discover modern polarity terms | ITRI** Hsinchu, Taiwan
  Research Intern *Jul. 2015 – Sep. 2015*
  - Developed rule-based algorithms to discover modern polarity terms by NLP from numerous BBS, Yahoo, and Twitter Mandarin Chinese (Taiwan) online articles

Awards and Honors

- NOVATEK MICROELECTRONICS CORP. PhD Excellence Scholarship (2022-2023)
- International Speech Communication Association (ISCA) Grants (2022)
- Alphabet/Google East Asia Student Travel Grants (2022)
- FAOS Outstanding Students Conference Travel Grant (2019, 2022)
- ACLCLP Outstanding Students Conference Travel Grant (2019, 2022)
- Merry Electronics Co., Ltd.: Electroacoustics Thesis Award – Bronze Award (2021)
- Reviewer: IEEE Transactions on Multimedia (2021)
- Ministry of Science and Technology (MOST) Graduate Students Study Abroad Grant (2020)
- MOST Futuretek Breakthrough Award (2019)
- APSIPA ASC Best Regular Paper Award (2019)
- ACII Student Travel Grant (2017)
- NTHU Dean's PhD Excellence Scholarship (2016)

Technical Skills

- **Data Collection**: Emotion Database (NTHU-NNIME and MSP-Podcast datasets), Deception Database (DDDM) [12], and Group and Team Dynamics Behavior (NTUBA) [15]
- **Multimodality Processing**: **Speech Signal Processing** (Praat, openSMILE, librosa, Fairseq), **Natural Language Processing** (Linguistic Inquiry and Word Count (LIWC), CKIPTagger, part-of-speech, named entity recognition), **Physiological Signal Processing**
- **Machine/Deep Learning**: Supervised learning methods (scikit-learn, Pytorch, Tensorflow (Keras))
- **Programming**: Python, MATLAB
- **Other Tools & Familiar OS**: LaTex, Git (Github and Gitlab), Linux (Ubuntu and Pop!_OS), Windows

References

[1] **Huang-Cheng Chou**. "Predicting Inter-annotator Agreements to Improve Calibration and Performance of Speech Emotion Classifiers". In: *8th Doctoral Consortium Proc. Interspeech 2022*. 2022.

[2] **Huang-Cheng Chou** , Chi-Chun Lee, and Carlos Busso. "Exploiting Co-occurrence Frequency of Emotions in Perceptual Evaluations To Train A Speech Emotion Classifier". In: *Proc. Interspeech 2022*. 2022.

[3] **Huang-Cheng Chou**, Wei-Cheng Lin, Chi-Chun Lee, and Carlos Busso. "Exploiting Annotators' Typed Description of Emotion Perception to Maximize Utilization of Ratings for Speech Emotion Recognition". In: *ICASSP 2022 - 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. 2022.

[4] **Huang-Cheng Chou** and Chi-Chun Lee. "Learning to Recognize Per-Rater's Emotion Perception Using Co-Rater Training Strategy with Soft and Hard Labels". In: *Proc. Interspeech 2020*. 2020, pp. 4108–4112. DOI: 10.21437/Interspeech.2020-1714. URL: http://dx.doi.org/10.21437/Interspeech.2020-1714.

[5] **Huang-Cheng Chou** and Chi-Chun Lee. "Every Rating Matters: Joint Learning of Subjective Labels and Individual Annotators for Speech Emotion Classification". In: *ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. 2019, pp. 5886–5890. DOI: 10.1109/ICASSP.2019.8682170.

[6] **Huang-Cheng Chou**, Wei-Cheng Lin, Lien-Chiang Chang, Chyi-Chang Li, Hsi-Pin Ma, and Chi-Chun Lee. "NNIME: The NTHU-NTUA Chinese interactive multimodal emotion corpus". In: *2017 Seventh International Conference on Affective Computing and Intelligent Interaction (ACII)*. 2017, pp. 292–298. DOI: 10.1109/ACII.2017.8273615.

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[8] **Huang-Cheng Chou**, Woan-Shiuan Chien, Da-Cheng Juan , and Chi-Chun Lee. ""Does it Matter When I Think You Are Lying?" Improving Deception Detection by Integrating Interlocutor's Judgements in Conversations". In: *Findings of the Association for Computational Linguistics: ACL-IJCNLP 2021*. Online: Association for Computational Linguistics, Aug. 2021, pp. 1846–1860. DOI: 10.18653/v1/2021.findings-acl.162. URL: https://aclanthology.org/2021.findings-acl.162.

[9] **Huang-Cheng Chou**, Yi-Wen Liu, and Chi-Chun Lee. "Automatic Deception Detection using Multiple Speech and Language Communicative Descriptors in Dialogs". In: *APSIPA Transactions on Signal and Information Processing* 10 (2021), e5. DOI: 10.1017/ATSIP.2021.6.

[10] **Huang-Cheng Chou** and Chi-Chun Lee. ""Your Behavior Makes Me Think It Is a Lie": Recognizing Perceived Deception using Multimodal Data in Dialog Games". In: *2020 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC)*. 2020, pp. 393–402.

[11] **Huang-Cheng Chou**, Yi-Wen Liu, and Chi-Chun Lee. "JOINT LEARNING OF CONVERSATIONAL TEMPORAL DYNAMICS AND ACOUSTIC FEATURES FOR SPEECH DECEPTION DETECTION IN DIALOG GAMES". In: *2019 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC)*. 2019, pp. 1044–1050. DOI: 10.1109/APSIPAASC47483.2019.9023050.

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[13] Min-Hsuan Lin and **Huang-Cheng Chou** and Yu-Fu Chen, Wangta Liu, Chi-Chun Lee, Lawrence Yu-Min Liu, and Yung-Jen, Chuang. "Development of a rapid and economic in vivoelectrocardiogram platform for cardiovascular drug assay and electrophysiology research in adult zebrafish". In: *Scientific Reports* 8, 15986 (Oct. 2018), p. 15986. DOI: 10.1038/s41598-018-33577-7.

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[15] Woan-Shiuan Chien, **Huang-Cheng Chou** , and Chi-Chun Lee. "Belongingness and Satisfaction Recognition from Physiological Synchrony with A Group-Modulated Attentive BLSTM under Small-group Conversation". In: *Companion Publication of the 2021 International Conference on Multimodal Interaction*. 2021. DOI: 10.1145/3461615.3485410.