ICASSP '25 notes and interesting posters

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April 16, 2025

1 Montag Vormittag

1.1 Tutorial: Generative AI and Model Optimization

Problem: (compute) cost, current foundation models not sustainable Solutions:

1.1.1 Sparsity

→ scalability, less overfitting, interpretability, adaptive ways to introduce sparsity

- post training: optimal brain damage (OBD)/ optimal brain surgery (OBS)
  - dropout by contribution to error, scale by Hessian $\mathcal{H}$ contribution
- training:
  - L1-loss: Convex optim.; no free lunch: initial model very large!, more eqs.
  - exaustive: very expensive
  - greedy/evolutionary solutions: StOMP, GOMP based on L0-norm, but very effective
- pre-training
  - SET
  - randomly initial init → evolutionary
- architecutral: grow and shrink networks...

Problem: doesn't really work with LMs (empirical study), but well for other networks (esp. low-weight dropout)

1.1.2 Compression

- filter: storage compresion
- low rank factorization (≠ LoRA), during train time not fine-tuning
- knowledge distillation

2 Dienstag Nachmittag

2.1 Talk: Underwater Communications

- Problem: very slow comm underwater, ≈10 kHz range
- Towards moving target, Doppler correction using active SP correction, very manual work

Comment: interesting manual process, tedious work to sample

3 Mittwoch Nachmittag

3.1 Talk: AI+SP

Comment: not great, just some basics on diffusion/transformers, a little bit of SP in NNs - not exciting

4 Donnerstag Vormittag

4.1 Talk: Multiomics

- Genomics: DNA understanding
- Transcriptomics: DNA-¿RNA understanding
- Proteomics: RNA-¿Protein structures
- Knowledge graphs: how do these systems influnce each other
- Flow:
  - identify DNA mutation that triggers illness
  - find possible RNA mechanism
  - find good fitting small ring structure
  - → check for side effects in knowledge graph! (certain protein effects unwantend)
  - → then test → animal tests, reduce through ML!
- Graph diffusion for drug discovery: noise schedule for diffusion essential, i.e. cosine-square schedule
  - diffuse graphs from atoms & edges as adjacency matrix
  - what is noise: discrete noise: each atom is discrete state $\implies$ graph structure undergoes state transition change
  - naive: uniform structure, not really chemically sensible - conditional probabibilites $\implies$ not uniform but marginal distribution of molecules in training (just logical!), same for edge (with deletion!)
  - one step further: consider carbon rings, restriction based on maximum bonds of atom (freie radikale)
  - SMILE-file, QED: Quantitative Esitmate of Drug likeness (from RDKit)
  - Existing methods: Time-consuming, progress slow, very few good molecules
  - Their work: jointly perturb rings+nodes
  - other approaches: motives as super-node with rings, difficulty: ring attachments - only ≈1 % improvement!
  - novelty however high, one molecule of them even patented!
- Knowledge graphs:
  - GNN link prediction
  - none of the existing benchmarks include features!
  - maybe talk to author!

Comment: focused on drug discovery using diffusion, not much on multiomics...

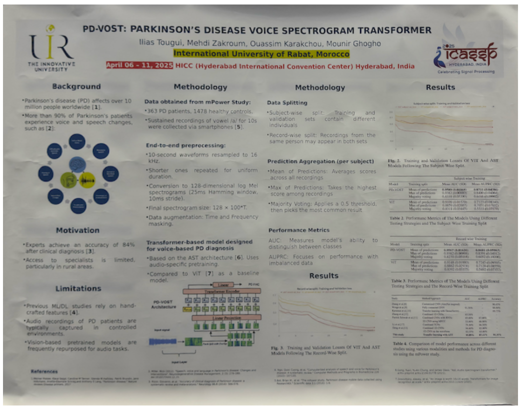
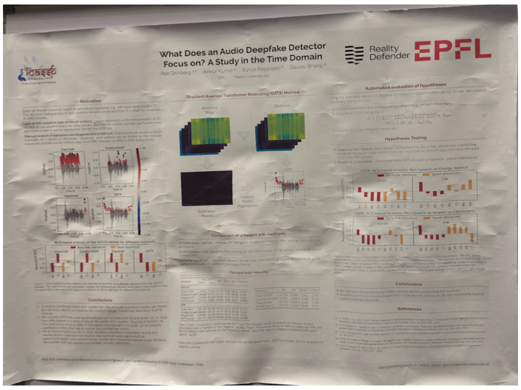
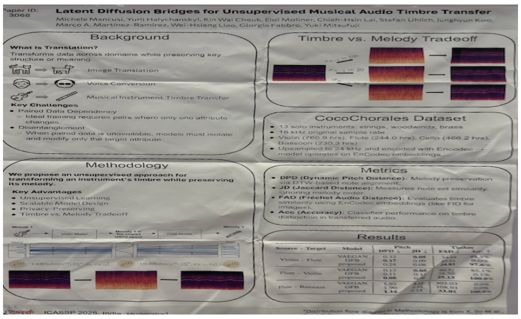
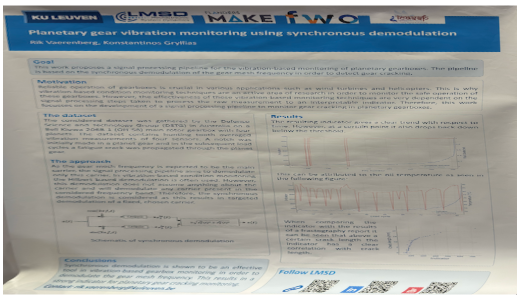
5 Lectures/Orals

Table 1:

Lecture	URL	Notes
Diversity-Seeking Techniques for Red-Teaming LLMs	https://ieeexplore.ieee.org/document/10890844/	Add RL-Loss to train similar to GAN by backpropagating if the model returns very similar output (i.e. discrimimnator)-¿ Very fragile learning; Limited further studies
FDR Control for Complex-Valued Data	https://ieeexplore.ieee.org/document/10889705	similar to LASSO; sparsifying system under certain guarantees
SpectralCam: High-Resolution Low-Cost Spectral Imaging Using DSLR Cameras	https://ieeexplore.ieee.org/document/10887725	Interesting concept of applying photo filter to DSLR sensor, Bayesian pattern restoration "learned" using diffusion & attenuation mtx
Fusing Multimodality of Large Language Models and Satellite Imagery	https://ieeexplore.ieee.org/document/10889624	Could be interesting in combination with HEREDITARY geospatial data once we have access
Controllable Forgetting Mechanism for Few-Shot Class-Incremental Learning	https://arxiv.org/pdf/2501.15998	Using embedding space to classify, add new classifier based on distance, seems rather hyperparameter-sensitive

6 Posters

Table 2:

<table>
<tr><td>Poster</td><td>Information</td></tr>
<tr><td>
</td><td>PD-VOST: Parkinson's Disease Voice Spectrogram Transformer llias Tougui, Mehdi Zakroum, Ouassim Karakchou, Mounir Ghogho
<code>https://ieeexplore.ieee.org/abstract/document/10889820/</code></td></tr>
<tr><td>
</td><td>The EPFL combinational benchmark suite pee/ginbergaepf.ch, facia, surya, gauravia roatty defender al
<code>https://infoscience.epfl.ch/entities/publication/309aea67{-}b5a1{-}4532{-}8a6f{-}0a141d8f1ab3/full</code></td></tr>
<tr><td>
</td><td>Latent Diffusion Bridges for Unsupervised Musical Audio Timbre Transfer Michele Mancusi, Yurii Halychanskyi, Kin Wai Cheuk, Eloi Moliner, Chieh-Hsin Lai, Stefan Uhlich, Junghyun Koo.
<code>https://ieeexplore.ieee.org/abstract/document/10890708/</code></td></tr>
<tr><td>
</td><td>do a crow endus ported ten band mentorine at pear enoses. The pipeline do a crow endus ported ten band mentorine at pear enoses. The pipeline</td></tr>
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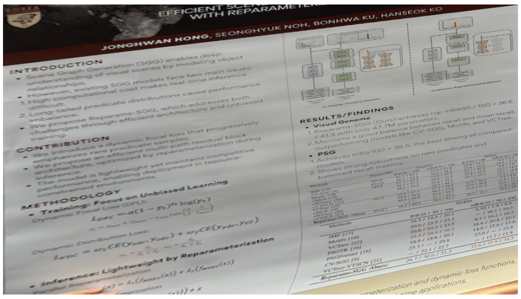
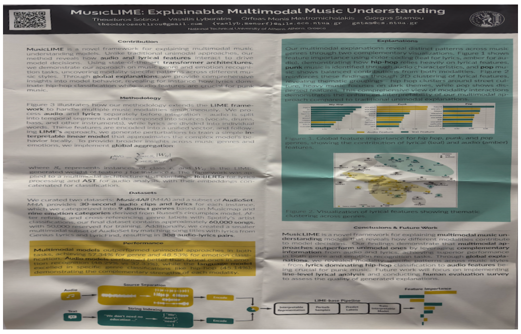
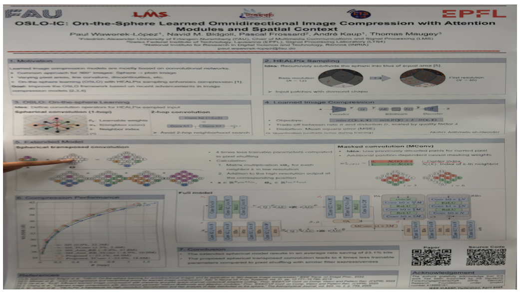
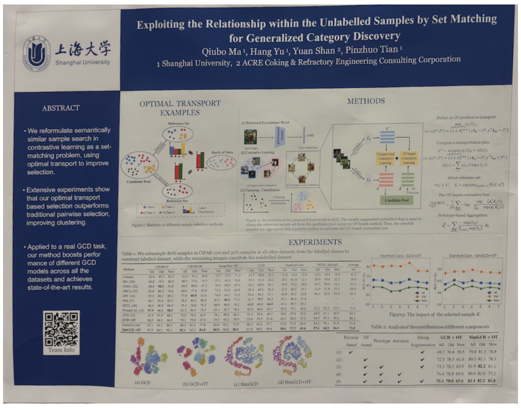
	**EFFICETH REPARAMNE** *outperforming models like CV-SOG, Motifs, and VCTree.*
	**Musiclime: Explainable multimodal music understanding** *tasks, achieving 57.34% for genre and 48.53% for emotion Classi-* `https://ieeexplore.ieee.org/abstract/document/10889771/`
	**OSLO-IC: On-the-Sphere Learned Omnidirectional Image Compression with Attention Modules and Spatial Context** *Bidgoll, Pascal Frossard?, André Kaup", Thomas Maugey?* `https://ieeexplore.ieee.org/abstract/document/10889131/`
	**Exploiting the Relationship within the Unlabelled Samples by Set Matching for Generalized Category Discovery** *Qiubo Ma', Hang Yu%, Yuan Shan 3, Pinzhuo Tian 1* `https://ieeexplore.ieee.org/abstract/document/10889522/`

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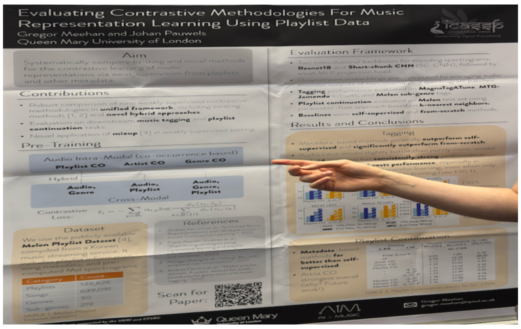
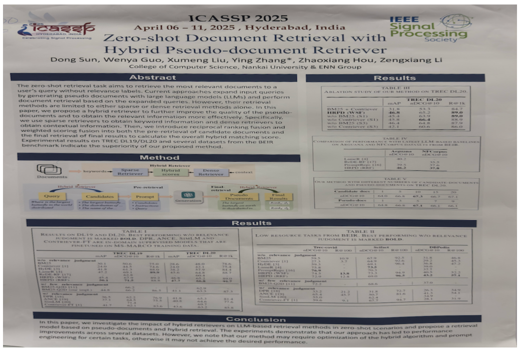
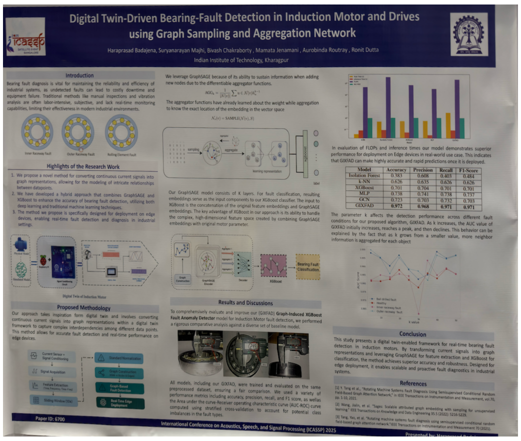
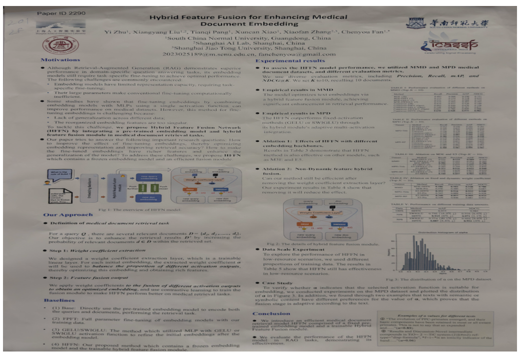
	**Evaluating Contrastive Methodologies for Music Representation Learning Using Playlist Data** *methods [1, 2] and novel hybrid approaches* `https://ieeexplore.ieee.org/abstract/document/10888157/`
	**Fine-tuning and prompt optimization: Two great steps that work better together** *Dong Sun, Wenya Guo, Xumeng Liu, Ying Zhang*, Zhaoxiang Hou, Zengxiang Li* `https://arxiv.org/abs/2407.10930`
	**Digital Twin-Driven Bearing-Fault Detection in Induction Motor and Drives using Graph Sampling and Aggregation Network** *Haraprasad Badajena, Suryanarayan Majhi, Bivash Chakraborty, Mamata Jenamani, Aurobinda Routray, Ronit Dutta* `https://ieeexplore.ieee.org/abstract/document/10889484/`
	**Yi Zhu', Xiangyang Liu!?, Tianqi Pang', Xuncan Xiao!, Xiaofan Zhang33, Chenyou Fan!.*** *Yi Zhu', Xiangyang Liu!?, Tianqi Pang', Xuncan Xiao!, Xiaofan Zhang33, Chenyou Fan!.**

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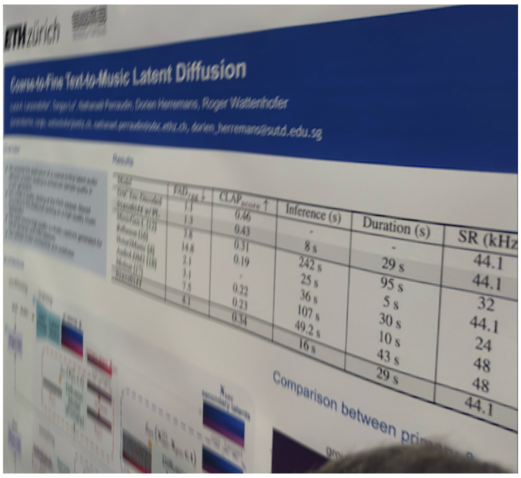
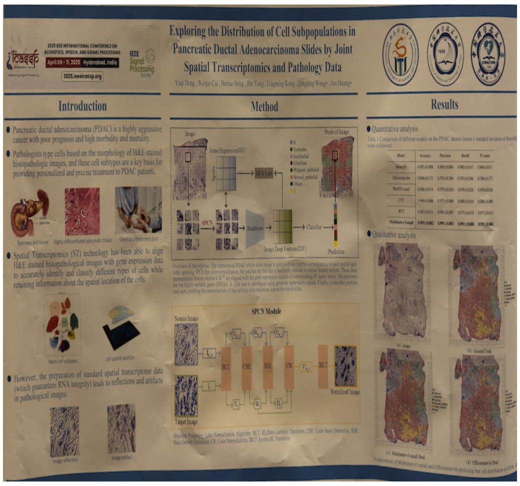
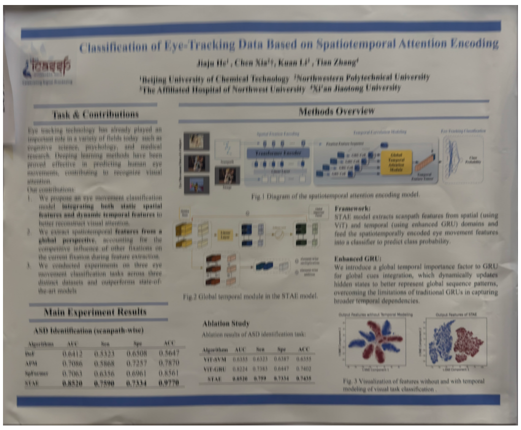
	**Text to music audio generation using latent diffusion model: A re-engineering of audioldm model** *1nh tonne Wegner Neteal Ponesin, Deren Hertemans, Rogger Wattenhofer* `https://www.diva{-}portal.org/smash/record.jsf?pid=diva2:1845150`
	**Exploring the Distribution of Cell Subpopulations in Pancreatic Ductal Adenocarcinoma Slides by Joint Spatial Transcriptomics and Pathology Data** *Yagi Deng, Wenjie Cai, Bentao Song, Bin Yang, Lingming Kong, Qingfeng Wang≫, Jun Huang* `https://ieeexplore.ieee.org/abstract/document/10890640/`
	**Classification of Eye-Tracking Data Based on Spatiotemporal Attention Encoding** *Maju Hel, Chen Xia't, Kuan L, Tan Zhangt* `https://ieeexplore.ieee.org/abstract/document/10889246/`

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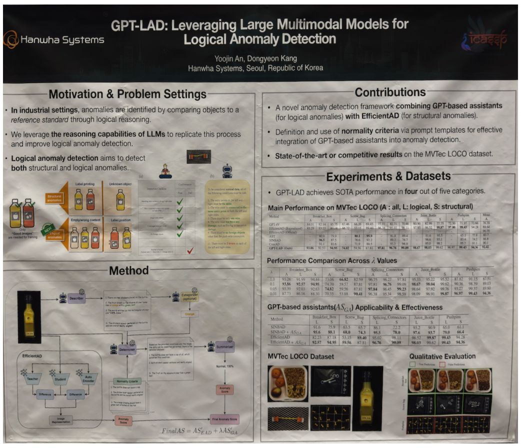
<td>
</td>
<td>GPT-LAD: Leveraging Large Multimodal Models for Logical Anomaly Detection Main Performance on MVTec LOCO (A : all, L: logical, S: structural)
https://ieeexplore.ieee.org/abstract/document/10888757/</td>
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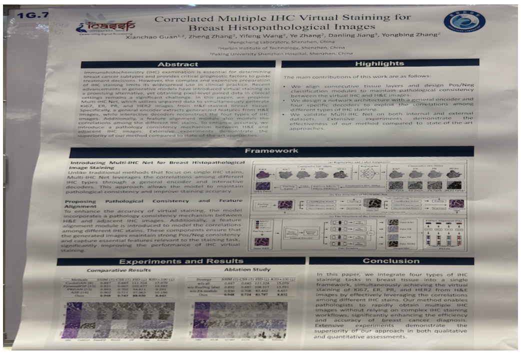
<td>
</td>
<td>Virtual multiplex immunohistochemistry: application on cell block of effusion and aspiration cytology Xianchao Guan12, Zheng Zhang?, Yifeng Wang?, Ye Zhang?, Danling Jiang”, Yongbing Zhang?
https://onlinelibrary.wiley.com/doi/abs/10.1002/dc.24344</td>
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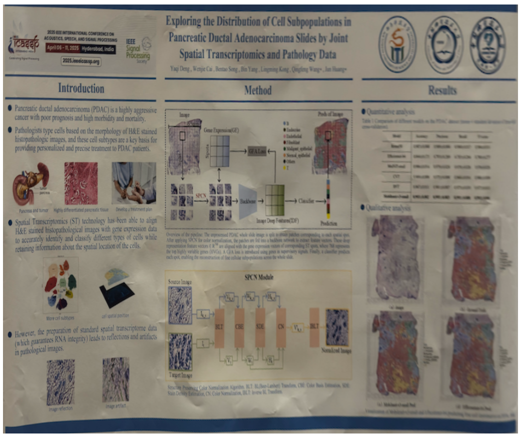
<tr><td>
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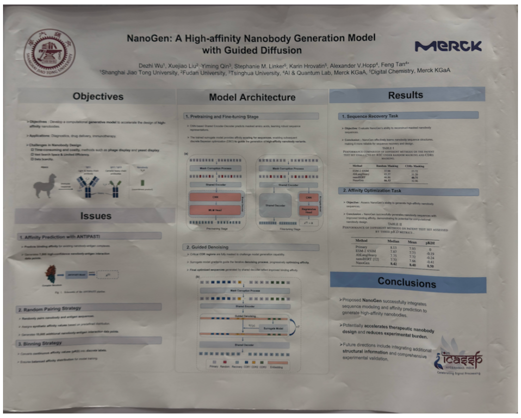
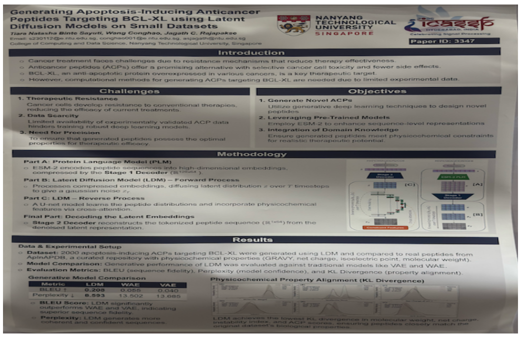
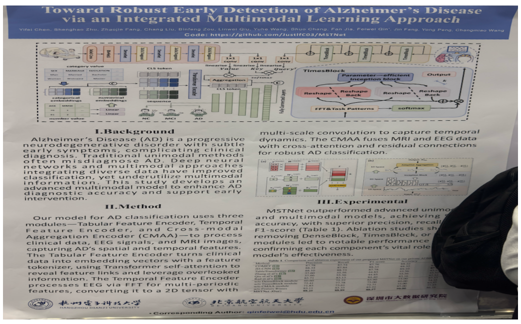
<tr><td>
</td><td>NanoGen: A High-affinity Nanobody Generation Model with Guided Diffusion Dezhi Wu’, Xuejiao Liu?, Yiming Qin”, Stephanie M. Linker’, Karin Hrovatin”, Alexander V.Hopp*, Feng Tan** <code>https://ieeexplore.ieee.org/abstract/document/10888039/</code></td></tr>
<tr><td>
</td><td>ApinAPDE, a curated repository with physicochemical properties (GRAVY, net charge, isoelectric point, molecular weight). Emas: 2230112006.M.00u.59. cong na00012e.ntu.edu.sg. as.293th@ntu.edu.5g</td></tr>
<tr><td>
</td><td>Toward robust early detection of alzheimer’s disease via an integrated multimodal learning approach Yifei Chen, Shenghao Zhu. Zhaojie Fang. Chang Liu, Binfeng Zou, Linwei Qiu, Yuhe Wang. Shuo Chang. Fan Jia, Felwel Qin”. Jin Fang. Yong Peng, Changmiao Wang <code>https://ieeexplore.ieee.org/abstract/document/10888363/</code></td></tr>
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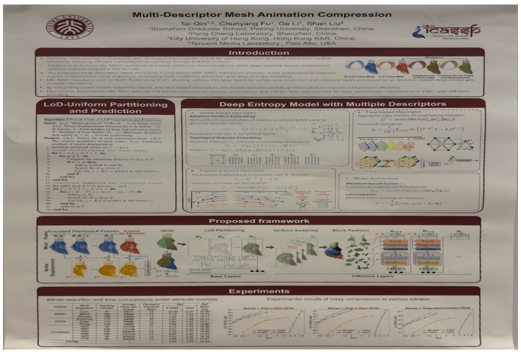
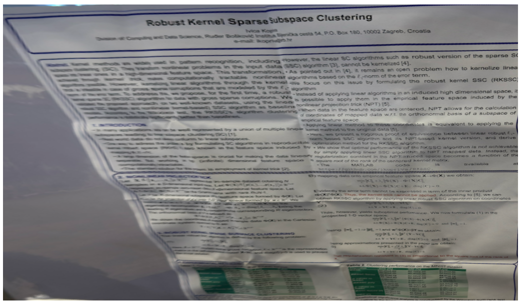
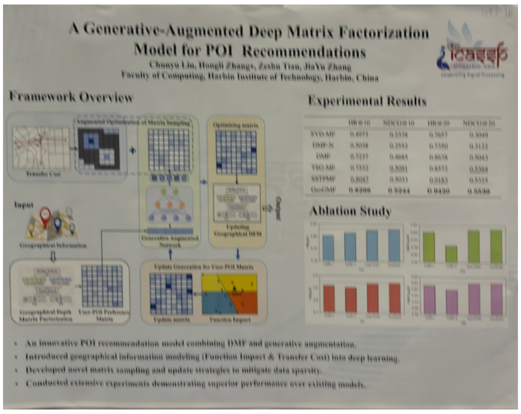
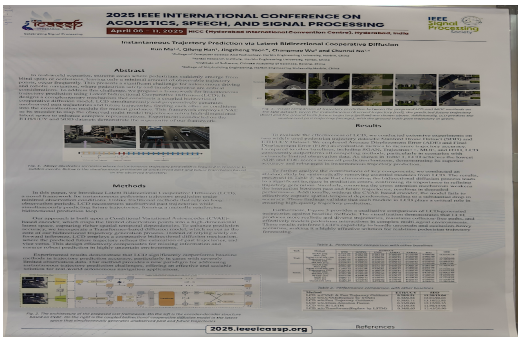
	**Experiments demonstrato MD-MAC achieves 22% bitrate reduction for lossless compression and 17% BD-Rate improvement for lossy compression compared to V-DMC, with 95% faster** *1Shenzhen Graduate School, Peking University, Shenzhen, China,*
	**Robust Kernel Sparse Subspace Clustering** *da cesta 54, P.O. Box 180, 10002 Zagrob, Croatia* `https://ieeexplore.ieee.org/abstract/document/10888170/`
	**A Generative-Augmented Deep Matrix Factorization Model for POI Recommendations** *Chonse Lio, Hongl Zhange, Aesta Man, Masa Zhang* `https://ieeexplore.ieee.org/abstract/document/10890082/`
	**2007 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)** *Kun Ma12, Qilong Han', Jingzheng Yao?.*, Changmao Wu' and Chunrul NazA* `https://scholar.archive.org/work/utteultwdberxnhwxuaxknu6be/access/wayback/http://ieeexplore.ieee.org/ielx5/79/34703/01657809.pdf?tp=&arnumber=1657809&isnumber=34703`

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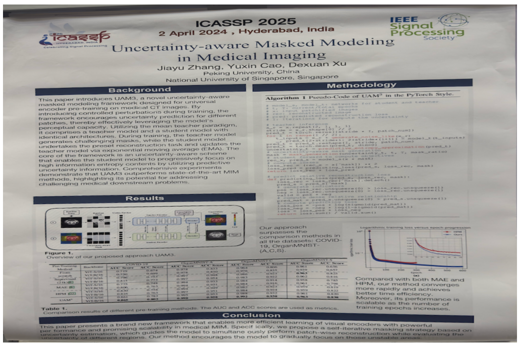
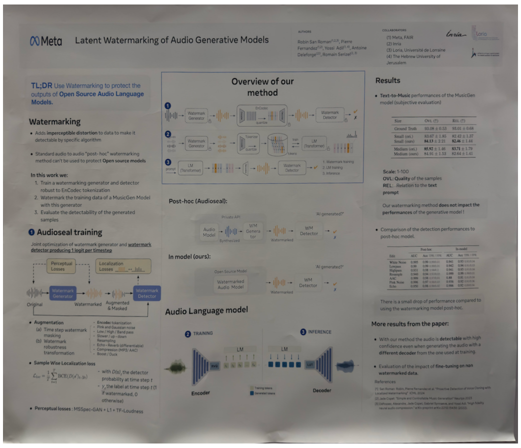
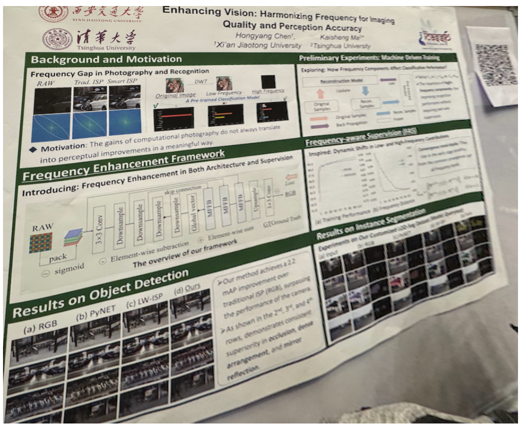
	**Masked image modeling advances 3d medical image analysis** *Der formance and promising scalability in medical MIM. Spect ically, we propose a tel-literative masking stratcoy based on* https://openaccess.thecvf.com/content/WACV2023/html/Chen_Masked_Image_Modeling_Advances_3D_Medical_Image_Analysis_WACV_2023_paper.html
	**Latent watermarking of audio generative models** *Losses .....*Inlt..* https://ieeexplore.ieee.org/abstract/document/10889782/
	**HYMAN: Hybrid Memory and Attention Network for Unsupervised Anomaly Detection** *Jiahao Li, Yigiang Chen, Yunbing Xing, Yang Gu, Xiangyuan Lan* https://ieeexplore.ieee.org/abstract/document/10890028/
	**A general framework for object detection** *>As shown in the 29, 3P%, and 4°* https://ieeexplore.ieee.org/abstract/document/710772/

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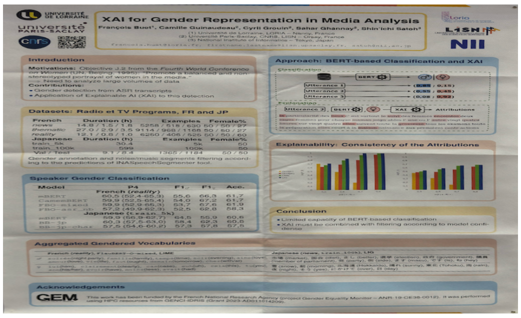
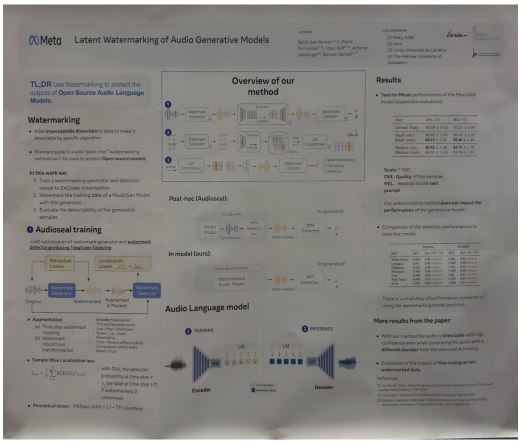
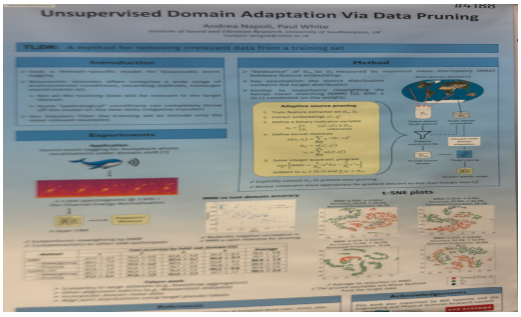
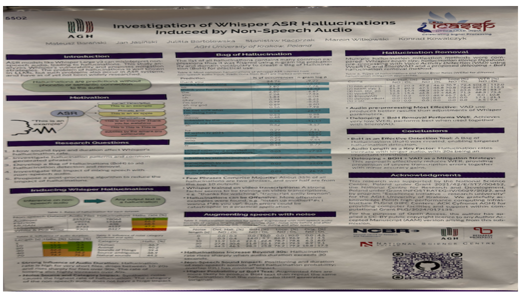
<table>
<tr><td>
</td><td>XD0h 18122089roject Gender Equalty Monitor - ANIR-19-GE30-0012). It was portormed François Buot', Camille Guinaudeau?, Cyril Grouin?, Sahar Ghannay?, Shin'ichi Satoh»</td></tr>
<tr><td>
</td><td>Latent watermarking of audio generative models 13) Olfonses, Alexandre, Jade Copet, Gabriel Synarve, and Yest Adt. "High fidelity https://ieeexplore.ieee.org/abstract/document/10889782/</td></tr>
<tr><td>
</td><td>Unsupervised Domain Adaptation Via Data Pruning TWDR. & method for removing irrelevant data from a training set https://ieeexplore.ieee.org/abstract/document/10890190/</td></tr>
<tr><td>
</td><td>Investigation of Whisper ASR Hallucinations Induced by Non-Speech Audio AGH University of Krakow. Poland https://arxiv.org/abs/2501.11378</td></tr>
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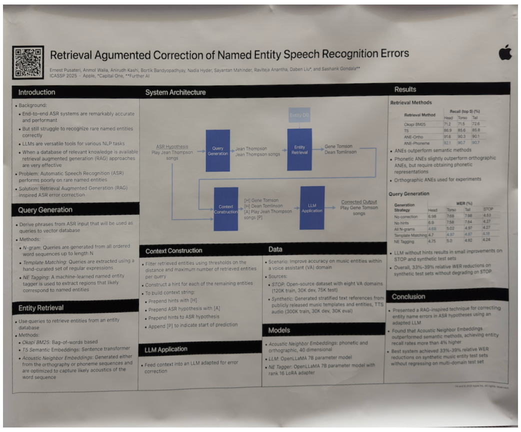
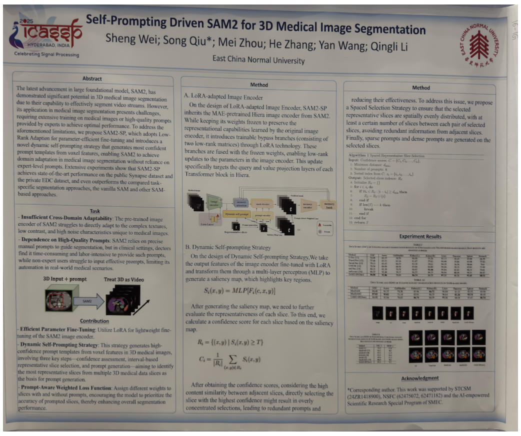
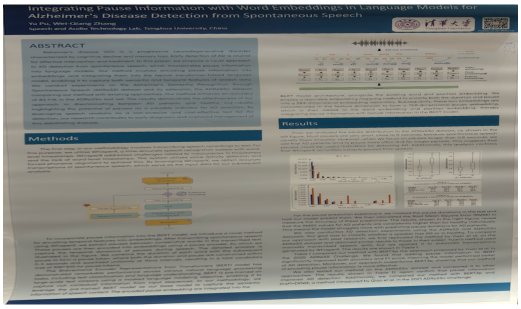
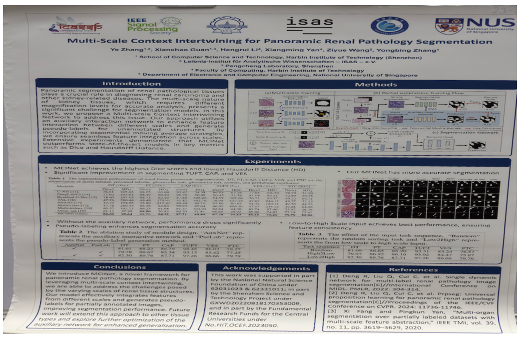
	**Retrieval augmented correction of named entity speech recognition errors** *Ernest Pusateri, Anmol Walia, Aniruch Kashi, Bortik Bandyopadhyay, Nadia Hyder, Sayantan Mahinder, Raviteja Anantha, Daben Liu*, and Sashank Gondala*** `https://ieeexplore.ieee.org/abstract/document/10888936/`
	**Self-Prompting Driven SAM2 for 3D Medical Image Segmentation** *a Sorted index from C: s, -(6r,62..., 62...,4)* `https://ieeexplore.ieee.org/abstract/document/10889344/`
	**Integrating Pause Information with Word Embeddings in Language Models for Alzheimer's Disease Detection from Spontaneous Speech** *Speech and Audio Technology lab, Tsinghua University, China* `https://arxiv.org/abs/2501.06727`
	**Multi-scale Context Intertwining for Panoramic Renal Pathology Segmentation** *Ye Zhang'2, Xlanchao Guan13, Hengrul LI", Xiangming Yan", Ziyue Wang", Yongbing Zhang'* `https://ieeexplore.ieee.org/abstract/document/10889659/`

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Table 2: (Continued)

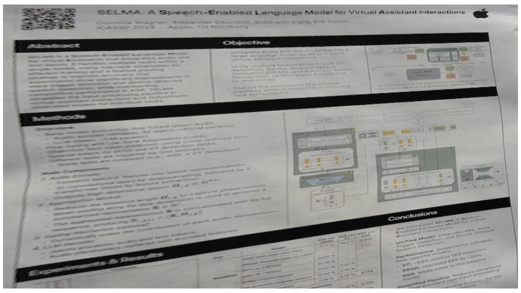
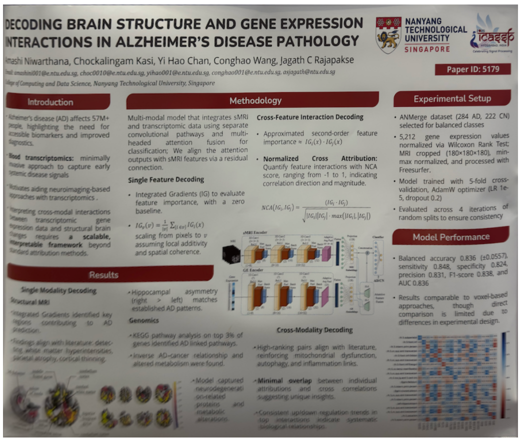
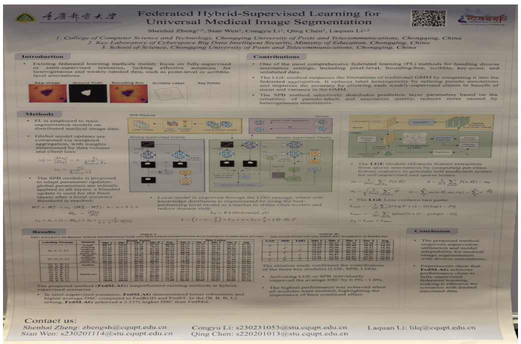
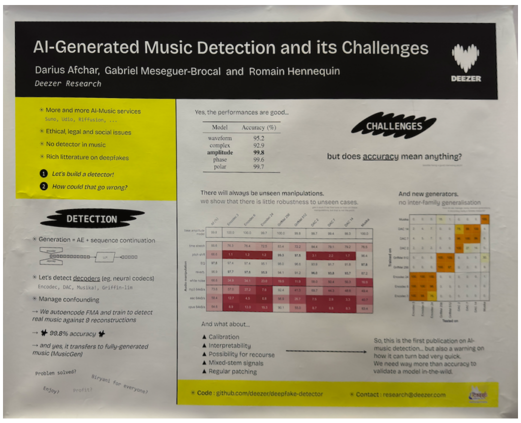
	**SELMA: A Speech-Enabled Language Model for Virtual Assistant Interactions** *Simplified Pigstina, Meduces complarty* `https://ieeexplore.ieee.org/abstract/document/10890139/`
	**Glial-neuronal interactions in Alzheimer's disease: the potential role of a 'cytokine cycle'in disease progression** *hutcmoshini001@Bentuedusg, choc0010@e.ntu.edusg,yihao001@e.ntu.edusg, conghao001@e.ntu.edusg,asjagath@ntu.edu.sg* `https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1750{-}3639.1998.tb00136.x`
	**Wireless Sensor Networks: 13th China Conference, CWSN 2019, Chongqing, China, October 12–14, 2019, Revised Selected Papers** *1. College of Computer Science and Technology, Chongqing University of Posts and Telecommunications, Chongging. China* `https://books.google.com/books?hl=en&lr=&id=o3fADwAAQBAJ&oi=fnd&pg=PR6&dq=1.+College+of+Computer+Science+and+Technology,+Chongging+University+of+Posts+and+Telecommunications,+Chongging.+China&ots=xK3vgQuzGb&sig=1RlJj8oR{-}X4PqqWdWiKUW8crgKE`
	**AI-Generated Music Detection and its Challenges** *Suno, Udio, Riffusion, ...* `https://arxiv.org/abs/2501.10111`

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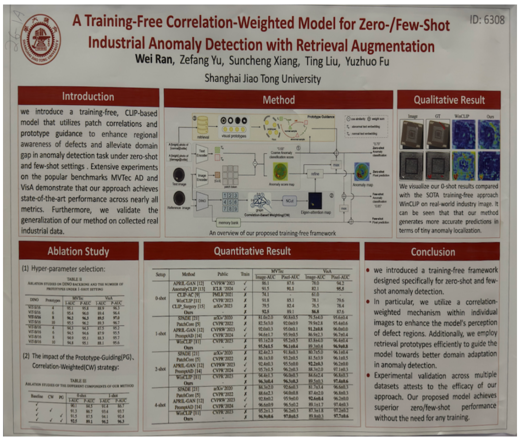
Table 2: (Continued)

	**A Training-Free Correlation-Weighted Model for Zero-/Few-Shot Industrial Anomaly Detection with Retrieval Augmentation** *Wei Ran, Zefang Yu, Suncheng Xiang, Ting Liu, Yuzhuo Fu* `https://ieeexplore.ieee.org/abstract/document/10890083/`
	**Parameter-efficient fine-tuning of large-scale pre-trained language models** *Changzeng Fits, Zelin Fut, Shaojun Yant. Xiaoyong Lyvt, Yuliang Zhaot* `https://www.nature.com/articles/s42256{-}023{-}00626{-}4`