



AALBORG UNIVERSITY
DENMARK

How do we accelerate collaboration on AI

Tech talk @ the Danish Academy of Technical
Sciences (ATV) on June 8, 2020

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Outline

- Introduction
- Collaboration between academia and industries
- A deep dive into the AI ecosystem of Silicon Valley



Section for Signal and Information Processing

- @ Department of Electronic Systems, The Technical Faculty of IT and Design, Aalborg University
- The Signal and Information Processing section is characterized by theoretical and experimental work related to *acoustics, signal processing and machine learning, and user research.*
- The application areas cover a variety of topics, such as audio and speech processing, image and video processing, audiology, hearing assistive devices, social robots, sound field control, sound over networks, and communications technology.



Our collaboration with industries – examples

- CASPR center
 - Oticon Foundation, Oticon A/S, and Aalborg University
- Industrial PhD and postdocs
 - E.g., Bang & Olufsen A/S, Oticon A/S, RTX A/S
- R&D projects with companies
 - E.g., Grundfos A/S, Lego A/S
- EU H2020 and national projects
- 20% professors from the industry
- Student projects and interns
- PhD courses and winter/summer schools
- Talks at companies
- Workshops and open labs
 - 2018 28th IEEE International Workshop on Machine Learning for Signal Processing, Aalborg, Denmark

Centre for Acoustic Signal Processing Research (CASPR)

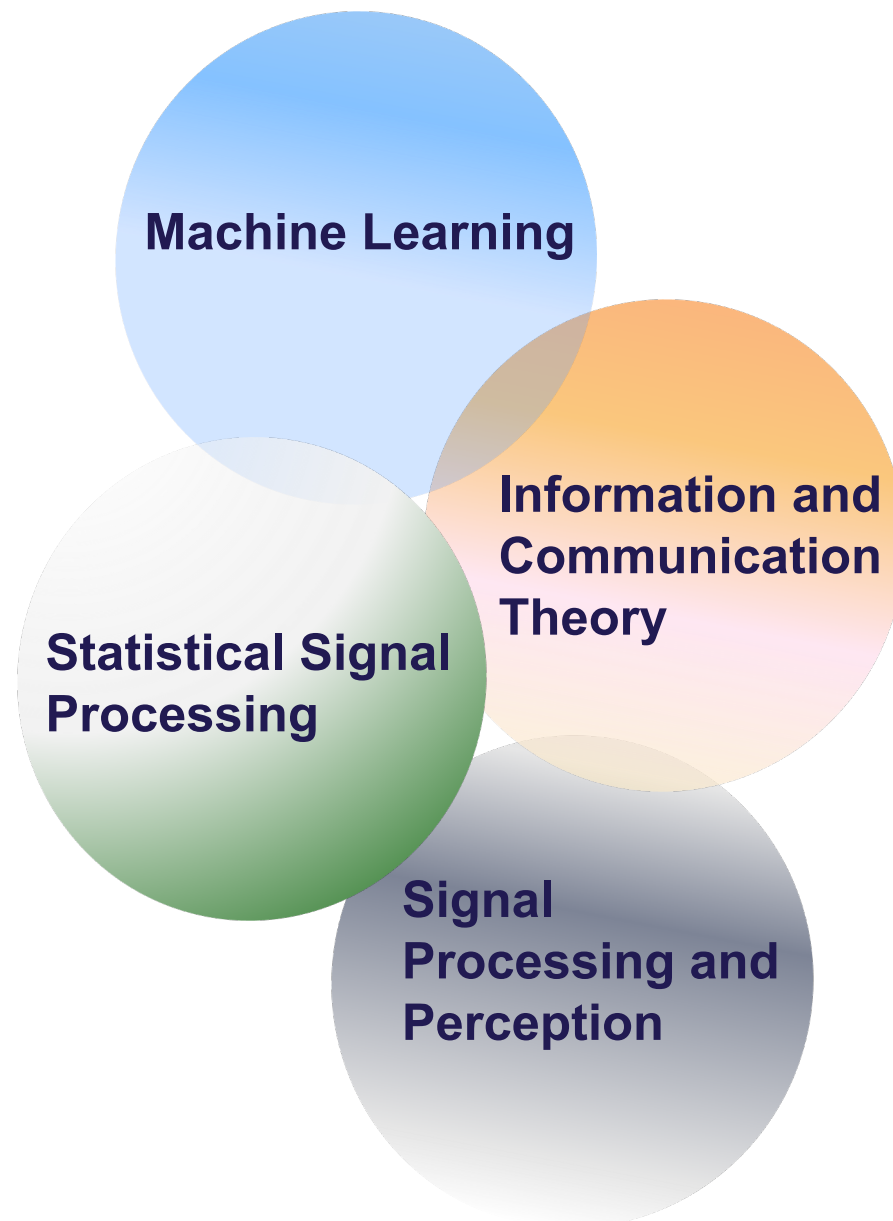
Mission:

- To conduct research and education in scientific disciplines supporting future statistical signal processing concepts for hearing assistive devices
- To disseminate research results to the sound processing industry and research community.

PhD/Postdoc project examples:

- Audio-visual speech enhancement for hearing assistive devices
- User-symbiotic speech enhancement for hearing aids
- Low-resource keyword spotting for hearing assistive devices

<http://caspr.es.aau.dk/>





Collaboration between academia and industries

Key elements and steps to establish and strengthen collaboration:

- Identify *problems* and formulate them as real AI problems via collaboration between domain- and AI-experts
 - Company: *problems* / pains / opportunities + domain knowledge + data
 - University: theory, algorithms and know-how in machine learning and AI + courses and open labs + data
 - It is beyond algorithms; rather, a machine learning workflow
- Collaboration formats
 - Research projects, student projects, etc.
 - Long-term, short-term
- Funding opportunities

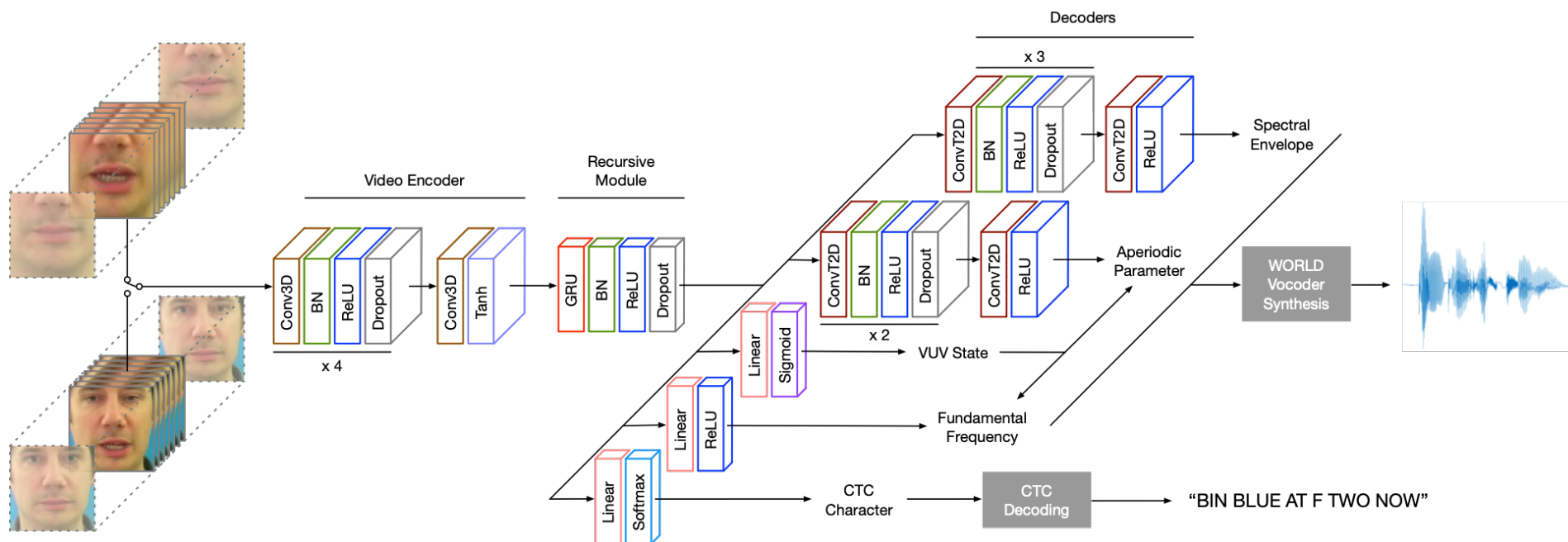


Funding opportunities

- Innovation Fund Denmark, e.g.,
 - Industrial PhD
 - Industrial postdoc
 - Grand Solutions
 - Innobooster
- Independent Research Fund Denmark
- Horizon 2020, an EU Research and Innovation programme
- Private foundations
- R&D projects with funding from the companies

Project example and demo 1

Lip reading – speech synthesis from silent videos



D. Michelsanti et al. Vocoder-Based Speech Synthesis from Silent Videos. arXiv preprint arXiv:2004.02541, 2020.



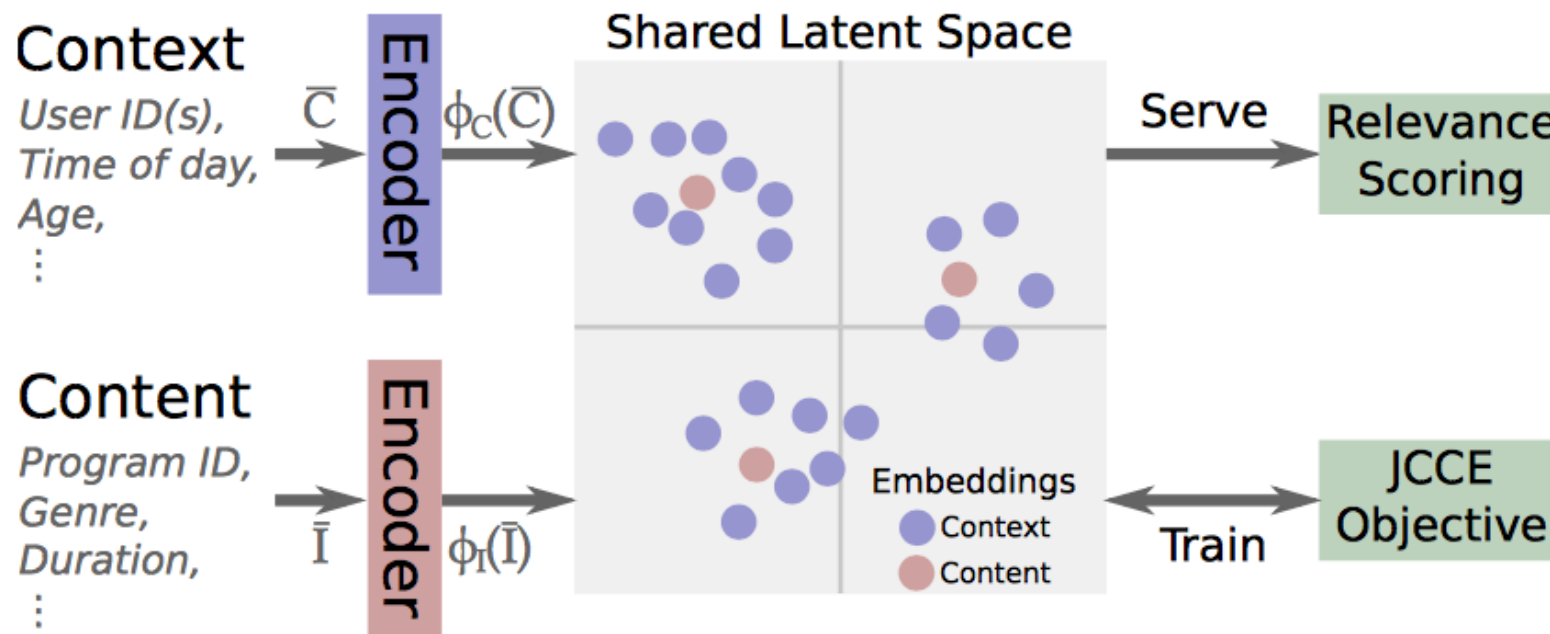
Lip reading examples

SEEN SPEAKERS

D. Michelsanti et al. Vocoder-Based Speech Synthesis from Silent Videos. arXiv preprint arXiv:2004.02541, 2020.

Project example and demo 2

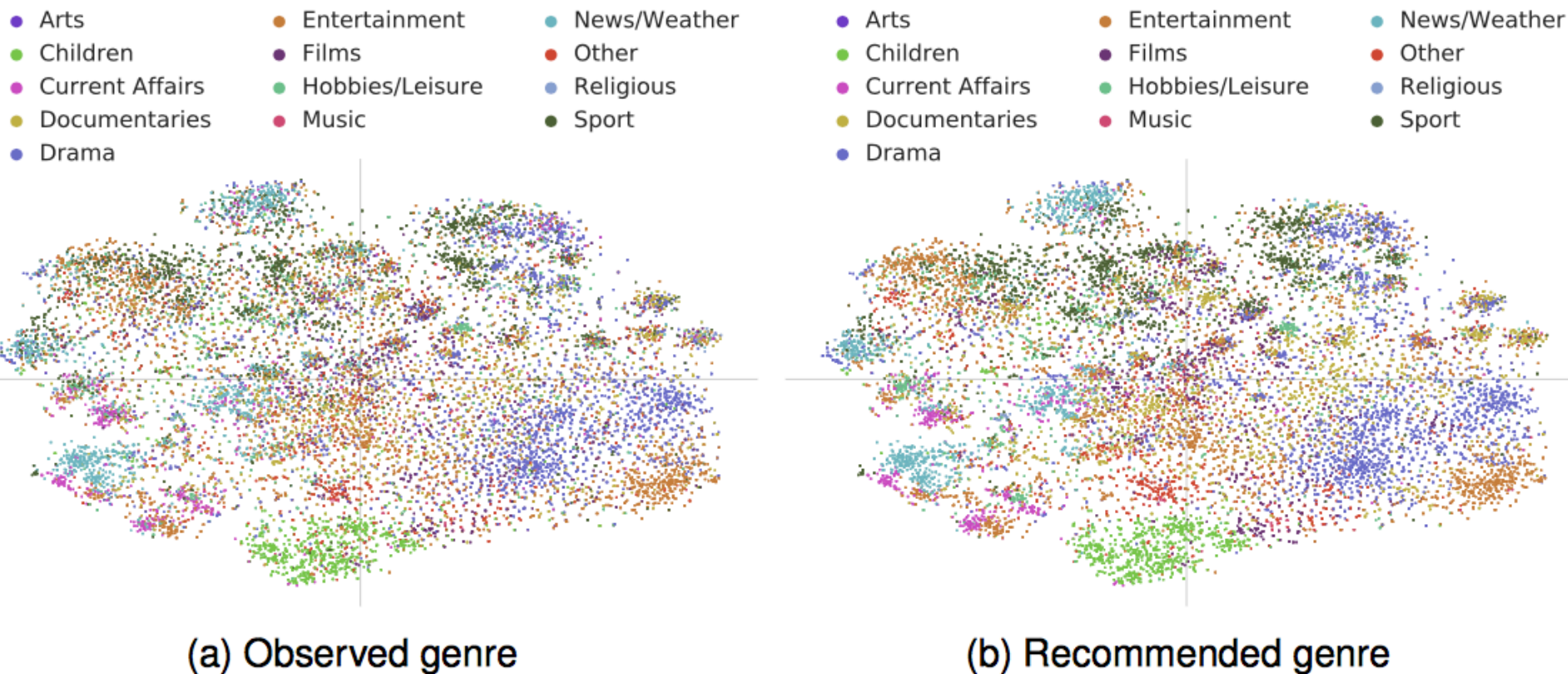
Representation learning for context-aware recommendations



Two nonlinear encoder networks consisting of three fully connected layers each. The first two layers are each defined to have 250 rectified linear units (ReLUs), and the last layer is a linear transformation with 50 units.

MS Kristoffersen, SE Shepstone, and Z-H Tan, "Context-Aware Recommendations for Televisions Using Deep Embeddings with Relaxed N-Pairs Loss Objective," submitted to IEEE T-KDE, 2020.

Representation learning for context-aware recommendations – cont'd



MS Kristoffersen, SE Shepstone, and Z-H Tan, "Context-Aware Recommendations for Televisions Using Deep Embeddings with Relaxed N-Pairs Loss Objective," submitted to IEEE T-KDE, 2020.



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A Deep Dive Into the AI Ecosystem of Silicon Valley

- Applied AI Academy 2019



Akademiet for de
Tekniske Videnskaber



CONSULATE GENERAL
OF DENMARK
Silicon Valley

**INNOVATION
CENTRE
DENMARK**

- The visit covers the entire spectrum of applied AI, from data through algorithms to human centered approaches, including
 - the value of data
 - algorithms and tools
 - global and future perspectives, strategies
 - ethical considerations
 - human-centered approaches
- This gave us a great opportunity to dive into and immerse in the AI ecosystem in Silicon Valley.
- The volume of activities and the amount of investment in AI in Silicon Valley are massive and impressive.



Data, algorithms and tools



ONSET | VENTURES

A **data**-centric vision of the future



NETFLIX

Data-driven decision-making in customer acquisition



lyft

Artificial intelligence in the wild

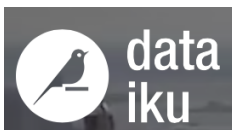


H₂O.ai

Open source **data** & **machine learning**



EGG
SAN FRANCISCO



Human centered AI conference
Dataiku demo



Human-centered AI, ethics, and perspectives



Human centered AI conference



CRISPR, AI and the ethics of scientific discovery



OFFICE OF DENMARK'S TECH AMBASSADOR
Silicon Valley | Copenhagen | Beijing

The global AI landscape



Making the future with foresight



Inside the world's leading innovation culture



Shaping the future by investing in applied AI



Reflections and next steps

- My biggest AHA experience
 - H2O.ai.
 - The scale of investment.
- How do I translate it into my daily work
 - Collaborate with an extended range of industries.
 - Update curricula of my Machine Learning and Deep Learning courses with more use cases and the whole process chain of applied AI, further inspiring students.
- What is HOT and NOT
 - HOT: Apply machine learning to data, leading to AI.
 - NOT: Neither overestimate nor underestimate the effort needed for realizing AI – it is a complete workflow that matters.
- Does and don'ts
 - Does: Identify problems and strengthen collaboration.
 - Don'ts: Not consider it as a matter for AI engineers only.



Thanks for your attention.