2023 Highlights

In 2023, renovations of the Pioneer Centre for Artificial Intelligence (P1) headquarters at the Observatory were completed and the centre officially moved into the building early in the year. Activity levels in the new building remained strong, with our 30 hot-desks for affiliated researchers are used by over 100 regular guests each week, along with frequent meetings and courses in the centre's meeting rooms, demonstrating the collaborative potential and high activity level of the new headquarters.

2023 also saw the completion of the P1 Compute Cluster under the leadership of the P1 Compute Governance Group and the DTU Computing Center.
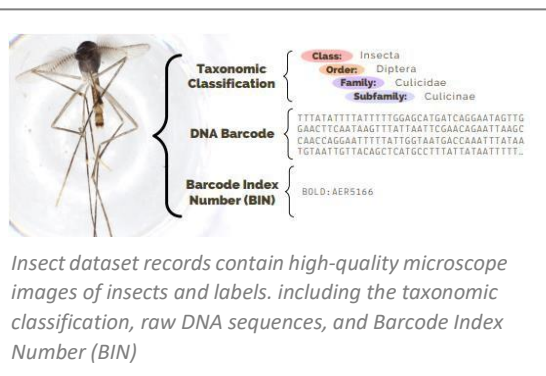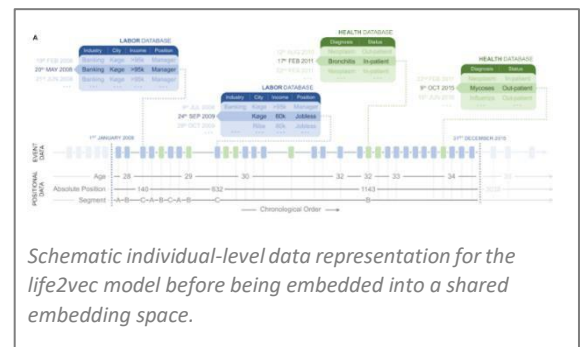

160 participants at the Nordic AI Meet

P1 hosted the second edition of the **Nordic AI Meet** (link), a two-day symposium aimed at early-career researchers for sharing research ideas, methods and theories as well as building up their network in the Nordics. P1 also took concrete steps towards formulating its long-term visions through a **Moonshot Workshop** (link), where all affiliates were invited to push the boundaries of research and brainstorm about the grand visions for their research. Organized around the P1 Collaboratories, each group discussed the state of current research and generated moonshot ideas. Work on developing some of the most promising moonshots started in 2023 and will continue in the future.

Research

Several high-impact projects by P1 co-leads and other researchers capture the nature of P1 research at the intersection of our seven fundamental research directions (collaboratories) and ten areas of societal impact. A few highlights from 2023:

Understanding life outcomes through networks. In *Using sequences of life-events to predict human lives* (cite), co-lead Sune Lehmann and collaborators use a comprehensive Danish registry dataset that includes information about life-events related to health, education, occupation, income, address and working hours to create embeddings of life-events in a single vector space. Their models allow them to predict diverse outcomes ranging from early mortality to personality nuances, outperforming state-of-the-art models by a wide margin.

Schematic individual-level data representation for the life2vec model before being embedded into a shared embedding space.

Insect dataset records contain high-quality microscope images of insects and labels. including the taxonomic classification, raw DNA sequences, and Barcode Index Number (BIN)

The BIOSCAN-1M Insect Dataset. In *A Step Towards Worldwide Biodiversity Assessment: The BIOSCAN-1M Insect Dataset* (cite), Postdoc Joakim Bruslund Haurum presented a novel dataset of more than 1M insect images, allowing for an unprecedented fine-grained study of insects and a better understanding of global biodiversity.

Deep learning for forest biomass estimation. In *Deep learning enables image-based tree counting, crown segmentation, and height prediction at national scale* (cite), co-lead Christian Igel and collaborators apply deep learning techniques to large-scale datasets obtained from various sources such as airborne LiDAR and satellite imagery in order to aid in forest biomass estimation, such counting tree biomass in Denmark for different landscape types.

Results of applying the framework to Danish satellite imagery for individual tree counting, crown segmentation, and height prediction from three major types of landscapes

People

P1 welcomed new research staff and PhD students into the centre. Associate Professor Toine Bogers (ITU) took up a key role as Chief Scientific Officer. Three new co-leads were appointed, and two new faculty members were hired to join P1 using the funding set aside for start-up packages, Teresa Hirzle (UCPH) and Stella Graßhoff (ITU). 14 new PhD students started working in the centre in 2023, representing all five partner universities.