Welcome to the (TA) Machine Learning Workshop

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History

- First workshop October in 2024 at ASIoP
- Organized by ASIoP group and Prof. H. Sagawa for TA members
- In Taipei, Taiwan
- Sponsored by Academia Sinica and JSPS

Purpose

- Deposit sufficient knowledge and skill so that participants can learn from www or apply ML by themselves
- Modernize data-analysis in TA
- There is less emphasis on theory and more on practical skill
  + Hands-on sessions/tutorials
  - Formal talks and lectures
- Build confidence in understanding ML terminology

  → You should be able to talk to ChatGPT/Grok/DeepSeek etc. about this.

13:30 → 17:30 **Machine Learning Workshop: 1st day** **TODAY**

13:30 **Welcome**
Speaker: Anatoli Fedynitch (Institute of Physics, Academia Sinica)

13:40 **Lecture: Basic I - Introduction to machine and deep learning**
Speaker: Anton Prosekin

14:40 **Hands-on: Basic I - Introduction to machine and deep learning** ¶
Speaker: Karolin Hymon (Institute of Physics, Academia Sinica)

09:00 → 13:30 **Machine Learning Workshop: 2nd day** **Thursday**

09:00 **Lecture: Basic II - Architecture Overview & CNN**
Speaker: Anton Prosekin

09:40 **Hands-on: Basic II - Architecture Overview & CNN**
Speakers: Anton Prosekin, Karolin Hymon (Institute of Physics, Academia Sinica)

12:30 Lunch

13:30 → 17:30 **Machine Learning Workshop Day 3 (Advanced) (for all participants)**

13:30 **Lecture: Advanced I - Transformers**
Speaker: Ivan Kharuk (INR RAS)

14:30 **Hands-on: Advanced I - Transformers**
Speakers: Ivan Kharuk (INR RAS), Konstantin Dolgikh

10:30 → 19:00 **Machine Learning Workshop** **Friday**

10:30 **ML workshop software installation training (all participants welcome)**
Supervised session for participants interested in setting up the software environment.

10:30 **TA ML WG meeting 1 (TA only)**

12:30 Lunch

Today's program starts from the Basics relevant in 2025.

The learning curve is steep, so **be focused and ask questions.**

Thursday morning is important for **minimal practical knowledge**. We will discuss relevant architectures and learn using CNNs.

Thursday afternoon relies on knowledge taught earlier. Transformer is currently the most popular/relevant architecture and your chance to understand it.

Friday morning splits in two parallel sessions. A closed session for TA members, and a tutorial for setting up a Python environment for ML (beginners).

09:00 → 17:00 **Machine Learning Workshop Day 3 (Advanced) (for all participants)**

Saturday

09:00 **Lecture: Advanced II - Graph Neural Networks**
Speaker: Konstantin Dolgikh

10:00 **Hands-on: Advanced II - Graph Neural Networks**
Speakers: Ivan Kharuk (INR RAS), Konstantin Dolgikh

12:30 **Lunch**

13:30 **Lecture: Advanced III - Statistical Modeling**
Speaker: Dr Francesca Capel (Max Planck Institute for Physics)

14:30 **Hands-on: Advanced III - Statistical Modeling**
Speaker: Dr Francesca Capel (Max Planck Institute for Physics)

Saturdays's program aims to appeal to advanced learners in particular those interested in topic like event reconstruction (astro-)particle physics and data analysis.

These sessions are open to **all participants**.

Strong recommendations

1. **Ask questions!** From our experience many participants had the same question you're thinking about, even if it appears simple.
2. **Don't be shy if we ask you questions!** Your response helps other particpants to weigh their own thoughts.
3. **Go through the slides/training course again on Wednesday evening by yourself**; this knowledge is needed for Thursday's lectures.
4. **Use the Friday to train yourself**

Resources and links

- Lecture slides, materials, and Zoom recordings inside this GoogleDrive folder.
- Hands-on session **code** and Python **setup instructions** are available on GitHub https://github.com/TA-DNN/TAML2025_ICRR_handson
- **24 GPU-accelerated JupyterLab nodes** at the Academia Sinica Grid Computing Center https://dicos.grid.sinica.edu.tw/
  - Click login in the top right corner
  - Then select “Apps” from the ribbon at the top of the page
  - “Launch”, then “Open” the Jupyterlab box