AI / ML – Technical Session 4 (09.10.2025)

Task 2 – Application Areas:

- *Choose one of the application areas of deep learning. This might be one that we mentioned in this session or something else of particular interest to you.*
- *How is deep learning used in this area?*
- *What impact has deep learning had?*
- *What projects exist (e.g. on Kaggle or GitHub) that you could learn from or even consider contributing to?*

Author note: As I am quite indecisive, I could not choose just one application; below are my top 3 findings.

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1. Medical Imaging

How is deep learning used in this area?

- Deep learning plays an important role in clinical imaging, particularly in identifying and classifying diseases from scans. Convolutional Neural Networks (CNNs) can detect features in X-rays, MRIs, and CT scans with remarkable precision. One can train these models on large datasets to recognise patterns linked to specific conditions such as Pneumonia or tumours.

Impact:

- Accuracy and diagnostic speed have both improved. Clinicians benefit from earlier detection and reduced manual workload, whilst error margins significantly decrease.

Example Projects:

- CheXNet (GitHub): Detects pneumonia in chest X-rays.
- Brain MRI Segmentation (Kaggle): Identifies brain tumours automatically.

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2. Videography and Film Production

How is deep learning used in this area?

- In videography, deep learning assists with scene recognition, object tracking, and even automatic editing. Neural networks can analyse footage to identify key subjects, stabilise shaky clips, and enhance colour grading in real time. One can also generate realistic visual effects using Generative Adversarial Networks (GANs).

Impact:

- Editing workflows have become faster and more precise, allowing filmmakers to focus on creative direction rather than technical clean-up. Deep learning also enables restoration of old footage by upscaling and denoising frames.

Example Projects:

- DeepRemaster (GitHub): Uses CNNs to restore and colourise historical videos.
- Video Enhancement (Kaggle): Projects exploring super-resolution and AI-based video denoising.

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3. Robotics

How is deep learning used in this area?

- Deep learning is used in robotics to improve perception, motion, and decision-making. Through computer vision and reinforcement learning, robots can recognise objects, navigate dynamic spaces, and adapt their actions based on feedback.

Impact:

- Robots can now handle tasks that once required human intuition, such as sorting, inspection, or precise assembly. In service robotics, deep learning contributes to safer interaction between humans and machines.

Example Projects:

- OpenAI Gym Robotics (GitHub): Reinforcement learning environments for robotic control.
- ROS Deep Learning Modules: Neural networks integrated into the Robot Operating System for perception tasks.
