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AI-based Solutions for Climate Change

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About AI

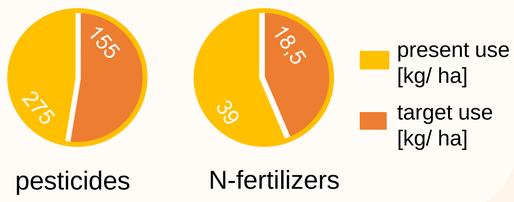
AI = Artificial Intelligence > learning > problem solving > decision making > climate change

Resource Management & Land Use

- Monitoring natural resources.
- Recognition of deforestation, environmental crime, and endangered species.
- Improving agricultural protocols such as in-depth analysis of soil data, climate patterns, and crop productivity.
- Assistance in conservation planning. [1, 2]

Real-life example:

Assessing the usage of agrochemicals with artificial neural networks in paddy cultivations in northeastern Pakistan, resulting in significant reduction of pesticides (52,6%) & nitrogen fertilizers (43,6%).[1,3]



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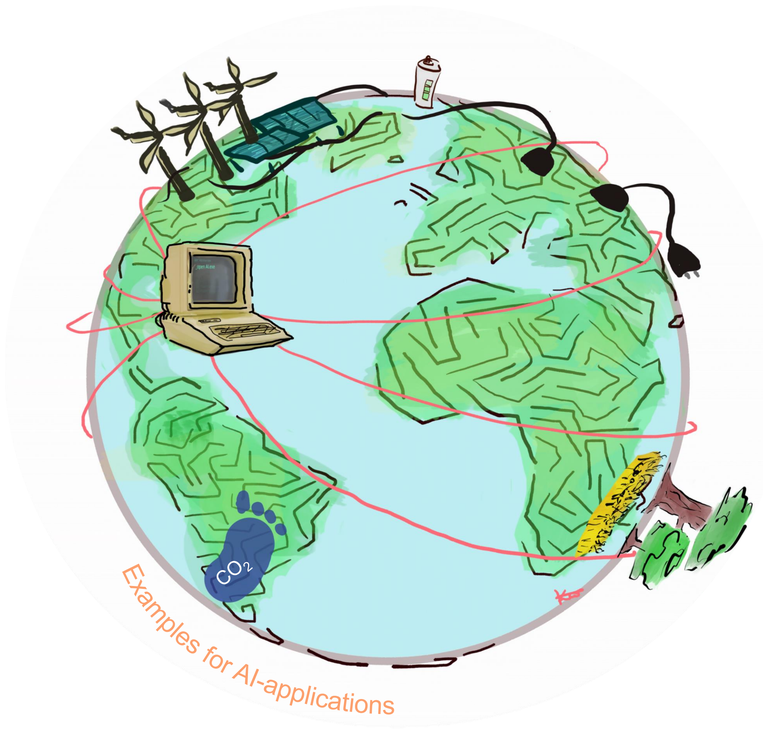
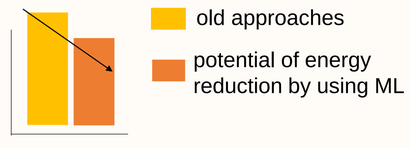


Energy Efficiency

- Managing carbon footprint and emission reduction by energy optimization in buildings, transportation, and industrial processes.
- Forecasting energy generation and demand for efficient energy management.
- Integration of renewable energy sources into the power grid.
- Optimizing energy storage and distribution. [1,2]

Real-life example:

In a commercial building in U.K., it was established a machine learning-based automatic fault detection system to detect faults and proactive notification to building management staff in order to optimize energy expenditure. [5]

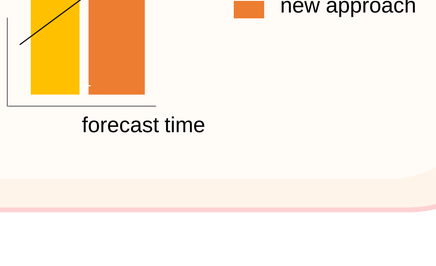


Climate Modelling & Prediction

- Improving climate modelling accuracy for better prediction of weather patterns, long-term climate trends and extreme weather events (e.g. typhoons).
- Aiding in disaster preparedness and response.
- Assessing and understanding the impacts of climate change. [1,2]

Real-life example:

Applying a prediction model based on deep learning to forecast El Niño-Southern Oscillation (ENSO) for the next 1½ years (before: max. 1 year). [4]



Take Home

Artificial Intelligence can **contribute** by providing solutions to:

- **resources management & land use**
- **energy efficiency**
- **climate modelling & forecasting**

References

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2. Rolnick, D. *et al.* Tackling Climate Change with Machine Learning. *ACM Comput. Surv.* 55, 1–96 (2023).
3. Elahi, E., Weijun, C., Zhang, H. & Abid, M. Use of artificial neural networks to rescue agrochemical-based health hazards. A resource optimisation method for cleaner crop production. *Journal of Cleaner Production* 238, (2019).
4. Ham, Y.-G., Kim, J.-H. & Luo, J.-J. Deep learning for multi-year ENSO forecasts. *Nature* 573, 568–572 (2019).
5. Dey, M., Rana, S. P. & Dudley, S. A Case Study Based Approach for Remote Fault Detection Using Multi-Level Machine Learning in A Smart Building. *Smart Cities* 3, 401–419 (2020).