

## Deeplay: Enhancing PyTorch with Customizable and Reusable Neural Networks

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### Abstract

Deeplay is a Python-based deep learning library that extends PyTorch, addressing limitations in modularity and reusability commonly encountered in neural network development. Built with a core philosophy of modularity and adaptability, Deeplay introduces a system for defining, training, and dynamically modifying neural networks. Unlike traditional PyTorch modules, Deeplay allows users to adjust the properties of submodules post-creation, enabling seamless integration of changes without compromising the compatibility of other components. This flexibility promotes reusability, reduces redundant implementations, and simplifies experimentation with neural architectures. Deeplay's architecture is organized around a hierarchy of abstractions, spanning from high-level models to individual layers. Each abstraction operates independently of the specifics of lower levels, allowing neural network components to be reconfigured or replaced without requiring foresight during initial design. Key features include a registry-based system for component customization, support for dynamic property modifications, and reusable modules that can be integrated across multiple projects. As a fully compatible superset of PyTorch, Deeplay enhances its functionality with advanced modularity and flexibility while maintaining seamless integration with existing PyTorch workflows. It extends the capabilities of PyTorch Lightning by addressing not only training loop optimization, but also the flexible and dynamic design of model architectures. By combining the familiarity and robustness of PyTorch with enhanced design flexibility, Deeplay empowers developers to efficiently prototype, refine, and deploy neural networks tailored to diverse machine learning challenges. Deeplay is accompanied by a dedicated GitHub page, featuring extensive documentation, examples, and an active community for support and collaboration [1].

### References

- [1] B. Midtvedt, J. Pineda, H. K. Moberg, H. Bachimanchi, C. Manzo, G. Volpe (2024) Deeplay. <https://github.com/DeepTrackAI/deeplay>

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