

Investigation of Deep Learning for Clinical Applications and Creation of Manual for Effective Utilization of iMed

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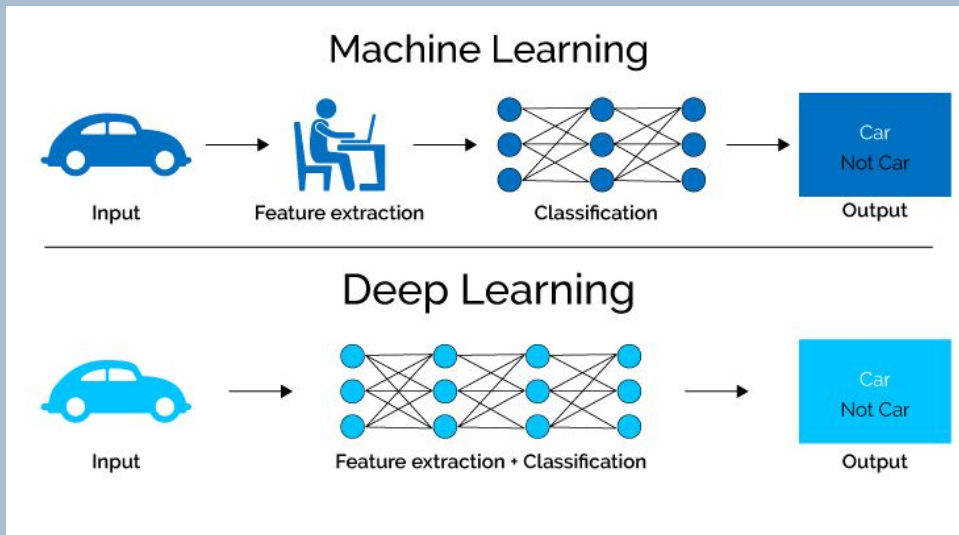
Overview of Project #1

- Manuscript Development for Deep Learning Techniques
 - Objective: Hyperparameter tuning for predicting late onset breast cancer metastasis (BCM)
 - Background: Single Hyperparameter Grid Search (SHGS)
 - Purpose: Exploring clinical applications for deep learning



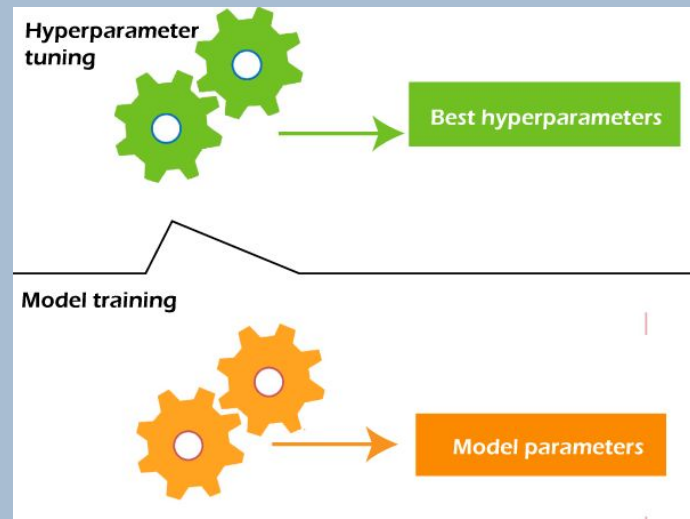
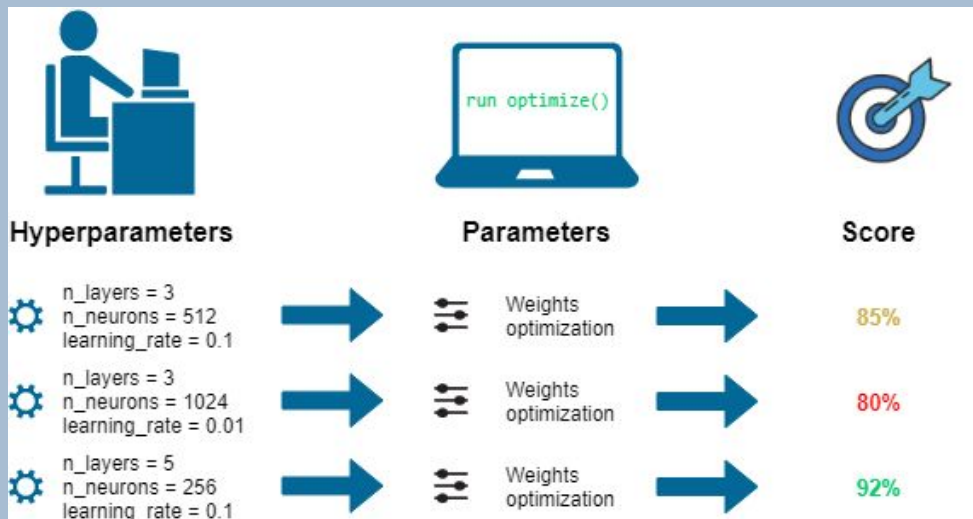
What is Deep Learning

- Subset of machine learning
 - Focuses on training neural networks to perform tasks
 - Aims to mimic the human brain's structure and function



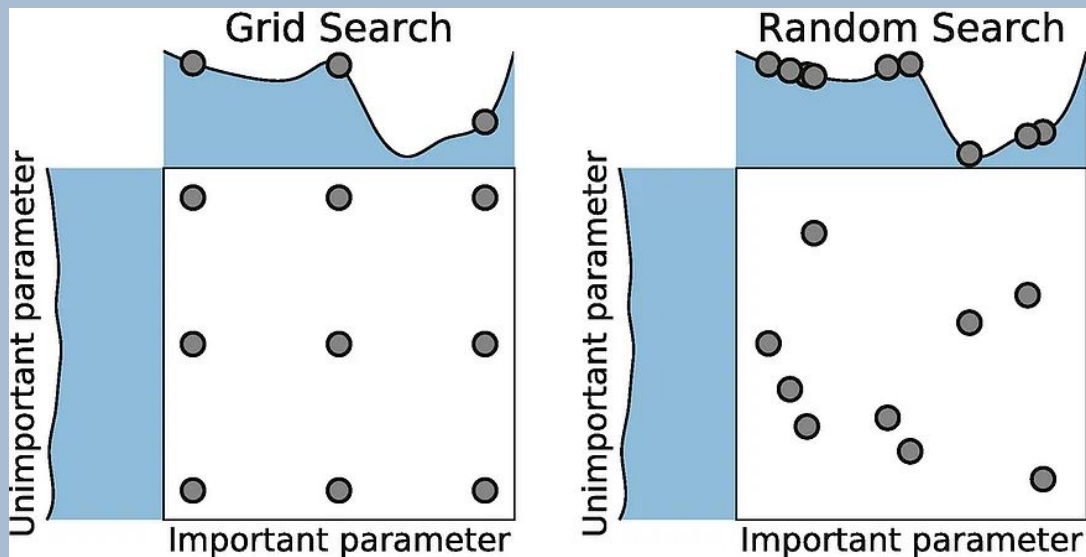
Hyperparameter Tuning

- Settings that control the behavior of deep learning models
- Proper hyperparameter tuning is critical to optimize model performance and achieve better results



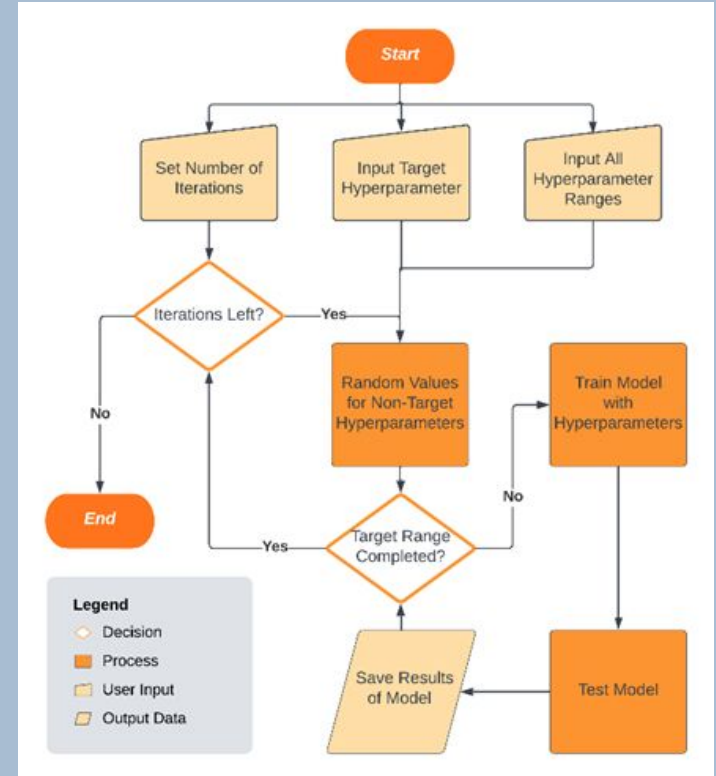
Existing Hyperparameter Tuning Techniques

- Grid Search: Systematically evaluates all combinations
- Random Search: Randomly searches predefined range
- Limitations - Computationally Expensive



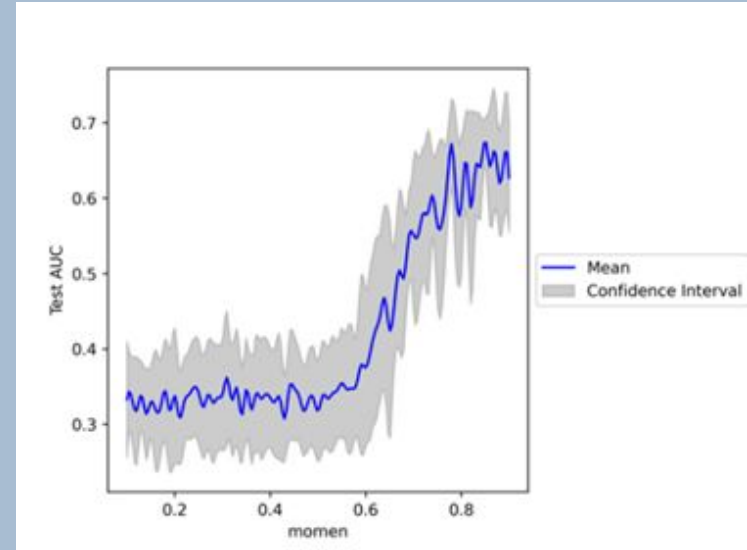
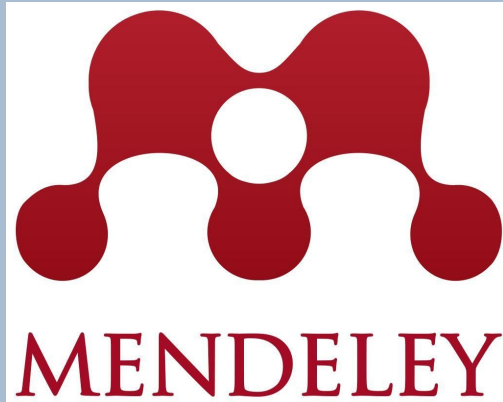
Single Hyperparameter Grid Search (SHGS)

- Assists in searching for a reduced range of hyperparameter values
- Beneficial for subsequent grid searches with a smaller solution space
 - Faster run time
 - More accurate model performance



Methods - Manuscript

- Extensive literature search for knowledge base
 - Agreeing and disagreeing ideas
- Use of Mendeley for reference management
- Creation of Flow chart using Lucidchart
- Python packages for manuscript figures



Overview of Project #2

- Medical Web App User Manual - iMed
 - Objective: Create a user-friendly guide to effectively utilize iMed's functionalities
 - Background: Platform to process, visualize, and analyze medical information
 - Purpose: Enhance medical research and clinical practice through data-driven insights



Methods - iMed

- Use and test the iMed Web App
- Table of Contents using bookmarks
- Flask
- Amazon Web Services (AWS)



Table of Contents



- ▶ 1 Introduction
- 2 Home Page
- 3 iMedBot
- ▶ 4 Data Analysis
- ▲ 5 ODPAC
 - ▶ 5.1. Learn
 - 5.2. Prediction
 - 5.3. Decision Support
- 6 MBIL
- ▶ 7 Datasets
- ▶ 8 Models

Results

- Completed deep learning manuscript and user manual
- Deep Learning Manuscript
 - Key Focus: Investigation of hyperparameter meta tuning
 - Focus on learning rate, momentum, and decay
 - Relationship between hyperparameters and their impact on model performance
 - Key hyperparameters with most influence on model performance
- User Manual
 - Objective: Development of a comprehensive user manual for iMed
 - User-friendly design for professionals and patients alike
 - Incorporated into the web application

Future Directions

- New domains and applications for deep learning techniques
 - Growth of deep learning for other clinical applications
- Improvements that build upon SHGS
- Dissemination and publication
- Develop a user base and gather feedback for iMed



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