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

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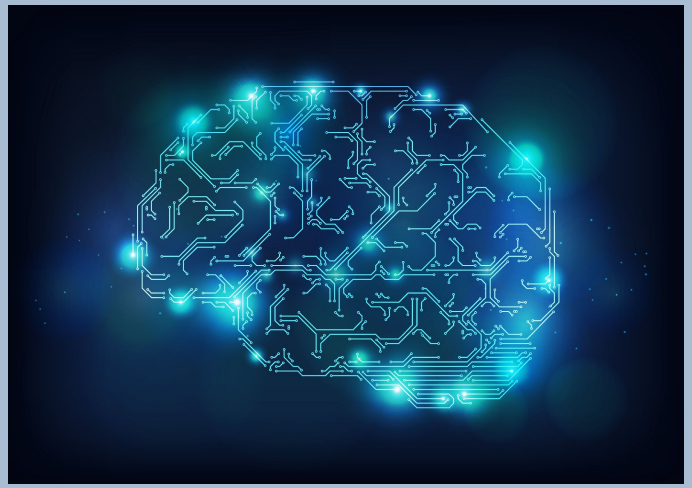
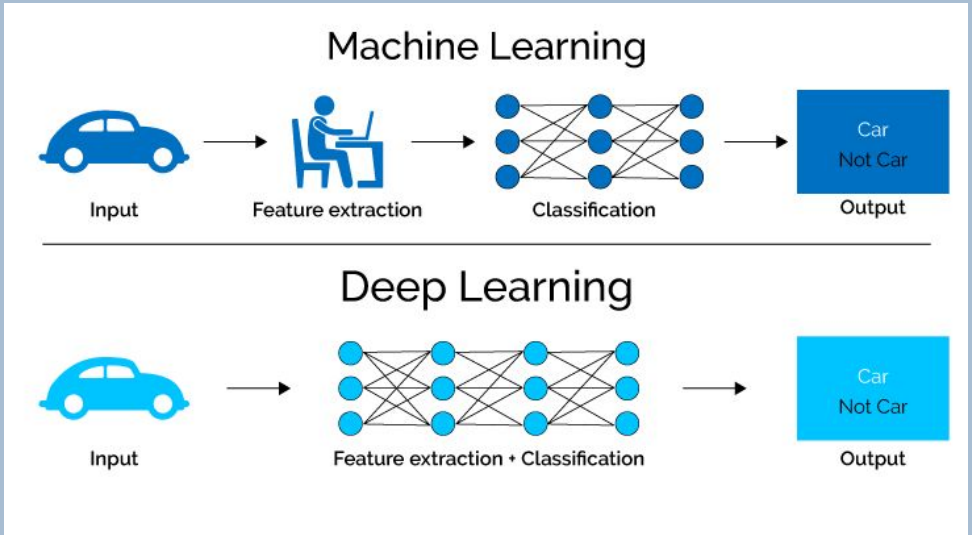
Overview of Project #1

- Collaboration of Manuscript Development: 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



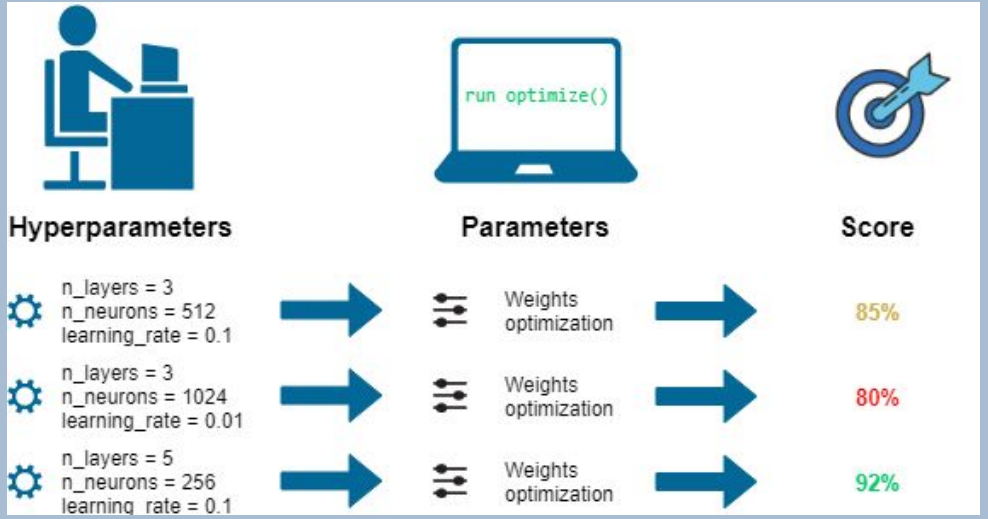
What is Deep Learning

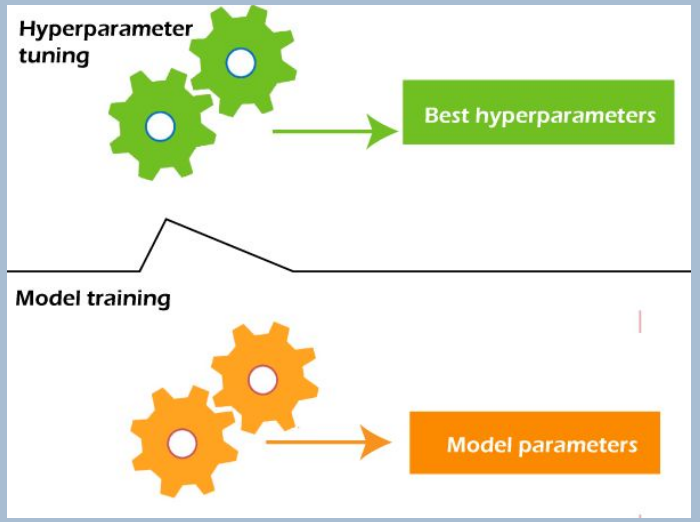
- Subset of machine learning
  - Focuses on training neural networks to perform tasks
  - Aims to mimic the human brain's structure and function



Hyperparameter Tuning

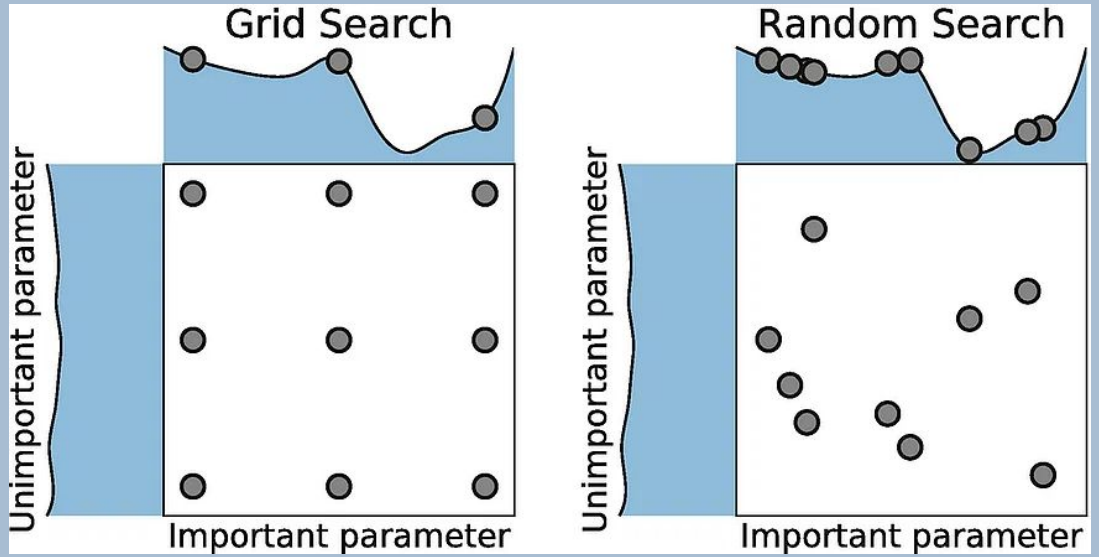
- Settings that control the behavior of deep learning models
- Proper hyperparameter tuning is critical to optimize model performance and achieve better results





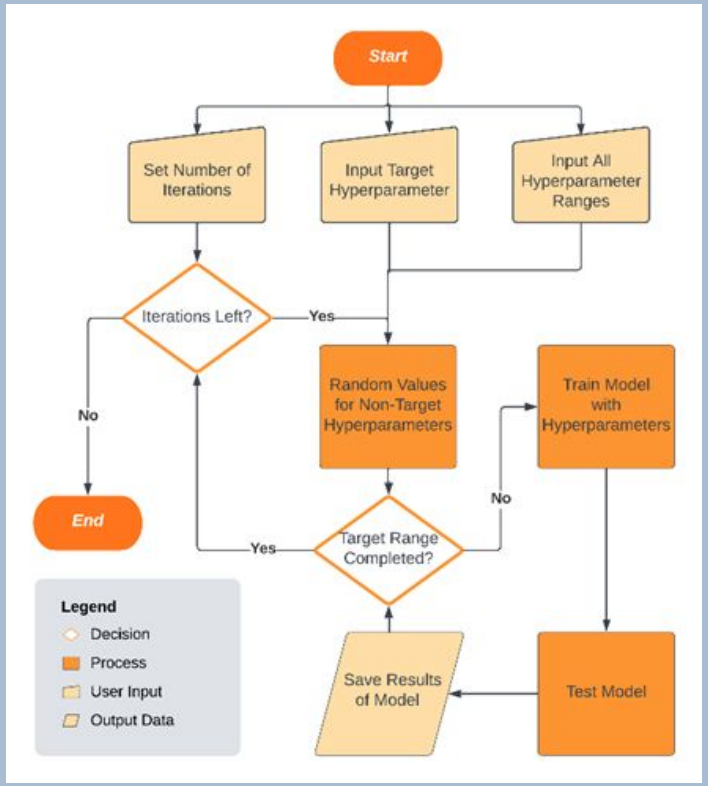
Existing Hyperparameter Tuning Techniques

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



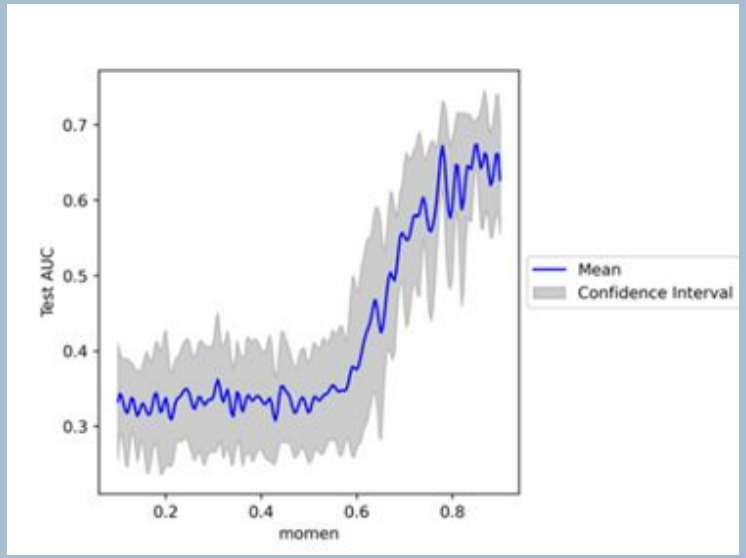
Single Hyperparameter Grid Search (SHGS)

- 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



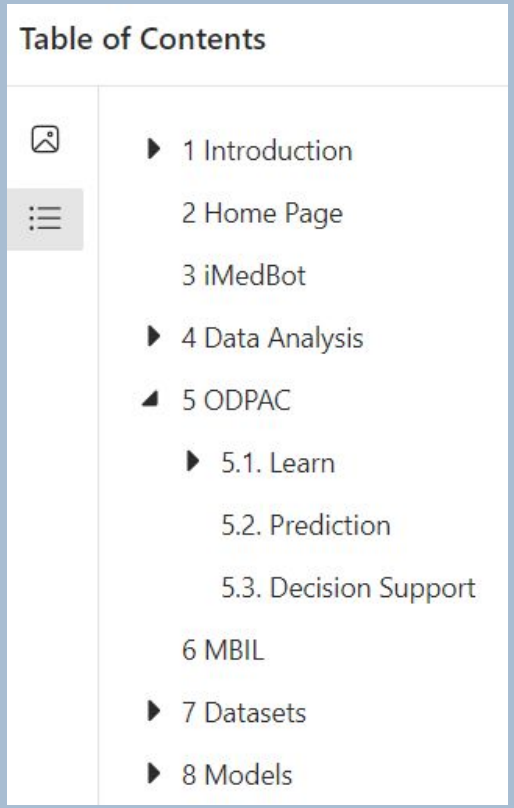
Overview of Project #2

- Medical Web App User Manual - iMed
  - Background: Platform for data mining, machine learning, prediction, and clinical decision support concerning breast cancer
  - Objective: Create a user-friendly guide to effectively utilize iMed’s functionalities
  - Purpose: Enhance medical research and clinical practice through data-driven insights

iMed

Methods - iMed

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



Results

- In progress: Deep Learning Manuscript
  - Completed my initial draft for assigned sections
  - 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 my version 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

Acknowledgements

This work is supported by a DOD grant to Xia Jiang under Award No. W81XWH1910495

Many Thanks to my PI and mentors Dr. Xia Jiang, PhD and Yijun Zhou as well as Dr. David Boone, Steven Jones, the University of Pittsburgh, the UPMC Hillman Cancer Center Academy, and the Department of Biomedical Informatics.

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