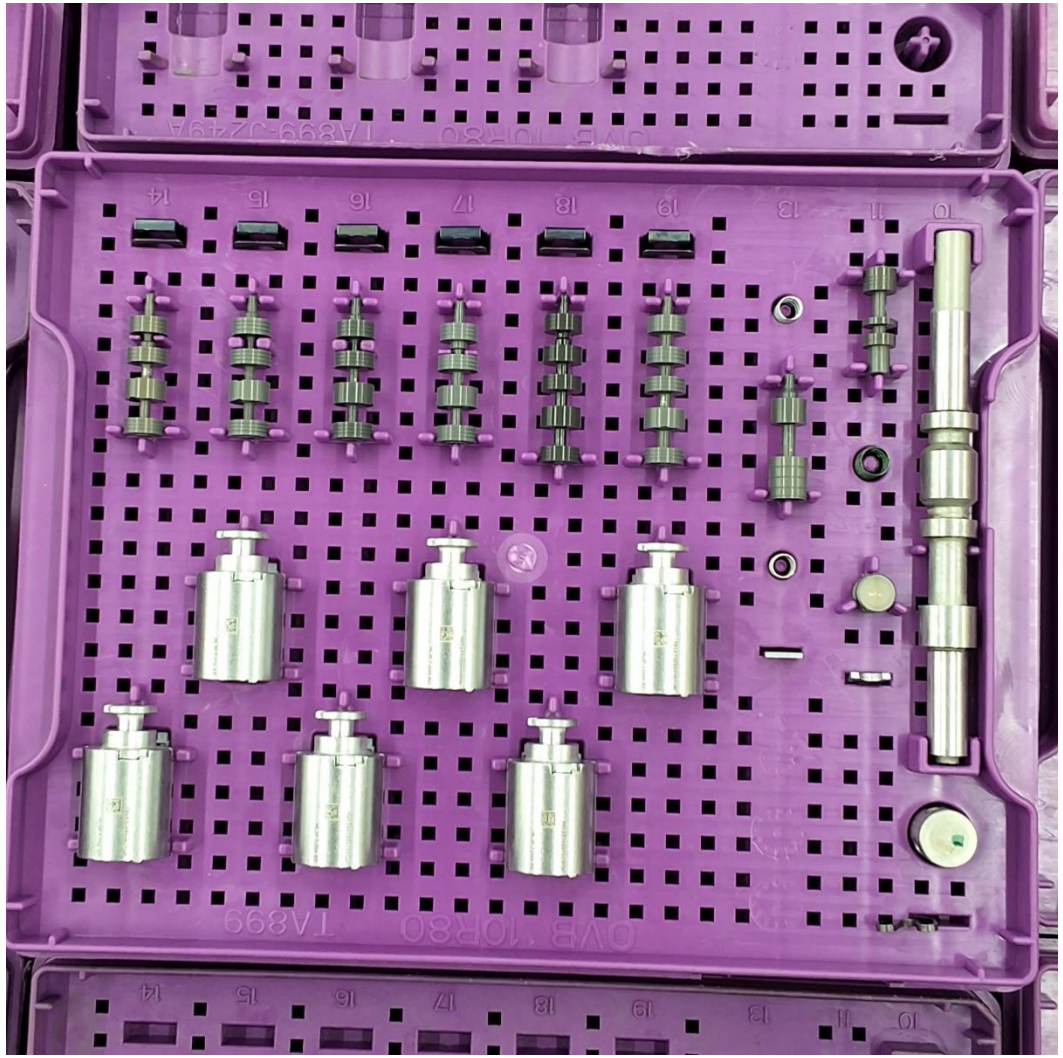
Term Projects: Applying EC techniques to find optimized DL models for suggested projects or your own project

Fall 2025

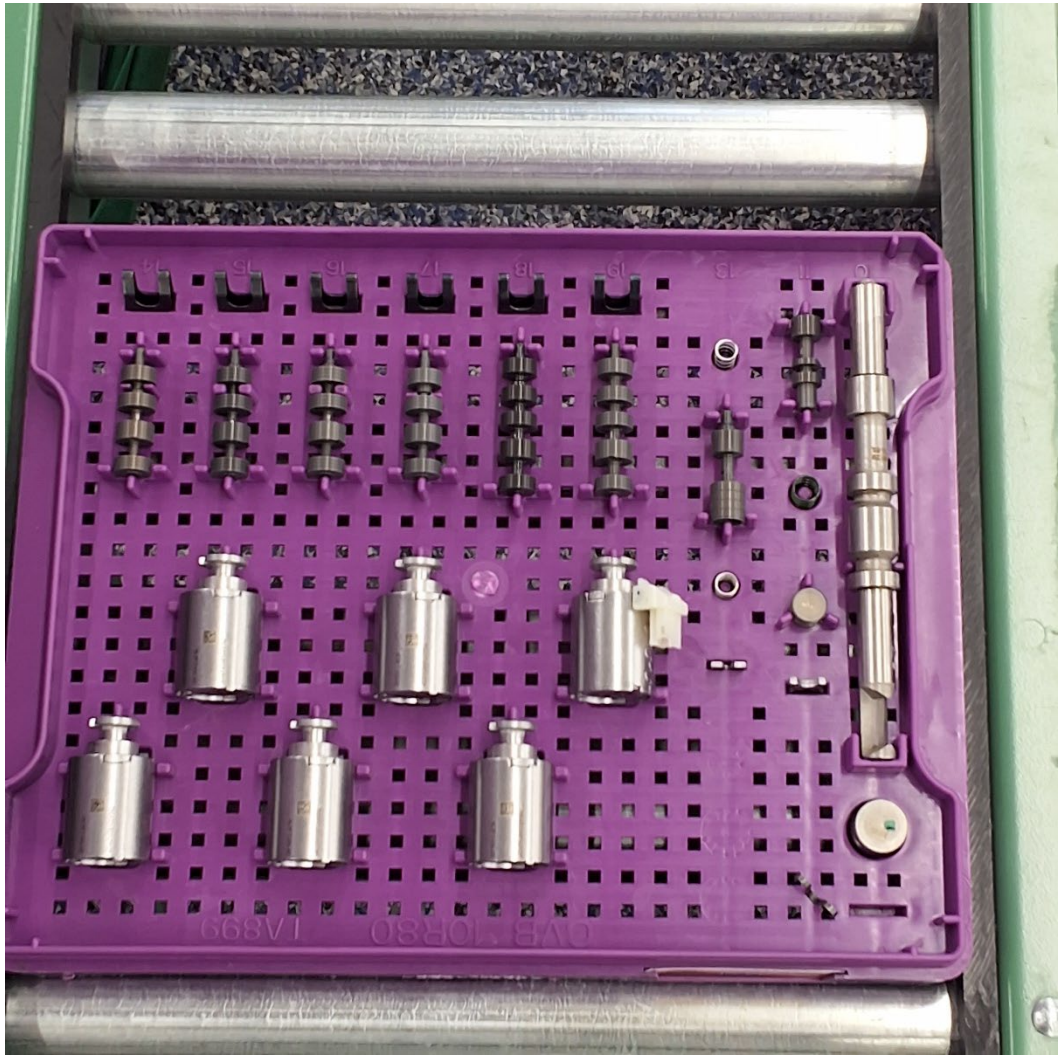
V3 Updated on Oct 22

Suggested Project 1: Find Defective Pallets

- Jayshop: Empowering disenfranchised and disabled workers through gainful employment
- Video: https://photos.app.goo.gl/7MLvciFa5YoqARHXA
- Need GPU



Good



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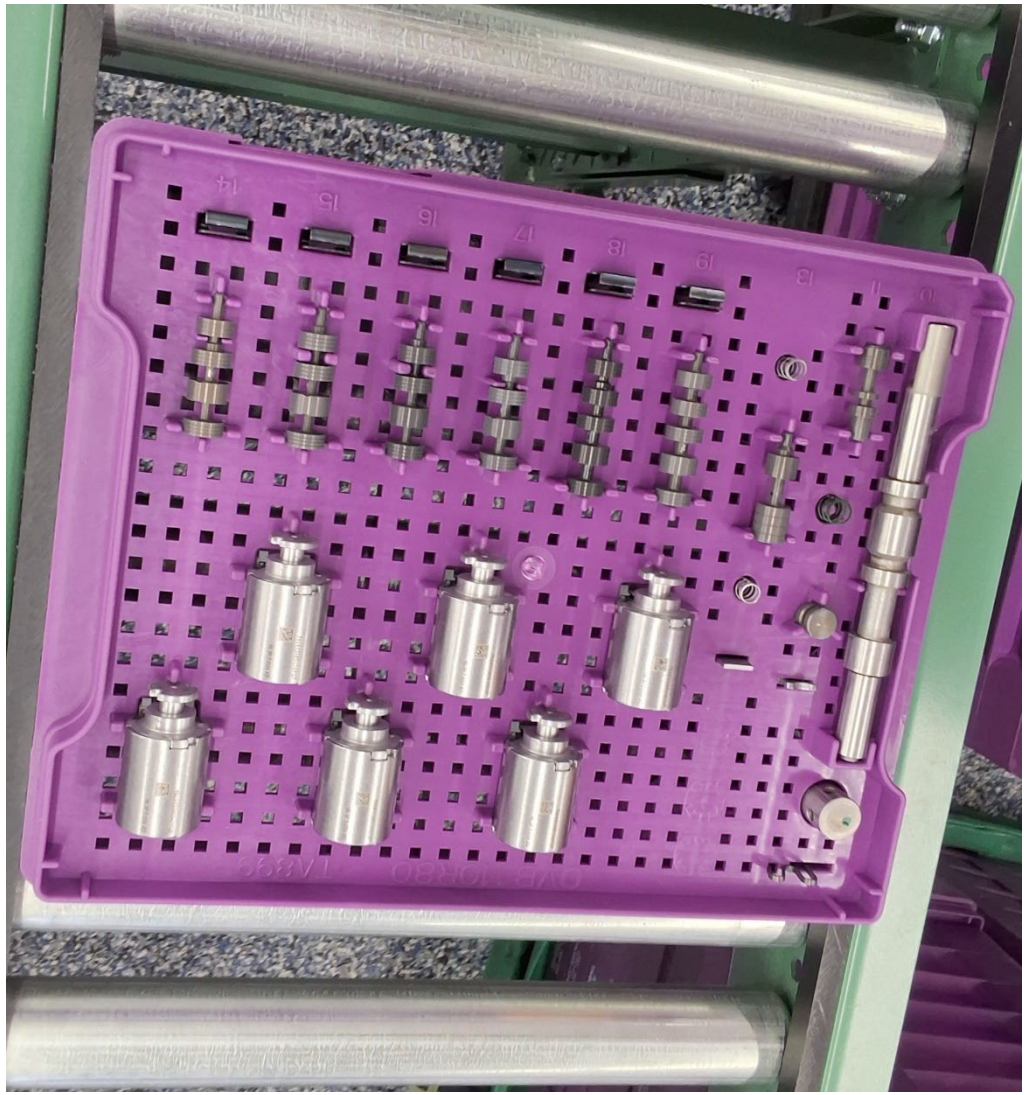
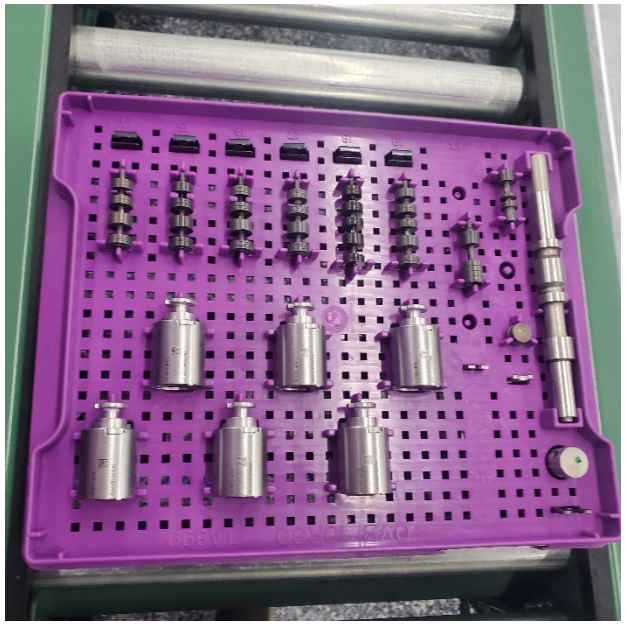
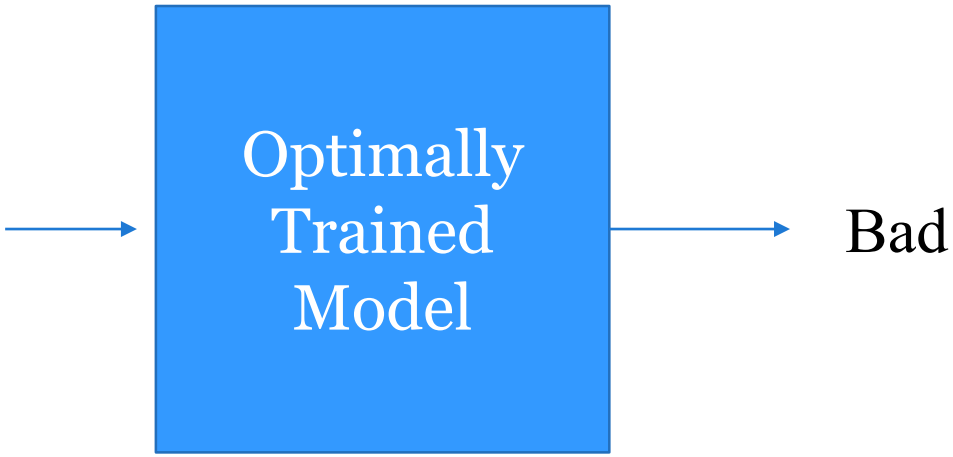


Good

Bad

Test





ES(1+1) with 1/5 rule
Another Evolutionary Algorithm
Random Search

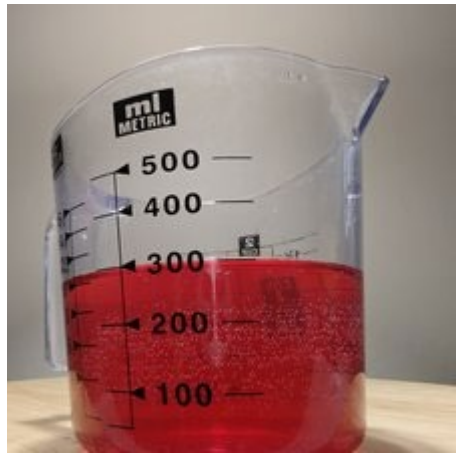
Suggested Project 2: Regression Problem - Estimate the volume of a measuring cup in ML

100 ml

150 ml

200 ml

250 ml



300 ml

350 ml

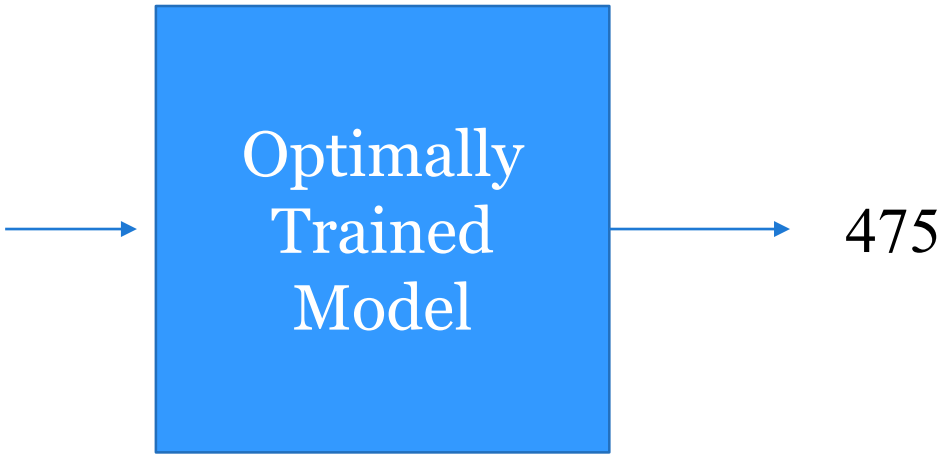
400 ml

450 ml

500 ml

Need GPU

Test



ES(1+1) with 1/5 rule
Another Evolutionary Algorithm
Random Search

Suggested Project 3: Leveraging EC for Your Own Image Classification or regression Problem

- Application must be unique. (Real-world project preferred)
- Required Model Optimization Algorithms
  - ES(1+1) with 1/5 rule
  - Another Evolutionary Algorithm such as using Cov. Matrix or Genetic Algorithms
  - Random Search

Suggested Project 4: Time series forecasting with Multivariate Time Series Datasets – *Extension of HW5*

- ES(1+1) with 1/5 rule
- Another Evolutionary Algorithm such as GA or Cov. Mat.
- Random Search
- You may not need GPU

Suggested Project 5: sequence-to-sequence (seq2seq) time series prediction using "Jena Weather Dataset"

- Seq2Seq time series prediction means using past time-series data (a sequence) to predict future time-series data (another sequence) — not just one next point, but several future steps.
- Multi-step horizons (Not just one step ahead)
- Optimize the model using 2 EAs
- https://www.kaggle.com/datasets/harishedison/jena-weather-dataset/data

Suggested Project 6 – Any research oriented project using EC and DL

- Must prepare a draft poster or paper at the end the semester

Use Discussions to express your initial interest

- Choose one out of 6 suggested projects.
- Group project possible up to 2 members
- **Due by Sat. Oct 18**
- Final decision/approval must be done by **Wed. Oct 22**

Project Evaluation

- Completed as planned?
- Functionality: Work as intended?
- User Interface (if applicable): Is the project user-friendly and accessible?
- Complexity: Is the project appropriately challenging for a senior-level?
- Code quality: Is the code clean, maintainable, and well-documented? Are best practices, standards followed?
- Size: not too small for a semester project?
- Others
  - Innovation? Does the project demonstrate creativity or a novel approach?
  - Scalability: Could the project handle growth in users or data volume?
  - Documentation (Poster, Papers)
  - Peer evaluation
  - …

Project Evaluation II

- Expected final product: A poster for Research Day, April ?, 2026
- Clearly specify the author of each result
- Clearly specify the author of each poster section/subsection
- Peer evaluation

Current Project Proposals (as of Oct 22)

GPU?

Name	Project Title	Notes
Jacob Moore	Genetic Algorithms for Partial Quantization of Resnet-18	CIFAR-10
Abdul Kareem Ansari	Automated Detection of Defective Pallets Using Evolutionary Computation Optimized Deep Learning	CNN+DNN HPO
V Harsha Vardhan Yellela	Deep Food Image Classifier with Binary Expert Layer: A CNN-HPO Approach with ES(1+1)	Need datasource
Venkata Sayee Joginipally, Anirudh Komaragiri	Regression Problem - Estimate the volume of a measuring cup in ML	CNN+DNN HPO
Ravali Kamindla, Gouthami Vasam	Time series forecasting with Multivariate Time Series Datasets. (Extension of HW5 from Suggested Project 4)	
Renuka Jayvant Jagadale	Time series forecasting with Multivariate Time Series Datasets (Extension of HW5)	
Fnu Mohammed Abdul Nafeh	Car Damage Cost Predictor Using Deep Learning Optimized with Evolutionary Algorithms	No dataset
Travis Bowman, Anthony Gabrail	Battery classification and segmentation	No mention about EC
Deepak Goud Nalla	Hand Gesture Recognition using Deep Learning	No mention about EC
Sathwika Kuppirala & Manikanta Jakkidi	Regression Problem: Estimate the volume of a measuring cup in ML(Suggested Project 2)	CNN+DNN HPO

Course Plan

- Quiz #3 from HW4 and HW5 on Wed Oct 29
- HW6 – Covariance Matrix Adaptation
- 1st Project Presentation on Mon. Nov 10
  - Project goals and description
  - Dataset description
  - Any Test Results

} => Poster Abstract

Extra Credit Opportunity 1

- Do the project 5 - sequence-to-sequence (seq2seq) time series prediction using “Jena Weather Dataset”

Extra Credit Opportunity 2

- Do some extra work for your chosen project
- The extra work must be approved by the instructor