**1. Problem Space**

![Cloud Resource Prediction Models](image)

**Resource Scaling:** Choose Model with Highest Prediction Accuracy.

**Overcommitment Policies:** Choose Model that predicts Max value.

**Problem Statement:** Can we select a model based on the pattern of resource usage?

**2. Proposed Approach**

- **1. Label Creation**
- **2. Time Series Similarity**
- **3. Model Selection**

![Input Task](image)

**Metric**

- Time

**Label = Full Time Series**

**3. Pattern-based Comparison**

**Data Representations**
- Numeric: Time Series Data “as-is”
- Image: Graman Angular Difference Field (GADF)

**Comparison Metrics**
- L2 Norm
- Dynamic Time Warping (DTW)
- Structural Similarity Index Measure (SSIM)

**Approach - Combinations**
- I. Numeric – L2
- II. Numeric – DTW
- III. GADF Image - L2
- IV. GADF Image - SSIM

**Methodology:** Run k-means to cluster the time series of the tasks creating 1 cluster per job.

- When using **homogeneous** (very similar) tasks, the clustering is successful for **all approaches**.

**4. Model Selection**

**Approach**
- Numeric – L2
- Numeric – DTW
- GADF Image – L2
- GADF Image – SSIM

**Models selected across approaches to predict task 11 of job 113.**

- Model 380, 382 deliver 10% - 40% error with probability 0.8.

**5. Main Insights**


2. Pattern-based comparisons using **distance-based metrics** are effective for very similar timeseries, but **break** when patterns become **slightly dissimilar** (e.g., time shifted), even with more sophisticated approaches (DTW, image-based). Opportunity for new contributions!

**6. Future Directions**

- **Expand dataset** to more jobs, tasks, patterns, resources, and finer granularity across time windows.
- **Explore more sophisticated ML-based pattern matching.**
- **Use explainable AI** to understand model generalizability.
- **Explore other forecasting models** (ML, statistical).
- **Integrate** pattern-based model selection in use case e.g., resource autoscaler, overcommitment policy.

**References**

![Scan for Paper](image)

![Scan for Code](image)