

# **School of Computer Science and Engineering**

Machine Learning Techniques for Prediction of Time Series Data

**Project Plan and Strategy**

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1. **Project Objective**

This project aims to propose and evaluate innovative machine learning techniques to enhance the accuracy of time series data prediction.

1. **Project Description**

Time series data plays a pivotal role in various domains, including finance, healthcare, and environmental monitoring. In these domains, accurate forecasting within a time series is essential for optimizing operations, reducing risks, and improving outcomes. While existing methods such as Long Short-Term Memory networks (LSTM), Convolutional Neural Network (CNN), and transformers have shown promise, this project aims to push the boundaries of prediction accuracy by exploring cutting-edge state-of-the-art (SOTA) techniques, both with and without the use of transformers.

In this project, the SOTA technique analyzed is the Stationary Wavelet Transform (SWT) technique. SWT is a derivative of discrete wavelet transform (DWT) and its key advantage is its ability to capture both time and frequency information for non-stationary signals. This makes it particularly useful for tasks such as feature extraction, signal denoising and time-frequency analysis. Therefore, this project will evaluate the ability of SWT and propose other techniques in time series data prediction.

1. **Project Scope**

The project will involve the following tasks:

* SOTA Technique evaluation
  + Explore and evaluate Stationary Wavelet Transform (SWT) technique in the area of time series data prediction
* Literature Review
  + Conduct an in-depth review of existing literature and research related to time series data prediction
  + Identify key challenges and gaps in SWT and current approaches in time series data prediction
* Technique identification
  + Select the most promising techniques to implement and evaluate
* Experimental Setup
  + Select diverse time series datasets from different domains for experimentation
  + Establish a controlled experimental setup that includes cross-validation, parameter tuning, etc.
* Implementation
  + Develop code implementations for selected machine learning techniques
  + Conduct rigorous testing to validate the correctness of the code
* Evaluation and Performance Analysis
  + Define the evaluation metrics to assess prediction performance
  + Analyze and interpret the results to compare the proposed techniques with existing methods
* Documentation
  + Maintain detailed documentation of all project activities, including code, experimental results and research findings
  + Prepare an Interim report, Final report, and Oral Presentation

1. **Project Schedule**

The following Gantt chart details the planned project schedule.

A screenshot of a computer

Description automatically generated