Plan Overview

A Data Management Plan created using DMPonline

Title: An Uncertainty-embedded Scheduling with Monte Carlo Simulation for Construction Projects

Creator: Wai Fong

Principal Investigator: Wai Fong

Data Manager: Wai Fong

Project Administrator: Wai Fong

Contributor: Prof. Eric Wai Ming Lee

Affiliation: City University of Hong Kong

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ORCID iD: 0000-0003-1338-2506

Project abstract:

Project scheduling plays a critical role in construction management, influencing cost, resource allocation, and timely delivery. Traditional methods such as the Critical Path Method (CPM) and Program Evaluation Review Technique (PERT) assume deterministic durations and static dependencies, making them inadequate for handling real-world uncertainties like weather disruptions, supply delays, and safety incidents. Recent research has shifted toward probabilistic and simulation-based approaches, integrating metaheuristic algorithms, Building Information Modelling (BIM), and multi-objective optimization to address dynamic conditions and resource constraints. This study proposes a Monte Carlo-based framework for uncertainty-embedded scheduling, which generates multiple schedule scenarios by sampling from probability distributions of task durations and start times. The model evaluates schedule reliability and cost profiles under user-defined confidence intervals, offering a more resilient planning tool compared to conventional methods. A case study demonstrates that while the proposed approach increases project duration and cost compared to CPM, it provides robust schedules without additional resources and supports proactive risk management.

ID: 193784

Start date: 02-09-2024

End date: 05-12-2025

Last modified: 10-01-2026

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An Uncertainty-embedded Scheduling with Monte Carlo Simulation for Construction Projects

Data Collection

What data will you collect or create?

An automatic generated schedule with suggested tasks start date and end date with cost evaluation from the sample of schedules.

- The data will be in .xlsx, .csv, .png
- Yes, the data can be shared.
- No reuse of existing data is required

How will the data be collected or created?

Automatically generated by python script
The results will be evaluated with python script

- Methodology - Statistic
- Structure in auto-generated folders named after the simulation execution date.
- Simulation date is the revision
- Auto reject when the simulation exceeded the set limit

Documentation and Metadata

What documentation and metadata will accompany the data?

- .csv file will be input to python script.
- scheduling python script will generate .xlsx and .csv files
- evaluation python script will generate .xlsx and .png files

Ethics and Legal Compliance

How will you manage any ethical issues?

No sentitive data is used.

How will you manage copyright and Intellectual Property Rights (IPR) issues?

City University of Hong Kong owns the interllectual property rights

Storage and Backup

How will the data be stored and backed up during the research?

The data are stored on cloud services, which can be backed up during the research.

How will you manage access and security?

It is restricted access, only the author can access to the data.

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

Scheduling python script and evaluation python script are long-term value and should be retained.

What is the long-term preservation plan for the dataset?

It is stored on cloud service.

Data Sharing

How will you share the data?

Data can be uploaded to a common platform when necessary.
Reviewer and editor can access to the data when necessary.

Are any restrictions on data sharing required?

- Data sharing agreement is required if python script is requested.
- Simulation results can be shared without any restrictions.

Responsibilities and Resources

Who will be responsible for data management?

Corresponding Author shall be responsible for data sharing. First Author will release data upon instruction from Corresponding Author.

What resources will you require to deliver your plan?

Common resources is required for reading output data