

# Cloud-based Interactive Digital Educational Applications (Cloud IDEA) Project Summary

This project aims to develop a portfolio of relatively simple applications (or apps) to be used as an interactive digital educational platform to facilitate the teaching of programming with an interactive interface on an open-access platform utilizing cloud-based technologies. The platform and its apps are collectively named Cloud-based Interactive Digital Educational Applications (Cloud IDEA).

Eight web apps have been developed:

1. Probability Distributions (<https://cloudidea.algol.xyz/probability-distributions/playground/>)
2. Probability Distribution Fitting (<https://cloudidea.algol.xyz/probability-distribution-fitting/playground/>)
3. Discretization of Probability Distributions (<https://cloudidea.algol.xyz/discretization-of-probability-distributions/playground/>)
4. Monte Carlo Simulation (<https://cloudidea.algol.xyz/monte-carlo-simulation/playground/>)
5. Bayesian Updating (<https://cloudidea.algol.xyz/bayesian-updating-markov-chain-monte-carlo-ensemble-kalman-filter/playground/>)
6. Value of Information (<https://cloudidea.algol.xyz/value-of-information/playground/>)
7. Utility Functions (<https://cloudidea.algol.xyz/utility-functions/playground/>)
8. Stochastic Process (<https://cloudidea.algol.xyz/stochastic-process/playground/>)

The interactive interfaces of the apps have been developed using Dash in Python. Each interactive interface has a control panel where users can change variables and a visualization panel that shows plots, tables, etc. Two former master students in Computational Engineering have been involved intensively in the apps development.

The open-access platform has been realized as a website developed using WordPress with the collaboration with NETTOP. More contents (e.g., explanations of theories, descriptions of codes, user guides, and exercises) for supporting the apps are continuously being added onto the website.

Cloud-based computing is served by Heroku – a platform for deploying and managing web apps. This makes the apps accessible on any smart devices (computers, smartphones, and pads) via internet, and there is no need for any installation or software license for using the apps.

The apps will be used in two courses – MOD500 Modeling for Decision Insight and PET685 Economics and Decision Analysis for Engineers – in the autumn semester 2021. The effect of using the apps in learning will be evaluated with regard of the following aspects:

- Receptiveness: Does using the apps increase students' efficiency of learning and retention of concepts?
- Enjoyment: Is it fun to use the apps? Do students and lecturers enjoy using the apps?
- Enthusiasm: Does using the apps increase students' enthusiasm to learn?
- Engagement: Does using the apps increase students' engagement in discussion?
- Relevance: Are the apps relevant to the course and students' projects and research?
- Usage: How many students use the apps and how often inside and outside class?

The results will be collected by observing, interviewing, and surveying students.