Statistics and Probability

Hafara Firdausi, M.Kom.

00. Introduction

Pengantar

Department of Information Technology
Faculty of Electrical and Intelligent Informatics
Institut Teknologi Sepuluh Nopember

Description

Course Name

Statistics and Probability

Course Code

ET234101

SKS

T=2

Semester

1

Lecturer

Hafara Firdausi

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Schedule

A: Friday 13.30
B: Wednesday 10.00
C: Thursday 12.00

Course Learning Outcomes

Capaian Pembelajaran Mata Kuliah (CPMK) ***Course Learning Outcomes (CLO)***	
CPMK-1	Mahasiswa mampu menjelaskan dan mengaplikasikan metode statistika dasar dalam analisis data, termasuk penggunaan diagram, tabel, dan ukuran statistika deskriptif. *Students are able to explain and apply basic statistical methods in data analysis, including the use of diagrams, tables, and descriptive statistical measures.*
CPMK-2	Mahasiswa mampu menjelaskan dan mengaplikasikan metode statistika inferensial untuk membuat estimasi dan menguji hipotesis berdasarkan sampel data, serta memahami batasan dan interpretasi hasil. *Students are able to explain and apply inferential statistical methods to make estimates and test hypotheses based on data samples, as well as understand the limitations and interpretation of results.*
CPMK-3	Mahasiswa mampu menjelaskan dan mengaplikasikan konsep probabilitas untuk memodelkan dan menganalisis situasi yang melibatkan ketidakpastian, serta memahami distribusi probabilitas diskrit dan kontinu, probabilitas bersyarat, serta Teorema Bayes. *Students are able to explain and apply the concept of probability to model and analyze situations involving uncertainty, as well as understand discrete and continuous probability distributions, conditional probability, and Bayes' Theorem.*
CPMK-4	Mahasiswa mampu mengumpulkan, membersihkan, dan mengeksplorasi data untuk analisis statistik. *Students are able to collect, clean, and explore data for statistical analysis.*

Tools

- *Python*
- *Anaconda*
- *Jupyter Notebook*

References

- *W. W. Piegorsch. (2015)* ***Statistical Data Analytics****: Foundations for Data Mining, informatics, and knowledge discovery. Wiley.*
- *Aczel, A.D. and Soundapandian, J. (2008)* ***Complete Business Statistics****. 7th Edition, The McGraw-Hill Companies, Inc., New York.*

Learning Plan

Week 1

Introduction to Statistics

- *Data analytics and data mining*
- *Concepts in probability*

Week 2-3

Statistical Distributions

- *Normal distribution*
- *Binomial distribution*
- *Poisson distribution*
- *Eksponensial distribution*

Week 4

Data Manipulation

- *Random sampling and sampling distribution*
- *Data diagnostics and data transformation*

Week 5

Data Visualization

- *Univariate visualization*
- *Bivariate and multivariate visualization*

Week 6-7

Statistical Inference

- *Point estimation*
- *Interval estimation*
- *Testing hypotheses*

Week 8

Quiz

Learning Plan

Week 9

Supervised Learning

- *Simple linear regression*
- *Correlation analysis*

Week 10

Supervised Learning

- *Multiple linear regression*
- *Feature selection*
- *ANOVA*

Week 11

Supervised Learning

- *Generalized linear model*

Week 12

Supervised Learning

- *Classification*
- *k-Nearest neighbor*
- *Tree-based method*
- *Support vector machines*

Week 13

Unsupervised Learning

- *Dimension reduction*
- *Principal component analysis*
- *Exploratory factor analysis*

Learning Plan

Week 14

Unsupervised Learning

- *Clustering and association*

Week 15-16

Final Project

- *Data analytics*
- *Exploratory data analysis*

Evaluation

Assignments	Quiz	Mini Project	Final Project
20%	***20%***	***30%***	***30%***

Rencana Evaluasi	CPMK-1	CPMK-2	CPMK-3	CPMK-4	Bobot
Tugas *Assignments*	V (5%)	V (5%)	V (10%)		20%
Quiz *Quiz*	V (5%)	V (5%)	V (10%)		20%
Proyek Mini *Mini Project*	V (10%)	V (10%)	V (10%)		30%
Proyek Akhir *Final Project*				V (30%)	30%
Bobot CPMK	20%	20%	30%	30%	**100%**

Rules

*Wearing **standard and appropriate** college attire*

***Minimum attendance of 80%** (maximum 3 absences)*

***No makeup exams/demos**, except for illness (with an official medical certificate) or representing the Department/Faculty/ITS in an official event (proven with an official letter/assignment letter)*

Online classes** or **cancellations** will be announced **one day before the scheduled class

*Grade improvements, practicals, and assignments can be done **no later than the 16th week of the course***

*Please be **active** in class ☺*

Any Discussion?

Long Term Assignments

- *Create **Github** account and **Github Repo** for StatProb course, submit it here*
  - *https://forms.office.com/r/PQwrwgMQxS*

- *Start to **learn free Python courses**, here:*
  - *https://www.codecademy.com/learn/learn-python (mandatory)*
  - *https://www.codecademy.com/learn/probability-mssp (mandatory)*
  - *https://www.codecademy.com/learn/python-for-data-science-working-with-data (mandatory)*
  - *Other courses (optional)*

- *Work on the free Python course **asynchronously**, and **upload the code to your GitHub.** I'll check your progress.*