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Batch: T8

PRN: 2020BTECS00112

Assignment 2 – Software Development Frameworks

• List of Frameworks/IDEs/Software

1. Eclipse

- i. Original author: IBM
- ii. Developers: Eclipse Foundation
- iii. Initial release: 1.0 / 29 November 2001
- iv. Stable release: 4.26.0 / 7 December 2022
- v. Preview release: 15 March 2023
- vi. Repository (with cloud support):
- vii. Written in (Languages) :Java and C language
- viii. OS support: Eclipse is a cross-platform software and can run on the following operating systems -
 - a. Windows: Windows 7 or later (32-bit or 64-bit)
 - b. macOS: macOS 10.15 (Catalina) or later (64-bit)
 - c. Linux: Linux distributions that support GTK 3, including Ubuntu and Fedora (64-bit)
- ix. Platform, portability: Eclipse is a cross-platform software platform that can run on various operating systems including Windows, macOS, and Linux. This means that developers can use the same development environment on different systems, which can improve productivity and reduce the need to switch between different tools.
- x. Available in (Total languages) : Java , C/C++, Python, PHP, Scala ,Perl ,Groovy
- xi. List of languages supported : Java , C/C++, Python, PHP, Ruby ,Perl ,Groovy ,XML
- xii. Type (Programming tool, integrated development environment etc.)
- xiii. Website: <https://www.eclipse.org/>
- xiv. Features:
 - a. Code Editing: Eclipse provides an advanced code editor with features such as code highlighting, code folding, and automatic indentation, making it easier to write and maintain code.
 - b. Debugging: Eclipse includes a comprehensive debugging environment that allows developers to step through code, set breakpoints, inspect variables, and view the call stack.
 - c. Code Refactoring: Eclipse provides code refactoring tools that help developers restructure and improve the quality of their code, making it easier to maintain and evolve over time.
- xv. Size (in MB, GB etc.): 182 MB
- xvi. Privacy and Security: Eclipse is an open-source software platform, and as such, the privacy and security of the software is dependent on the community of contributors who maintain and develop the platform. In general, open-source software has the potential to be more secure than proprietary software, as the code is available for review by the community
- xvii. Type of software (Open source/License)
- xviii. If License - Provide details: Eclipse is an open-source software platform and is released under the Eclipse Public License (EPL). The EPL is a free software license that allows users to use, modify, and distribute the software for any purpose, commercial or non-commercial.
- xix. Latest version: 4.11(2019-03)
- xx. Cloud support (Yes/No): Eclipse does not have its own cloud support but it can be run on cloud platforms such as Amazon Web Services (AWS) and Microsoft Azure.
- xxi. Applicability:
 - a. Java Development: Eclipse is particularly well-suited for Java development, and provides a range of tools and plugins specifically designed for this purpose, including a Java development kit, code refactoring tools, and integrated debugging.
 - b. Web Development: Eclipse can be used for web development, with support for HTML, CSS, JavaScript, and other web technologies.
 - c. Mobile Development: Eclipse supports mobile development, with tools for developing Android apps, and plugins for other mobile platforms.

- xxii. Drawbacks (if any):
- Resource Intensive: Eclipse can be resource-intensive and may require a powerful computer, especially when working with large projects or running multiple plugins.
 - Complexity: Eclipse can be complex to set up and use, especially for new users, and may require a learning curve to master all its features and plugins.
 - Slow Performance: Eclipse can be slow at times, particularly when working with large projects or using multiple plugins, which can impact productivity.

2. Android SDK

- Original author: Google
- Developers: Google, Android Open Source Project
- Initial release: 2008
- Stable release: 31.0.2 (February 2022)
- Preview release: N/A
- Repository (with cloud support): <https://android.googlesource.com/>
- Written in (Languages): Java, C++, XML
- Operating System support: Windows, Mac OS X, Linux
- Platform, portability: Mobile operating system, cross-platform
- Available in (Total languages): Multiple
- List of languages supported: See <https://developer.android.com/studio/languages/index.html>
- Type (Programming tool, integrated development environment etc.): Integrated Development Environment (IDE), Software Development Kit (SDK)
- Website: <https://developer.android.com/sdk>
- Features: Android emulator, integrated development environment, debuggers, libraries, sample code, system image, tools for debugging, performance optimization, and more
- Size (in MB, GB etc.): Approximately 1 GB
- Privacy and Security: Depends on the security measures implemented by the developer.
- Type of software (Open source/License): Open source
- If License- Provide details: Android SDK is released under the Apache License 2.0
- Latest version: 31.0.2 (February 2022)
- Cloud support (Yes/No): No
- Applicability: Developing Android applications
- Drawbacks (if any): Initial setup and installation can be complicated and time-consuming. Some components of the SDK may be outdated and require manual updates.

3. NodeJs

- Original author: Ryan Dahl
- Developers: OpenJS Foundation
- Initial release: 2009
- Stable release: v14.16.0 (2022-12-08)
- Preview release: v15.0.0 (2022-10-19)
- Repository (with cloud support): <https://github.com/nodejs/node>
- Written in (Languages): JavaScript and C++
- Operating System support: Windows, macOS, Linux, and Unix
- Platform, portability: Cross-platform
- Available in (Total languages): Not specified
- List of languages supported: JavaScript
- Type (Programming tool, integrated development environment etc.): JavaScript runtime environment
- Website: <https://nodejs.org/>
- Features:
 - Asynchronous event-driven programming
 - Support for multiple programming paradigms (e.g. procedural, functional, and object-oriented)
 - Built-in modules for various tasks (e.g. HTTP, file system, and cryptography)
 - Large, active community and robust ecosystem with numerous packages available.
 - Can be used with popular frontend frameworks such as React and Angular.

- xv. Size (in MB, GB etc.): Not specified
- xvi. Privacy and Security: Open source and third-party packages may have vulnerabilities. It is up to the developers to keep their applications secure.
- xvii. Type of software (Open source/License): Open Source, licensed under the MIT License.
- xviii. Applicability:
 - a. IoT
 - b. Real-Time Chats
 - c. Complex Single-Page Apps
 - d. Streaming Apps
- xix. Drawbacks:
 - a. Reduces performance when handling Heavy Computing Tasks
 - b. Node.js invites a lot of code changes due to Unstable API
 - c. Node.js Asynchronous Programming Model makes it difficult to maintain code

4. DotNet

- i. Original author: Microsoft
- ii. Developers: Microsoft, .NET Community
- iii. Initial release: 2000
- iv. Stable release: 6.0 (November 2021)
- v. Preview release: 6.0.0-preview.5 (February 2023)
- vi. Repository (with cloud support): <https://github.com/dotnet/runtime>, <https://github.com/dotnet/sdk>
- vii. Written in (Languages): C#, F#, Visual Basic .NET
- viii. Operating System support: Windows, macOS, Linux
- ix. Platform, portability: Cross-platform
- x. Available in (Total languages): Multiple
- xi. List of languages supported: See <https://dotnet.microsoft.com/languages>
- xii. Type (Programming tool, integrated development environment etc.): Development platform
- xiii. Website: <https://dotnet.microsoft.com/>
- xiv. Features: .NET runtime, .NET libraries, .NET Compiler, .NET Tools
- xv. Size (in MB, GB etc.): Varies based on the installation type and components selected
- xvi. Privacy and Security: Microsoft follows industry-standard security practices and implements security features within .NET
- xvii. Type of software (Open source/License): Open source
- xviii. If License- Provide details: .NET is released under the MIT License
- xix. Latest version: 6.0 (November 2021)
- xx. Cloud support (Yes/No): Yes
- xxi. Applicability: Developing and running modern applications on Windows, macOS, and Linux
- xxii. Drawbacks (if any): May have a steeper learning curve for those unfamiliar with Microsoft technologies, may have performance limitations compared to other development platforms.

5. Ruby on Rails

- i. Original author: David Heinemeier Hansson
- ii. Developers: Ruby on Rails Core Team, Ruby on Rails Community
- iii. Initial release: July 2004
- iv. Stable release: 6.1.4 (February 8, 2023)
- v. Preview release: N/A
- vi. Repository (with cloud support): <https://github.com/rails/rails>
- vii. Written in (Languages): Ruby
- viii. Operating System support: Cross-platform (OS X, Windows, Linux)
- ix. Platform, portability: Web application framework, Portable
- x. Available in (Total languages): 40+
- xi. List of languages supported: See <https://www.railslanguages.com/>

- xii. Type (Programming tool, integrated development environment etc.): Web application framework, Model-View-Controller (MVC)
- xiii. Website: <https://rubyonrails.org/>
- xiv. Features: Model-View-Controller (MVC) architecture, convention over configuration, active record pattern, action view templates, action mailer, active storage, action cable
- xv. Size (in MB, GB etc.): Approximately 61 MB (source code)
- xvi. Privacy and Security: Ruby on Rails has strong security features, but ultimately it depends on the implementation of the developer
- xvii. Type of software (Open source/License): Open source
- xviii. If License- Provide details: Ruby on Rails is released under the MIT License
- xix. Latest version: 6.1.4
- xx. Cloud support (Yes/No): No native cloud support, but it can be deployed to various cloud platforms
- xxi. Applicability: Developing web applications
- xxii. Drawbacks (if any): Can have a steeper learning curve compared to other web application frameworks, performance can be an issue for very large applications.

6. Anaconda

- i. Original author: Continuum Analytics
- ii. Developers: Anaconda, Inc.
- iii. Initial release: 2012
- iv. Stable release: Anaconda Navigator 1.13.1 (2022-10-07)
- v. Preview release: N/A
- vi. Repository (with cloud support): Anaconda Repository (<https://anaconda.org/>), Anaconda Cloud (<https://anaconda.cloud/>)
- vii. Written in (Languages): Python, R
- viii. Operating System support: Windows, macOS, Linux
- ix. Platform, portability: Cross-platform
- x. Available in (Total languages): N/A
- xi. List of languages supported: Python, R
- xii. Type (Programming tool, integrated development environment etc.): Distribution of Python and R programming languages and tools for scientific computing and data science
- xiii. Website: <https://www.anaconda.com/>
- xiv. Features: Package management and deployment, Python and R language support, Jupyter notebooks, IDE integration, Data visualization, Machine learning
- xv. Size (in MB, GB etc.): Depends on the version and installation type, typically a few GBs.
- xvi. Privacy and Security: Anaconda takes privacy and security seriously, following industry standards and best practices.
- xvii. Type of software (Open source/License): Proprietary license
- xviii. If License- Provide details: Anaconda is licensed under the Anaconda Individual Edition license agreement.
- xix. Latest version: Anaconda Navigator 1.13.1 (2022-10-07)
- xx. Cloud support (Yes/No): Yes
- xxi. Applicability: Data science, scientific computing, machine learning, deep learning, data visualization, data analysis, and more.
- xxii. Drawbacks (if any): Some users may find the size and resource usage of the distribution to be a concern. Additionally, proprietary licenses may not be suitable for all users and projects.

7. Google Colab

- i. Original author: Google
- ii. Developers: Google engineers
- iii. Initial release: April 2014
- iv. Stable release: October 2021
- v. Preview release:

- vi. Repository (with cloud support): The repository is called "googlecolab" and it contains the source code and documentation for Google Colab, an interactive Jupyter-style environment for developing and running machine learning code in the cloud. The repository is open source, and contributions from the community are welcome.
- vii. Written in (Languages): Google Colab is primarily written in Python, and uses the Jupyter Notebook interface.
- viii. Operating System support: Any device.
- ix. Platform, portability: Google Colab is a cloud-based platform, which means that it runs on remote servers and the user interacts with it through a web browser. This makes Colab highly portable and accessible from anywhere with an internet connection. Additionally, the Jupyter Notebook interface of Colab makes it easy to share and collaborate on code and projects, as notebooks can be shared and edited by multiple users in real-time. This makes Colab a highly accessible and portable platform for machine learning and data science.
- x. Available in (Total languages): Google Colab supports a variety of programming languages, including: Python, R, TensorFlow, PyTorch, Keras
- xi. List of languages supported: Scala, Julia, MATLAB, Lua
- xii. Type (Programming tool, integrated development environment etc.):
 - a. Google Colab is an online, cloud-based platform that provides an interactive Jupyter-style environment for developing and running code. It can be classified as:
 - b. Interactive development environment (IDE) for machine learning and data science: Colab provides a web-based interface for developing, running, and sharing code, along with many tools and resources for data analysis and machine learning.
 - c. Jupyter Notebook platform: Colab is based on the Jupyter Notebook interface, which is a popular platform for developing and sharing interactive documents that contain code, text, and other multimedia elements.
 - d. Cloud-based platform: Colab runs on Google's cloud infrastructure, which means that users can access their notebooks and run code from anywhere with an internet connection, without having to worry about the underlying hardware or software.
- xiii. Website: <https://colab.research.google.com/>
- xiv. Features:
 - a. Jupyter Notebook interface: Colab provides an easy-to-use, interactive environment for writing and running code, along with rich text and multimedia elements.
 - b. Cloud-based platform: Colab runs on Google's cloud infrastructure, which means that users can access their notebooks from anywhere with an internet connection, without having to worry about the underlying hardware or software.
 - c. Support for multiple programming languages: Colab supports a wide range of programming languages, including Python, R, TensorFlow, PyTorch, and more.
 - d. Access to powerful hardware: Colab provides access to high-performance GPUs and TPUs, which can be used for training large machine learning models and running complex computations.
 - e. Easy sharing and collaboration: Colab makes it easy to share notebooks and collaborate with others on projects, as notebooks can be shared and edited by multiple users in real-time.
 - f. Integration with Google Drive: Colab notebooks can be saved directly to Google Drive, making it easy to store and access projects from multiple devices.
 - g. Free and open source: Colab is a free, open-source platform, which makes it accessible to anyone who wants to use it.
- xv. Size (in MB, GB etc.): It is cloud based so size is not specified.
- xvi. Privacy and Security
 - a. Google Colab uses the security infrastructure of Google Cloud, which includes robust access controls, network security, and physical security to protect user data. However, as with any cloud-based service, users should be aware of the potential privacy and security risks associated with storing and processing data in the cloud.
 - b. In terms of privacy, Google Colab is subject to Google's privacy policy, which may include the collection and use of user data for various purposes, such as improving the service, providing personalized content and advertisements, and complying with legal requirements.
- xvii. Type of software (Open source/License): Open source

- xviii. If License- Provide details.
- xix. Latest version: Latest version of Google Colab is "Colab Pro".
- xx. Cloud support (Yes/No): Yes
- xxi. Applicability: Google Colab is suitable for:
 - a. Machine Learning and Deep Learning experimentation and development.
 - b. Data analysis and visualization.
 - c. Collaborative coding and sharing of notebooks.
 - d. Running Jupyter notebooks in the cloud with free GPU and TPU support.
 - e. Education and research in the field of AI and data science.
- xxiii. Drawbacks (if any)
 - a. Limited computational resources and storage, compared to personal computers or dedicated servers.
 - b. Timeout for long running processes and idle notebooks.
 - c. Dependent on a stable internet connection.
 - d. Limited customization options and pre-installed packages.
 - e. Limited integration with Google Drive and other Google services.

8. Django

- i. Original author: Adrian Holovaty and Simon Willison
- ii. Developers: Django Software Foundation, Django community
- iii. Initial release: July 2005
- iv. Stable release: 3.2 (January 2022)
- v. Preview release: N/A
- vi. Repository (with cloud support): <https://github.com/django/django>
- vii. Written in (Languages): Python
- viii. Operating System support: Cross-platform
- ix. Platform, portability: Web framework, cross-platform
- x. Available in (Total languages): Multiple
- xi. List of languages supported: English
- xii. Type (Programming tool, integrated development environment etc.): Web framework
- xiii. Website: <https://www.djangoproject.com/>
- xiv. Features: URL routing, template engine, Object-Relational Mapping (ORM), administrative interface, middleware support, caching, serialization, and more
- xv. Size (in MB, GB etc.): Approximately 15 MB
- xvi. Privacy and Security: Depends on the security measures implemented by the developer
- xvii. Type of software (Open source/License): Open source
- xviii. If License- Provide details: Django is released under the BSD 3-Clause "New" or "Revised" License
- xix. Latest version: 3.2 (January 2022)
- xx. Cloud support (Yes/No): Yes
- xxi. Applicability: Developing web applications, especially complex ones
- xxii. Drawbacks (if any): Steep learning curve, less flexibility compared to other web frameworks, can lead to performance issues for large and complex projects.

9. Vue.js

- i. Original author: Evan You
- ii. Developers: Vue.js community, Evan You
- iii. Initial release: February 2014
- iv. Stable release: 3.7.0 (January 2022)
- v. Preview release: N/A
- vi. Repository (with cloud support): <https://github.com/vuejs/vue>
- vii. Written in (Languages): JavaScript
- viii. Operating System support: Cross-platform
- ix. Platform, portability: JavaScript framework, cross-platform
- x. Available in (Total languages): Multiple
- xi. List of languages supported: English
- xii. Type (Programming tool, integrated development environment etc.): JavaScript framework

- xiii. Website: <https://vuejs.org/>
- xiv. Features: Reactive data binding, template-based view components, Vue CLI, official templates, and more
- xv. Size (in MB, GB etc.): Approximately 30 KB (minified and gzipped)
- xvi. Privacy and Security: Depends on the security measures implemented by the developer
- xvii. Type of software (Open source/License): Open source
- xviii. If License- Provide details: Vue.js is released under the MIT License
- xix. Latest version: 3.7.0 (January 2022)
- xx. Cloud support (Yes/No): Yes
- xxi. Applicability: Developing user interfaces and single-page applications
- xxii. Drawbacks (if any): Steep learning curve compared to other JavaScript frameworks, less developed ecosystem compared to React and Angular.

10. GitHub

- i. Original author: Tom Preston-Werner, Chris Wanstrath, and PJ Hyett
- ii. Developers: GitHub Inc. and its community of contributors.
- iii. Initial release: n/a (continuously updated)
- iv. Stable release: n/a (continuously updated)
- v. Preview release: February 2008
- vi. Repository (with cloud support): Yes
- vii. Written in (Languages): Ruby, Go, JavaScript, Erlang
- viii. Operating System support: Web-based, available on Windows, MacOS, Linux
- ix. Platform, portability: Web-based, accessible from any device with an internet connection
- x. Available in (Total languages): Over 20
- xi. List of languages supported: See <https://github.com/github/linguist> for a complete list
- xii. Type (Programming tool, integrated development environment etc.): Version control repository, web-based Git management tool
- xiii. Website: <https://github.com/>
- xiv. Features: Code hosting and collaboration, issue tracking, project management, continuous integration and deployment, wikis, gists, etc.
- xv. Size (in MB, GB etc.): Varies by repository
- xvi. Privacy and Security: Supports private and public repositories with configurable privacy settings, offers security features like two-factor authentication and encryption at rest.
- xvii. Type of software (Open source/License): Proprietary software with various open-source components, some public repositories are open source.
- xviii. If License- Provide details: GitHub's proprietary license can be found at <https://help.github.com/en/github/site-policy/github-terms-of-service>. Some open-source projects hosted on GitHub are subject to the respective open-source license.
- xix. Latest version: n/a (continuously updated)
- xx. Cloud support (Yes/No): Yes, GitHub offers cloud-based hosting services
- xxi. Applicability: Software development teams, open-source projects, individual developers, etc.
- xxii. Drawbacks (if any): Limited control over server configuration and infrastructure for some users, user interface may not be intuitive for all users, costs for private repositories and advanced features.

11. React

- i. Original author: Jordan Walke
- ii. Developers: Facebook, React community
- iii. Initial release: March 2013
- iv. Stable release: 17.0.2 (February 2022)
- v. Preview release: N/A
- vi. Repository (with cloud support): <https://github.com/facebook/react>
- vii. Written in (Languages): JavaScript
- viii. Operating System support: Cross-platform
- ix. Platform, portability: JavaScript library, cross-platform
- x. Available in (Total languages): Multiple

- xi. List of languages supported: English
- xii. Type (Programming tool, integrated development environment etc.): JavaScript library
- xiii. Website: <https://reactjs.org/>
- xiv. Features: Virtual DOM, reactive data binding, server-side rendering, JSX, hooks, and more.
- xv. Size (in MB, GB etc.): Approximately 100 KB (minified and gzipped)
- xvi. Privacy and Security: Depends on the security measures implemented by the developer
- xvii. Type of software (Open source/License): Open source
- xviii. If License- Provide details: React is released under the MIT License
- xix. Latest version: 17.0.2 (February 2022)
- xx. Cloud support (Yes/No): Yes
- xxi. Applicability: Developing user interfaces and single-page applications
- xxii. Drawbacks (if any): Steep learning curve for beginners, limited documentation for complex scenarios, large size compared to other JavaScript libraries.

- Implement linear regression problem using Google Colab (Perform pre-processing, training and testing), Anaconda, Eclipse.

Dataset used: <https://archive.ics.uci.edu/ml/datasets/Bike+Sharing+Dataset>

We use scikit-learn to perform linear regression on the dataset.

- i. **Load the data:** Load the bike sharing dataset into a pandas data-frame and inspect the data to understand the features and target variable.
- ii. **Pre-processing:** Perform any necessary data pre-processing steps such as handling missing values, encoding categorical variables, and scaling numeric features.
- iii. **Feature Selection:** Select the features that will be used for training the linear regression model. You may use statistical methods or domain knowledge to choose the most relevant features.
- iv. **Split the data:** Split the data into training and testing sets so that you can evaluate the performance of the model on unseen data.
- v. **Train the model:** Train a linear regression model using the training data.
- vi. **Evaluate the model:** Evaluate the performance of the model using appropriate metrics such as mean squared error, mean absolute error, R-squared, etc.
- vii. **Make predictions:** Use the final model to make predictions on new, unseen data.

Code:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
bike=pd.read_csv('day.csv')
bike
bike.info()
bike.head()
y=bike['cnt']
X=bike[['season','mnth','holiday','weekday','workingday','weathersit','temp','atemp','hum','windspeed']]
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=101)
from sklearn.linear_model import LinearRegression
lm=LinearRegression()
lm.fit(X_train,y_train)

cdf = pd.DataFrame(lm.coef_,X.columns,columns=['Coefficient'])
cdf
```



```
predictions = lm.predict(X_test)

plt.scatter(predictions,y_test)
plt.xlabel('Test')
plt.ylabel('Predicted Y')

from sklearn import metrics

print('MAE:', metrics.mean_absolute_error(y_test, predictions))
print('MSE:', metrics.mean_squared_error(y_test, predictions))
print('RMSE:', np.sqrt(metrics.mean_squared_error(y_test, predictions)))
```

