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Assignment A03

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Understanding of Module 3

The advancement of technology in every undertaking in almost all fields in life made work easier, faster and more accurate. So many tools have been beneficial. They are the Python Libraries and Frameworks, Jupyter Notebooks and Jupyter Labs, Local Development Environment, High Performance Computer and Code Repositories and Collaboration Platforms.

Libraries and frameworks are tools used to make computer vision software. While libraries are pre-written codes, frameworks provide structure for building software. ML frameworks are Keras, Fastai and Caffe. Keras are API written in Python. It's easy to use with TensorFlow. The next is Fastai. Its focus is on transfer learning and abstractions. The third is Caffe. It's deep learning for classification of images. Libraries and frameworks are important to accelerate development, to improve accuracy, to enhance collaboration and to ensure scalability.

The ML Libraries are also very useful because of the collections of functions ready to use without creating the codes from scratch. The popular CV libraries are OpenCV for image processing, TensorFlow for machine learning and PyTorch for computation graph.

Jupyter Notebooks and Jupyter Labs are used to create computer vision applications. While Jupyter notebooks are web applications for creating and sharing documents including visualization, live code and text, Jupyter labs is the better version because it offers a wider range of features like debugging, completion of codes, and multiple notebook views. They are being

used by educators, researchers and scientists. Jupyter Notebooks are installed by using conda or pip. It can also be installed by using virtual environments.

Microsoft developed a free and opensource editor called Visual Studio Code. It has key features such as intelliSense, extensions, integrated terminal, version control and debugging. It's so beneficial because it fits into different development workflows. It's suitable for large projects. It's also efficient and lightweight. The software application with tools for development in a single interface is Integrated Development Environment (IDE). It provides tools for debugging, visualization and collaboration. It has languages, development tools, data platforms, data ingestion tools,data exploration and visualization, ML and AI Tools, and Data Science Virtual Machine. Then there is the Google Colab, a free cloud-based Python Environment which made possible running computer vision applications without installing software or hardware. It has also data preprocessing and analysis likewise the Model Training and testing. Then there is Amazon AWS SageMaker Studio Lab which is a well based integrated development environment (IDE) for machine learning. It is a tool for deployment, for preparing data and for model training. Microsoft Azure has the Azure Copilot which is a set of container-based applications. It helps make applications easy using pre-built models and APIs. It's also easy to scale and manage the machine learning models. The one that has supercomputers and massive storage system is Texas Advanced Computing Center (TACC). It uses Frontera and Stampede2. The center facilitates research and development and accelerates large-scale computations.

The Code Repositories and Collaboration Platforms is where Git and Github are. It has version control and tools for effective collaboration. It's also used for computer vision code repositories. It also provides collaboration tools among developers to suggest relevant codes for

computer vision. Another relevant computer vision tool is Hugging face. It focuses on image classification, object detection and semantic segmentation. It can also integrate easily with other computer vision tools to enhance accuracy. It integrates well with TensorFlow and PyTorch.

The particular tools powered by AI are the coding assistants. They help developers write codes efficiently. It has features like code generation and completion. It can detect errors, too. It has an enormous number of codes to predict what developers have in mind to write. The advantages of AI code Assistants are the increase of productivity, reduced errors, learning improvement and better collaboration. The examples of available code assistants are Gemini Code Assist, Amazon Code Whisperer, Claude 3, Git Hub Copilot, Microsoft Copilot and Devin Ai. Google Gemini Code is also driven by AI. It works well with CoLab in enhancing coding efficiency and accuracy.

GitHub Copilot was developed by GitHub and OpenAI. It has multi-language support with Python, JavaScript, TypeScript, Ruby, and Go. It works with Visual Studio Code. Another AI-powered code companion is Amazon CodeWhisperer. It helps the developers write code faster. It can integrate into Sagemaker, Studio Lab and other IDEs. There are also Gen AI Code Assistants outside IDEs like GPT, Claude, and Devin. They offer explanations outside the traditional IDE. Flexibility is one of the benefits. The other is custom applications.

To summarize, there are so many technology tools that improve the lives of people. They are being used in different fields like Education, Engineering, Business, Medicine and many more. They are the Libraries and Frameworks, Jupyter Notebooks and Jupiter Labs, Cloud Computing Platforms, Github and Hugging Face.

Reference:

Module 3 Tools of the Trade