

Faculty of Technology and Engineering

Department of Computer Science and Engineering

Date :10/07/2024

Event Application No in E-governance :

Event Name : Peer Learning session series on Embedded Machine Learning with NVIDIA Jetson Nano :- Session 1 : Introduction to setting up NVIDIA Jetson Nano and classification problems.

Detail About the event :

For the students of 5th sem of the department of CSE, CSPIT the session 1 of the dedicated series on embedded machine learning with Jetson Nano which was focused on Setting up the device and performing classification problems on it was organized by the AI/ML club on 10/07/2024 - Wednesday at Lab 324-D (AIML Department). Total of – 32 students and 4 volunteers attended the workshop. Students reported at the lab at around 12:15 and we started the workshop at 12:20.

Firstly the students collected their Nvidia Jetson Nano kit from the volunteers and they were divided into a batch of 3 students. They were allocated a PC. In the lab students were with Harshul sir, 4 volunteers and 2 presenters. Then the session started with the introduction of what is Jetson nano and how it can be used in various IOT applications. Om Barai explained various types of boards and developer kits sold by Nvidia. He went on to explain the hardware capabilities of Jetson Nano and the various types of communication ports available on the carrier board of the module and how to make connections and arrange them such that to minimize consumption of space. He explained what embedded machine learning is and highlighted key features of Nano by mentioning real world applications which use embedded systems.

He went through all required materials for setting up a Jetson nano and started to describe the setup.

After that we started the installation of Jetpack (OS specially designed for Jetson Nano). The installation process involved several steps. Volunteers formatted the 64GB memory cards and flashed the image required for the Nano to startup. We faced some errors during installation and then after the installation process had been completed for everyone.

After this, Om continued to explain further on the docker image required to perform specific tasks of Hello AI world tutorials on the board. Everyone ran the docker script as Om described, and within 5-10 minutes the image was successfully installed. Om explained the Pin-out Diagram and various types of input slots available. He also explained about the memory swap creation. This was the end of Part 1 of this session: Introduction and setting up the Jetson.

Shortly after, Part 2 on performing the classification problems was started by Yuvrajsinh Bodana. He first explained what classification problems are by taking suitable examples and made a difference clear about Regression and classification problems and what are the ways to solve them: 1) Traditional Methods and 2) Deep Learning methods. Further he added on what docker is and why we require it here to perform our classification tasks. He explained about the folder structure the docker container contains and installed all required models to perform it.

Furthermore he explained the specific .py file to perform the classification tasks which is imagenet.py, and explained about the imagenet dataset, and various pre-trained models trained on the same, such as ResNet, VGG etc...

After this he continued to explain the architecture of each of the mentioned pre-trained models in depth.

Clearing all these core concepts he moved to the practical part of session, implementing Hello AI world tutorials for classification problems for which he first explained the general CLI based command structure and then performed commands to classify real world object in form of images, video, all similar images in one go, and through live camera for which the team has used the USB camera.

He explained the commands to perform classification tasks using a specific model. This was the end of our session 1.

Outcome:

The "Introduction to setting up NVIDIA Jetson Nano and classification problems." The workshop was a resounding success, leaving participants equipped with valuable knowledge and skills in deploying machine learning models on the Jetson Nano platform. Here are some of the outcomes that students achieved:

Comprehensive Understanding: Participants gained a deep understanding of embedded machine learning concepts, techniques, and applications. They grasped the fundamentals of deploying machine learning models on resource-constrained devices, specifically focusing on the Nvidia Jetson Nano.

Practical Skills: Through hands-on exercises and projects, participants acquired practical skills in setting up the Jetson Nano, configuring the development environment, and deploying machine learning models. They learned to harness the power of popular frameworks like TensorFlow or PyTorch for training and inference tasks.

Performance Evaluation: Participants became proficient in evaluating the performance of embedded machine learning models deployed on the Jetson Nano. They learned how to measure metrics like accuracy, inference time, and resource utilization to assess the effectiveness and efficiency of their models.

Real-World Applications: Through real-world case studies and examples, participants explored a range of applications where the Jetson Nano is utilized, including robotics, IoT, surveillance, and autonomous vehicles. They gained inspiration and insights into how embedded machine learning is transforming these industries.

Overall, the "Introduction to setting up NVIDIA Jetson Nano and classification problems." workshop empowered participants with the necessary skills and knowledge to leverage the power of the Jetson Nano for developing and deploying machine learning models in resource-constrained environments. The outcomes of the workshop enabled participants to create innovative solutions, contribute to cutting-edge projects, and make a positive impact in their respective fields.

Actionable insights of Event:

Through this event

1. Students get exposure about the embedding programming
2. They can start their own small projects that can be implemented with Jetson Nano kit and also use the machine learning approach to the project.
3. Students can practice the concepts of Classification, Regression and Neural Networks especially convolutional neural networks using image processing

- Photographs with captions :

Photo-1 :



**Interactive Students learning to setup the Jeston
(Date : 10/07/2024)**

Photo-2 :



**Om Barai Explains about setting up the Jeson
(Date : 10/07/2024)**

Photo-3 :



Yuvrajsinh Bodana explaining the Classification part (Date : 10/07/2024)

Evaluation of Feedback

Feedback was taken from the participants at the end of the talk. From the feedback form filled by the students, Evaluation of Feedback is as per given below:

Evaluation of Feedback

Name of Expert Talk: “Introduction to setting up NVIDIA Jetson Nano and classification problems.”

Resource Person: Om Barai , Yuvrajsinh Bodana

Date: 10-07-2024

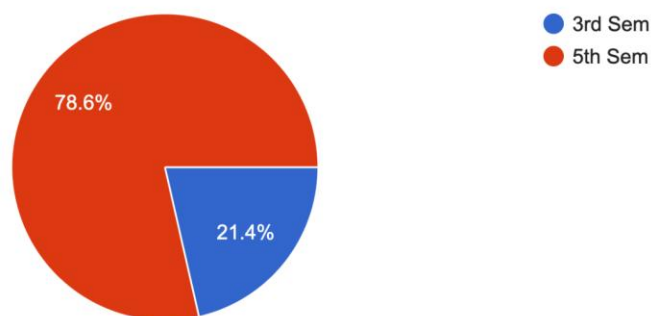
Time: 12:20 to 2:20

Venue: Lab no : 324-D , AIML Labs , A6 Building , CSPIT

***Percentage values are rounded wherever required**

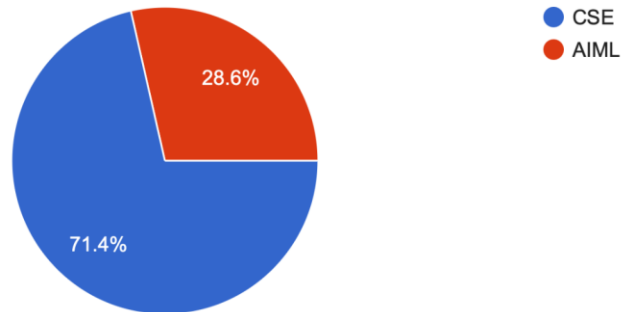
Select Semester

14 responses



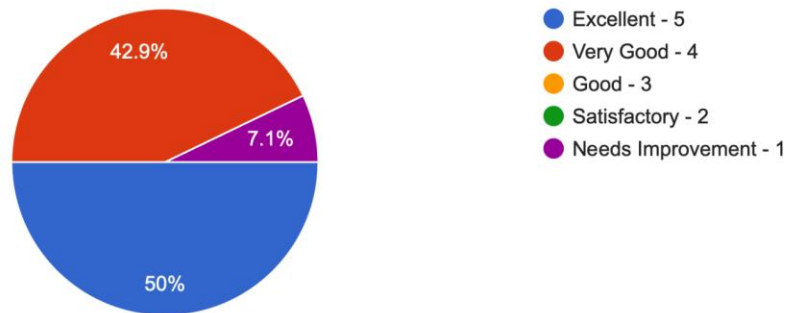
Branch

14 responses



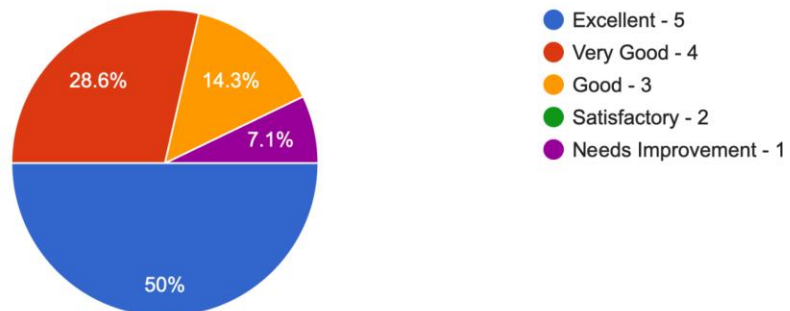
Content of Workshop

14 responses



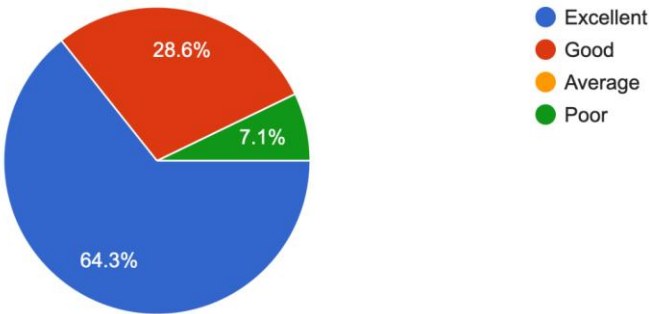
Have a desired balance between theory and practical

14 responses



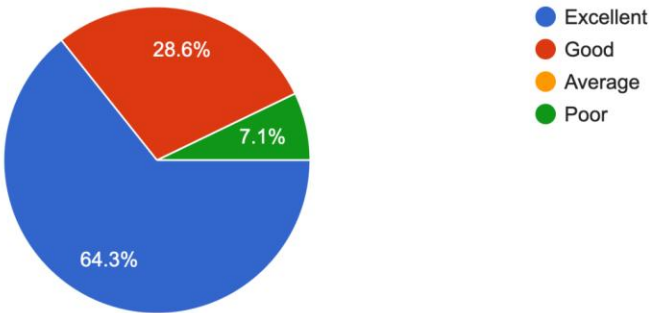
The content of workshop

14 responses



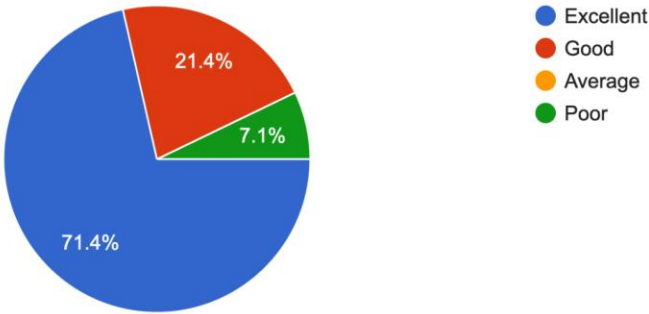
Method of Presentation

14 responses



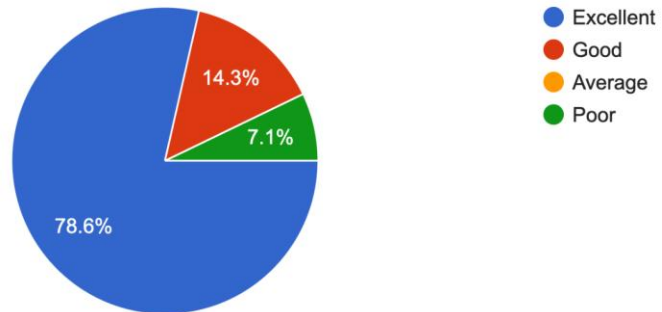
Response to Questions / Queries by Expert

14 responses



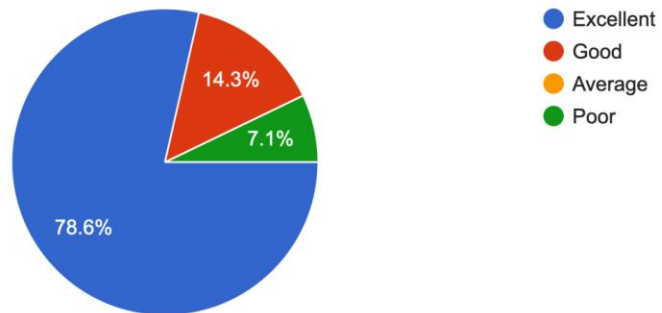
Innovativeness

14 responses



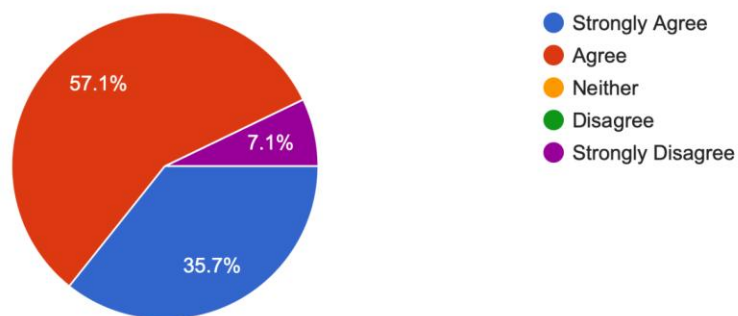
Overall Impact

14 responses



After attending the workshop, are you able to understand use of Jetson Nano?

14 responses



Can you explain Applications Jetson Nano Developer Kit ?

14 responses

