Machine Learning

The Machine Learning module introduces participants to building and evaluating models that learn from data. Teams will work with datasets to train, test, and improve predictive models while understanding core concepts such as features, evaluation metrics, and model performance. This module emphasizes practical implementation and analytical reasoning.

REGISTRATION - PER TEAM MEMBER	
Early bird	Normal
PKR 700	PKR 1500
TEAM SIZE	1-3 Members

PRIZE POOL	
TOTAL - 250 USD	
Winner	150 USD
Runner Up	100 USD

DUALITY

Machine Learning Module Guidelines

Competition Overview:

- You will train your model exclusively using high-quality synthetic data (source will be provided)
- The competition highlights the power of synthetic data for overcoming data scarcity, creating controlled variations, and improving model robustness.
- Duration: Announced at the start of the event (typically 24 hours).
- Participants work on their own machines (bring laptops).
- Internet will be available where relevant, but have a backup connection ready.
- Development starts immediately after any opening announcements
- Submission deadline is strict — no extensions will be granted for technical or other issues.
- Teams must be available for judging in person

Core Constraints:

- You must train only on the synthetic dataset
- Do not use any real-world data, external datasets, or pre-labeled images from other sources for training.
- The evaluation will be performed on a separate, unseen set of images from a similar
- Never use the designated test images for training or validation — doing so will result in disqualification.
- You are free to choose and modify any loss function, optimizer, data augmentation strategy, or training technique, as long as training uses only the allowed synthetic data.

Allowed Technologies & Practices:

- Any modern deep learning framework (PyTorch, TensorFlow, etc.).
- Any semantic segmentation model or backbone (U-Net, DeepLab, SegFormer, HRNet, Mask2Former, custom, etc.).
- Standard pre-trained encoders/backbones are allowed for fine-tuning.
- Custom code, notebooks, augmentations, scheduling, optimization tricks, etc. are encouraged.
- You may use the sample environment setup and starter scripts (if provided), or create your own from scratch.

Machine Learning Module Guidelines

Team Rules:

- Teams can be solo, pairs, or small groups (size limit announced at start).
- Fair collaboration is expected; remote git/cloud sharing is fine.
- Plagiarism, code/model copying, or sharing solutions during the event is strictly forbidden and leads to disqualification.

What to Submit:

- Participants will be informed
- Clear documentation/report that includes:
    - Brief description of your approach and training methodology
    - Key choices (architecture, augmentations, hyperparameters, etc.)
    - Performance results on validation and/or unseen data
    - Visualizations (loss curves, prediction examples, etc.)
    - Main challenges you faced and how you addressed them
- A README file with:
    - Step-by-step instructions to set up the environment and reproduce your results
    - How to run training and inference
    - Expected outputs and how to interpret them
- Package everything in one zipped folder.
- Upload to a private GitHub repository (or as instructed).
- Add the required judges/organizers as collaborators (usernames shared during the event).
- Submit your final performance metric via the provided form.

Judging Focus:

- Primary: Quality and accuracy of the model on the unseen test set (main metric will be announced).
- Secondary: Clarity, reproducibility, and insightfulness of your documentation and methodology.
- Judges' decisions are final.