Fast Track

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Pose Estimation Deep Learning Capstone Team

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The Problem

- Foundational Need : video-based animal & insect tracking underpins biology, neuroscience, ecology, medicine.
- Manual Bottleneck : frame-by-frame labeling is slow and caps study scale.
- Tool Gap : DeepLabCut & SLEAP exist, yet installs, GPUs, and configs block adoption.
- Cloud Answer : free NSF-ACCESS GPUs (e.g., Jetstream) remove hardware limits.
- Fast Track : one-click, cloud-hosted pose estimation so researchers spend time on insights, not setup.

Current State

- CyVerse Desktops : two Kasm images (DLC & SLEAP) + Jupyter + GPU.
- Jetstream VM : snapshot with both tools for any NSF-ACCESS user.
- Docs & Onboarding : step-by-step cloud account + workflow guide.
- HPC Reality : UA cluster works, but GPUs are scarce & campus-only—Fast Track scales beyond.

Potential Future Ehancements

- Unified Image : DLC + SLEAP, Python ≥ 3.10
- Diplomat Integration for post-processing
- CI/CD Auto-Builds on upstream changes
- Terraform Provisioning per experiment
- Slimmer Docker (layering, cache, size, speed)
- Actual modification of SLEAP and DLC via git fork

The Tech Stack

jupyter

docker

NVIDIA CUDA

Challenges

- Leverage existing Docker images
- Learn & configure DLC / SLEAP
- Pick a base image that keeps Kasm + GPU happy
- Conda/Mamba env setup; Python versioning
- GPU drivers (CUDA, NVIDIA)
- ML library conflicts (e.g., TensorFlow)
- Dialing resource requiremnts

Testimonials/ User Feedback

- “On-boarding my students is painless now; they jump straight into research instead of wrestling with installs.”
- “Running DLC & SLEAP in the cloud with free GPU is a total game-changer for our lab’s budget.”
- “Everything—docs, code, workflows—is in one place; no more chasing forum threads or emailing maintainers.”