**README: Advancing Human-AI Collaboration – Towards a Functional Framework for Co-Creative AI**

**Overview**

This repository accompanies the article *"Advancing Human-AI Collaboration: Towards a Functional Framework for Co-Creative AI"*. The study investigates whether generative AI functions as an autonomous co-creative agent or a collaborative tool in the sense understood by creativity research in human-computer interaction, and how its integration challenges human-centric creativity in creative industries.

**Citation**

If you use or reference this work, please cite it as:

Haidemariam, T. (2025). *Advancing Human-AI Collaboration: Towards a Functional Framework for Co-Creative AI*. Manuscript Submitted to *International Journal of Human-Computer Studies*.

**Structure**

The study follows a multiphase methodology encompassing:

1. **Experimental Generation**
   * VNAI (Visual Non-Embodied AI): Using Stable Diffusion to generate symbolic and abstract visual representations.
   * PEAI (Performing Embodied AI): Using OpenAI’s Sora to generate choreographed dance performances from textual prompts.
2. **Prompt Design**
   * VNAI Prompt-stable diffusion: "AI in the style of the creative industries"
   * PEAI Prompt-stable diffusion: " robots performing synchronized dance routines on a stage with dynamic lighting "
   * PEAI Prompt-Sora: " robots performing synchronized dance routines on a stage with dynamic lighting"
   * PEAI Prompt-Sora: "AI performing synchronized dance routines with dynamic lighting"
3. **Analytical Pipeline**
   * CLIP-Based Semantic Alignment to assess prompt fidelity
   * Reverse Image Search for dataset dependency
   * Latent Feature Analysis (PCA/t-SNE) using ResNet50
   * Optical Flow Motion Tracking and Speed Variation Analysis to examine motion patterns
   * Visual Comparison using framing and keyframe extraction

**Contents**

* images/ – Contains AI- and human-generated image outputs (framed and raw)
* videos/ – MP4 files used for kinetic analysis (AI and human performances)
* motion analysis/ – Contains speed variation plots, optical flow visualizations
* notebooks/ – Python notebooks for PCA, t-SNE, motion extraction, and CLIP alignment
* figures/ – Final figures for publication
* data\_links.docx – List of Sora-generated video links and access notes

**Tools and Libraries Used**

* Python 3.10
* OpenCV (optical flow and keyframe extraction)
* MediaPipe (pose estimation)
* scikit-learn (PCA, t-SNE)
* PyTorch + CLIP
* ResNet50 (ImageNet pretrained)
* matplotlib, seaborn (visualizations)

**Dataset Notes**

* AI-Generated Data:
  + Visuals created using Stable Diffusion (locally hosted)
  + Dance performances generated via OpenAI's Sora (links provided)
* Human Reference Data:
  + Stills and video segments of professional human dancers were included for comparative analysis.
  + Due to copyright considerations, only selected frames are distributed.

**Limitations**

* Optical flow tracking does not account for semantic meaning or emotional content of motion.
* Analysis does not include real-time co-creation or live audience interaction.
* CLIP alignment focuses on prompt fidelity and may overlook deeper aesthetic interpretations.

**Potential Use and Reuse**

This framework can be applied or extended to:

* Assess dataset dependency and originality in AI-generated media
* Evaluate co-creative potential in visual and performative arts
* Inform policy development and ethical standards in AI-assisted creative industries
* Compare embodied vs. non-embodied AI creativity using empirical techniques

**Contact**

For questions or collaborations, please contact:

**Tsehaye Haidemariam**  
Email: [tsehaye.haidemariam@bi.no](mailto:tsehaye.haidemariam@bi.no)   
Affiliation: BI Norwegian Business School