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Cross-Morphology Motion Transfer with Semantic Style Alignment

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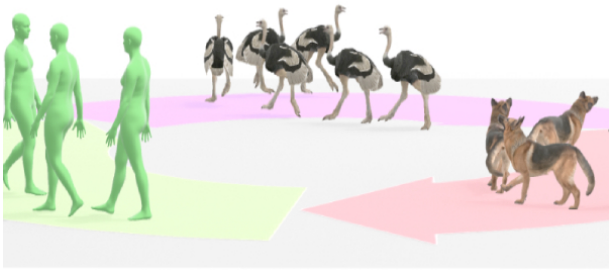

Transferring animations between characters with diverse skeletal structures is challenging. Traditional retargeting pipelines rely on fixed correspondences, canonical skeletons, or human-centric datasets, which can lead to artifacts when applied across heterogeneous morphologies. We introduce a framework for cross-morphology motion transfer with semantic style alignment that uses morphology-agnostic control signals (e.g., velocity, angular velocity, relative height) to align behaviors across species. Our method supports all-to-all retargeting: motions from any source can be mapped to any trained target while preserving target-specific style. For each target morphology, we train a Vector Quantized VAE and an autoregressive sequence model to construct a compact, morphology-specific codebook that captures stylistic priors. This modular design scales to new morphologies without retraining existing models and allows optional user control (e.g., phase, velocity scaling) for fine-grained alignment. Experiments across bipeds and quadrupeds demonstrate accurate, plausible, and style-faithful motion transfer, establishing a scalable approach to retargeting across arbitrary skeletal topologies.

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