# Harnessing the Power of Distributions: Probabilistic Representation Learning on Hypersphere for Multimodal Music Information Retrieval

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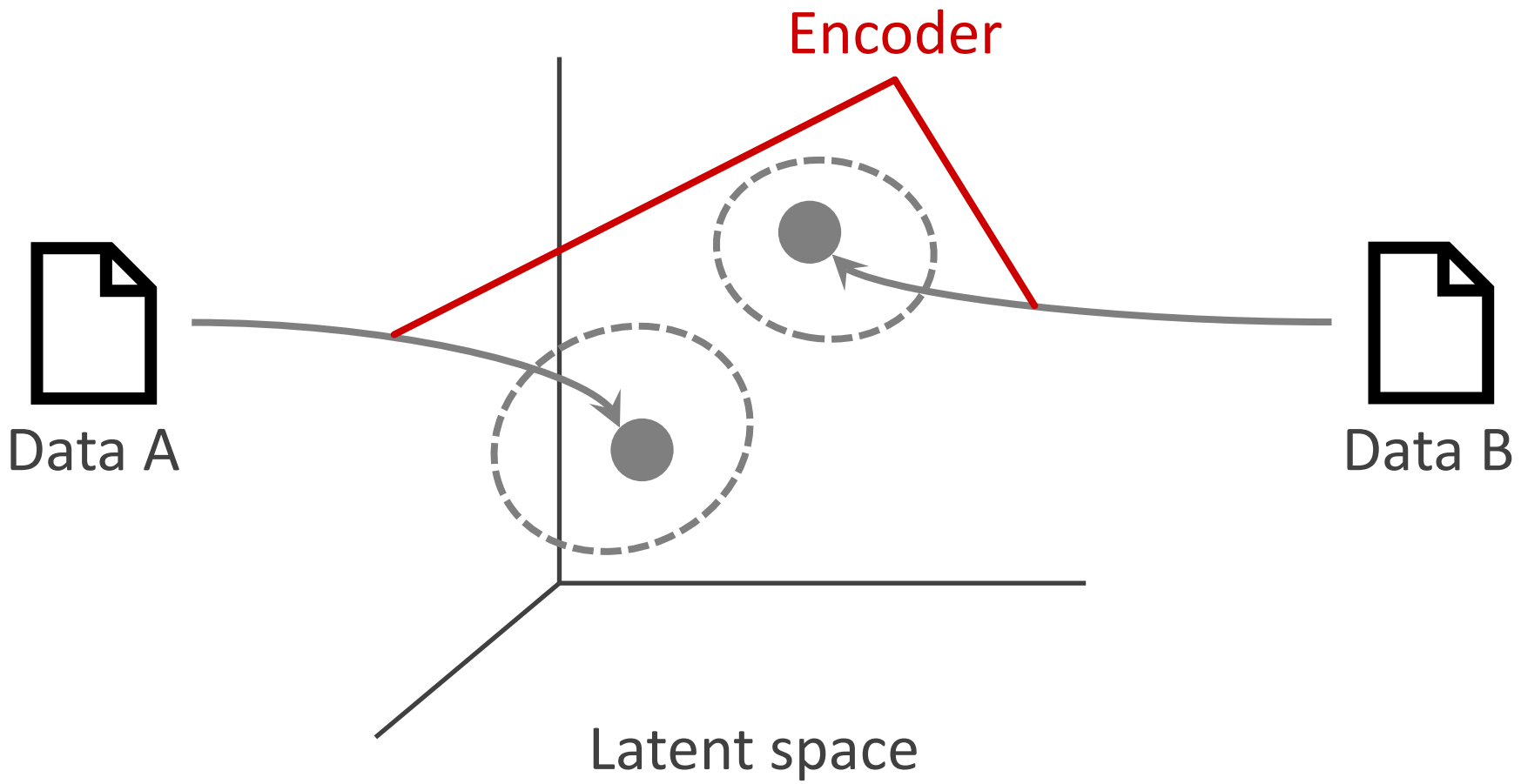
National Institute of Advanced Industrial Science and Technology (AIST)

The 25th International Society for Music Information Retrieval (ISMIR) Conference

# Probabilistic Representation Learning

Provide intricate and diverse representations of data items



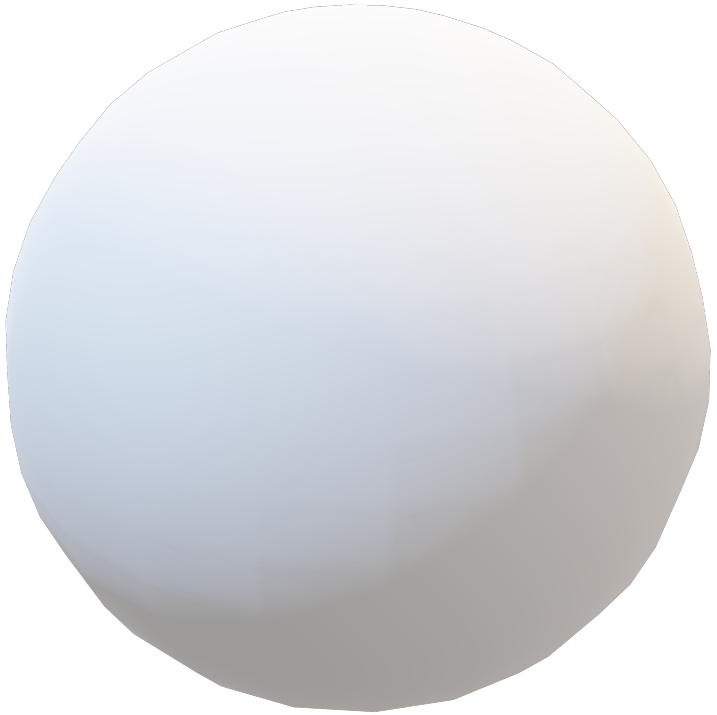
# Probabilistic Representation Learning

Our proposed loss functions are based on

**(1) Contrastive learning**

**(2) Optimal transport**

# Probabilistic Representation Learning on Hypersphere



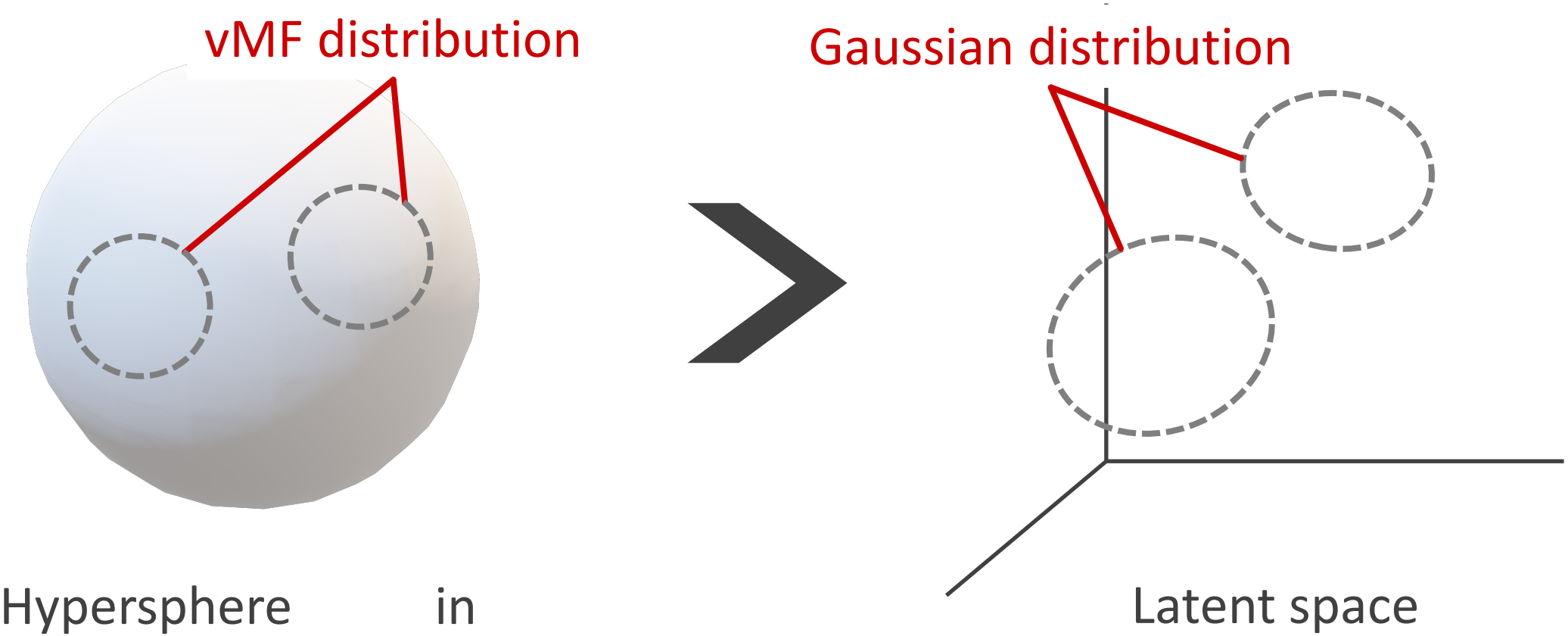
Hypersphere in

# Probabilistic Representation Learning

✓ Methods using the angular distance between distributions [Scott et al., 2021]

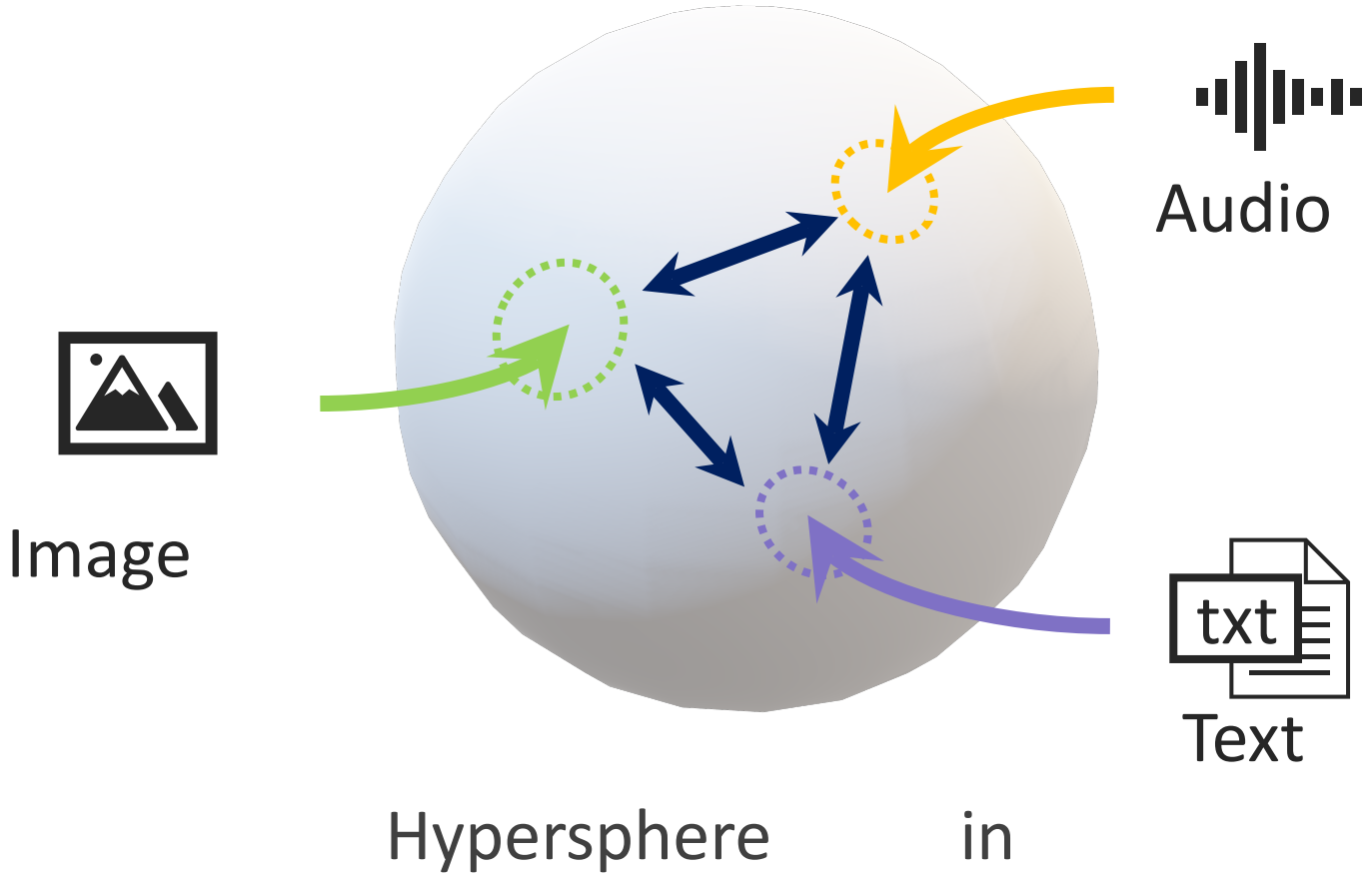
# Probabilistic Representation Learning

✓ Methods using a von Mises-Fisher (vMF) distribution [Li et al., 2021]



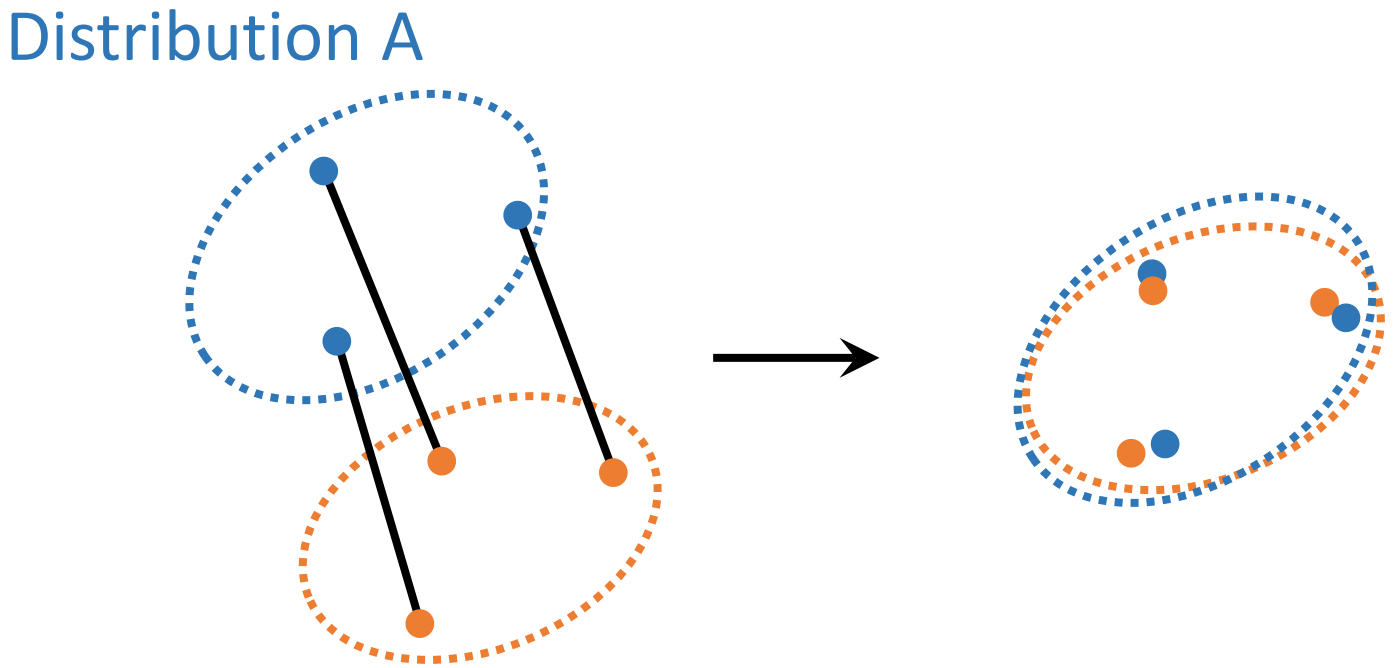
# Probabilistic Representation Learning on Hypersphere

We propose a contrastive loss function on a hypersphere for multiple modalities based on probabilistic contrastive learning [Kirchhof et al., 2023]



# Optimal Transport (OT)

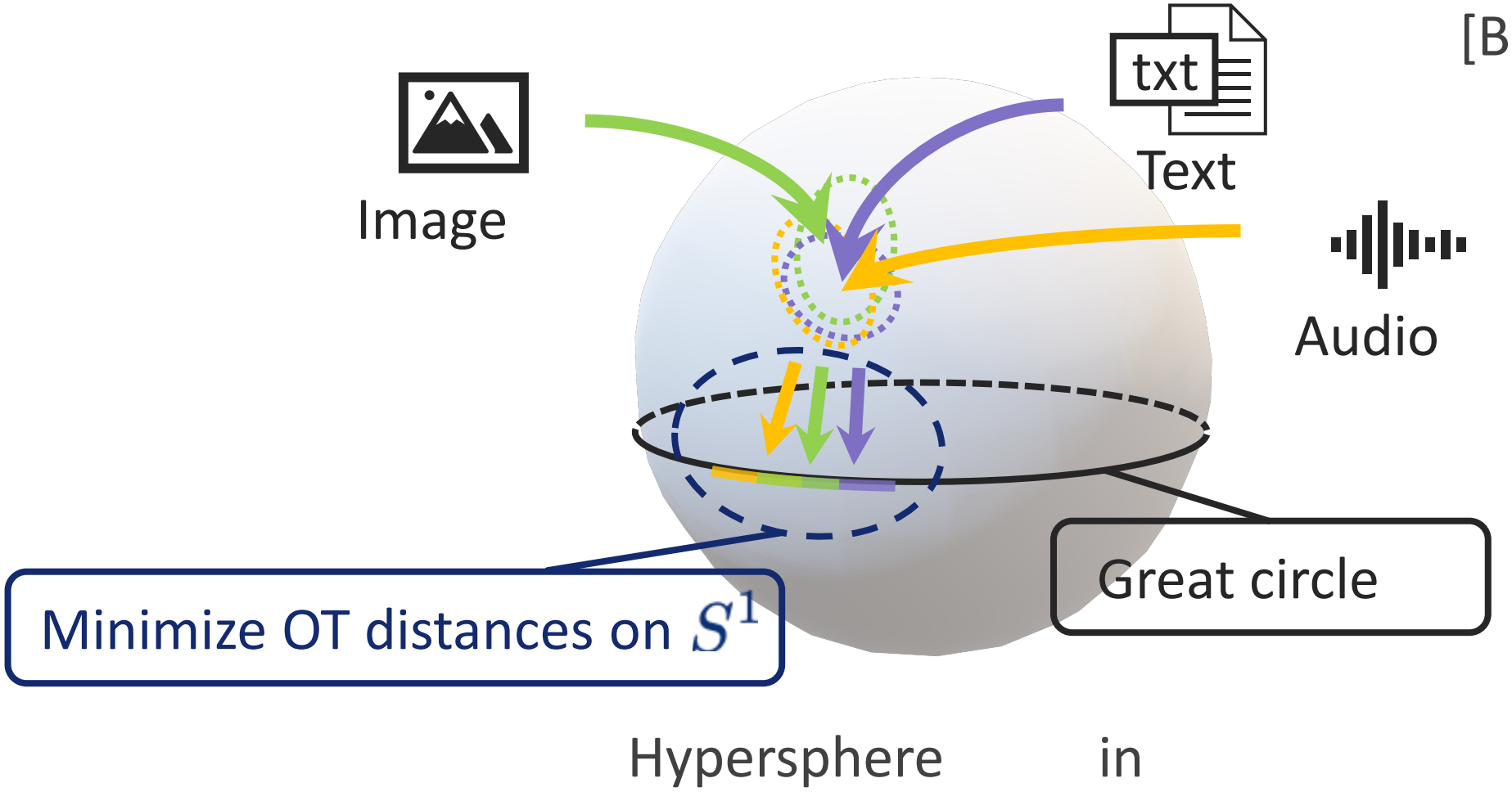
Provide a tool for calculating distances between distributions




● Samples from Distribution B ● Samples from Distribution B

# Probabilistic Representation Learning on Hypersphere

We propose a loss function based on Spherical Sliced-Wasserstein (SSW) distance [Bonet et al., 2023]



# Quantitative Evaluations

Comparison on YT8M-MusicVideo test dataset for Multimodal MIR

Mean Reciprocal Rank

Recall@$k$

Mean Rank

Proposed

Baseline

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