Invariant and Equivariant Neural Networks

Adrian Salewsky

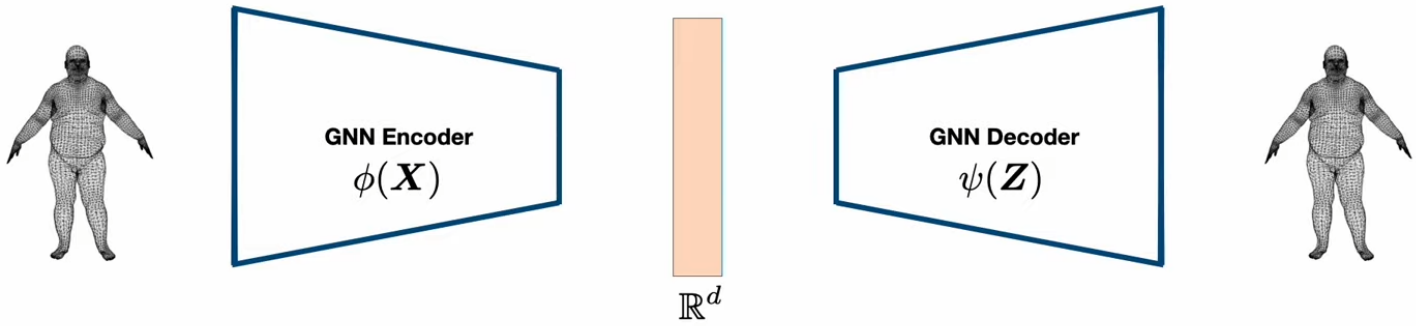
Technische Universität Berlin

12.05.2023

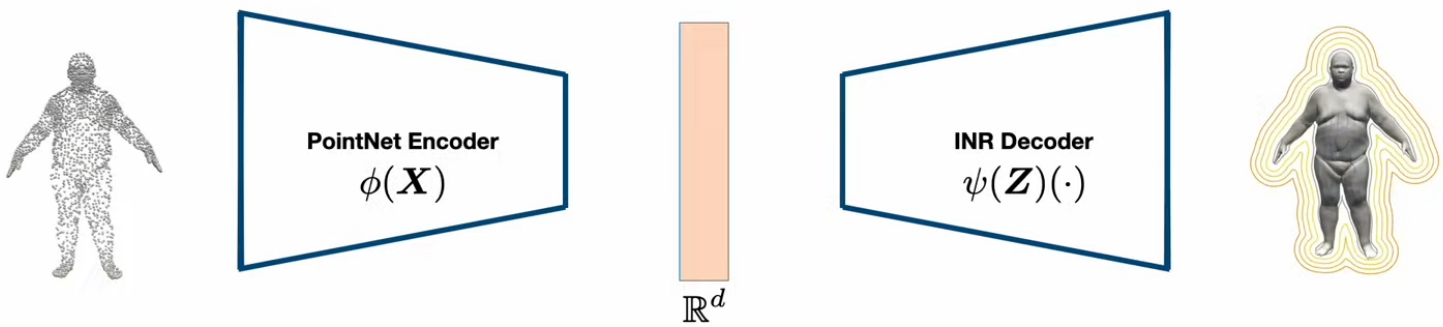
Table of Contents

Introduction

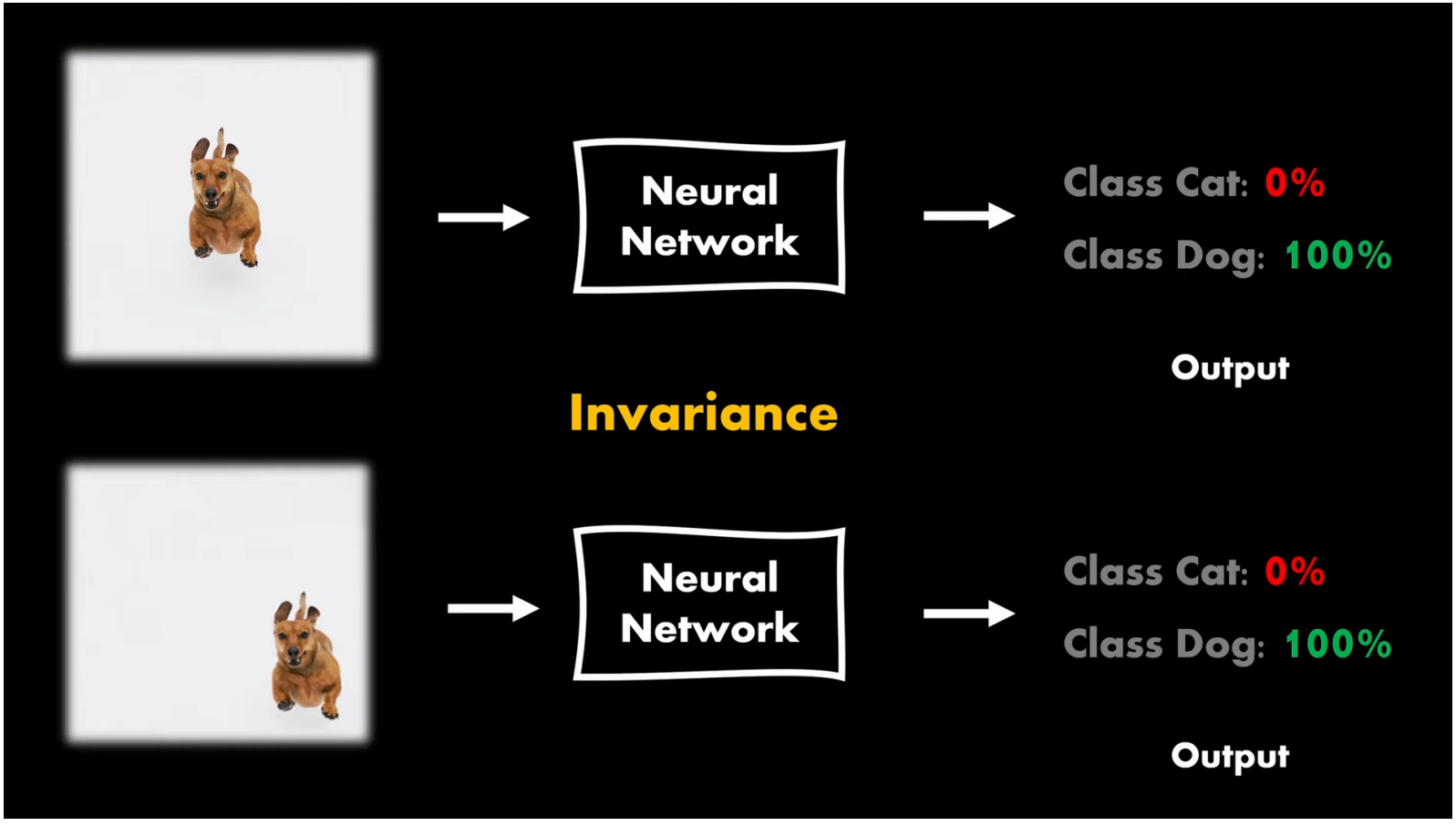
Mesh → mesh



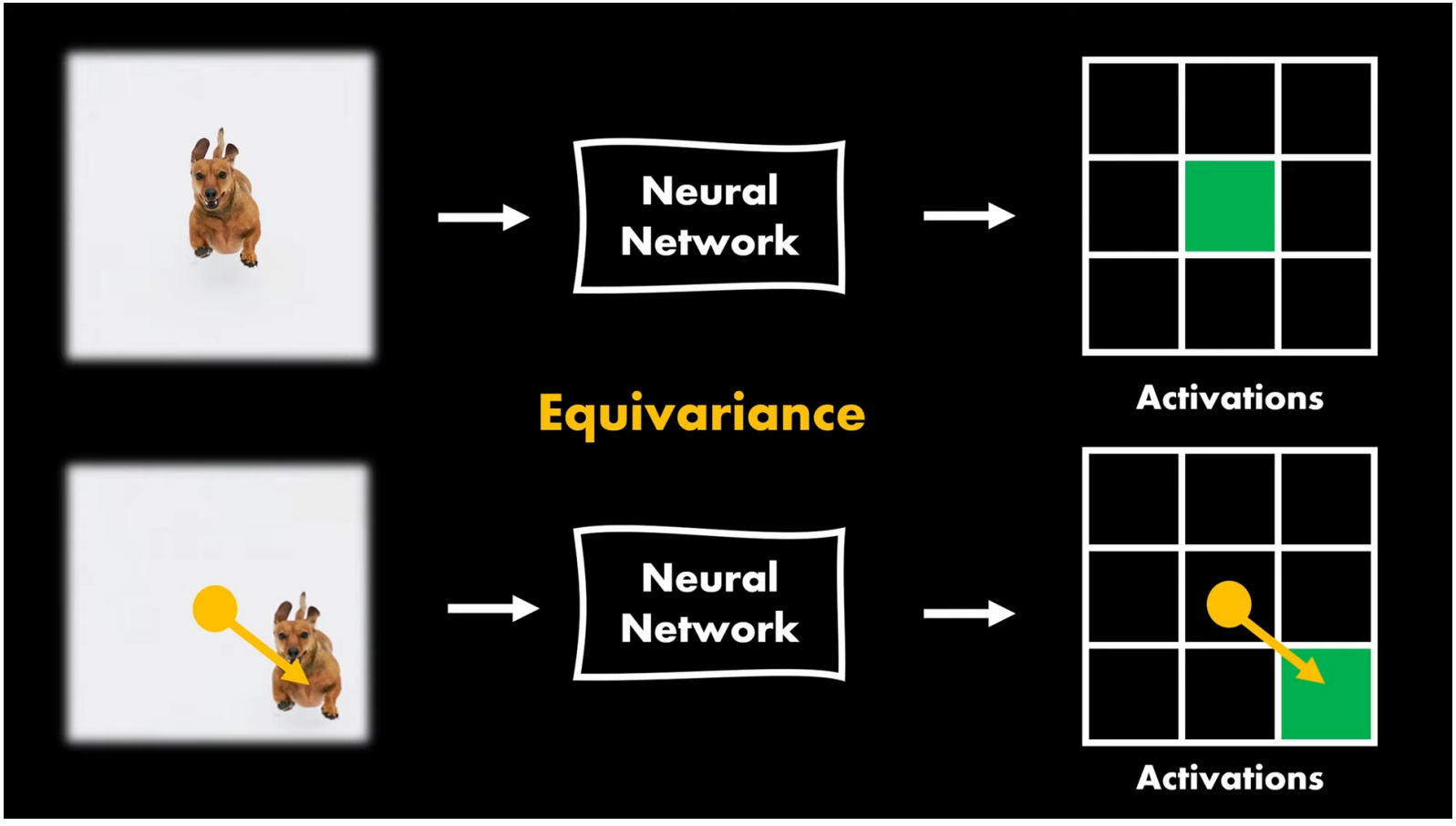
Point cloud → implicit



Invariance


Neural Network
Class Cat: 0%
Class Dog: 100%
Output
Invariance
Neural Network
Class Cat: 0%
Class Dog: 100%
Output

Equivariance



Frame Averaging

Frame Averaging

- Method to introduce equivariance and invariance to networks

Frame Averaging

- Method to introduce equivariance and invariance to networks
- Averaging over subset of group instead of whole group

Frame Averaging

- Method to introduce equivariance and invariance to networks
- Averaging over subset of group instead of whole group
- Efficient and expressive

Outlook

Outlook

- Introduce layer-wise equivariance in decoder

Outlook

- Introduce layer-wise equivariance in decoder
- Each layer represents features

Outlook

- Introduce layer-wise equivariance in decoder
- Each layer represents features
- Mesh $\rightarrow$ Mesh