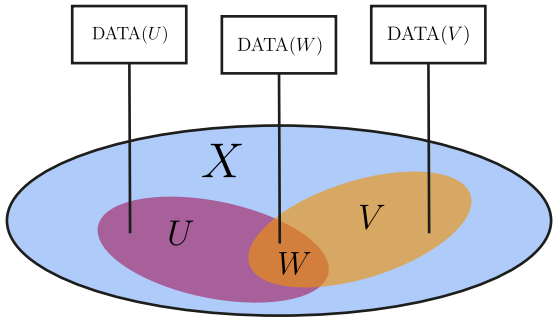
Topological Deep Learning

A research programme studying deep learning on data attached to topological spaces and topological aspects of machine learning models.

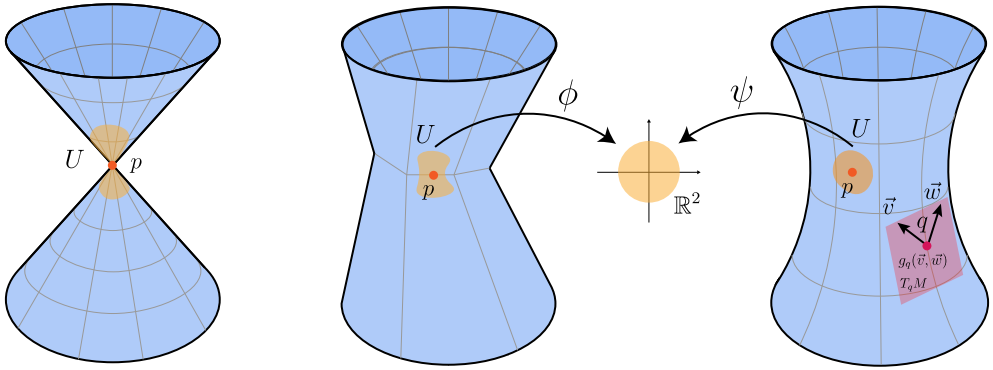


Geometric Deep Learning

Data often resides on structured domains: molecules, meshes, manifolds . . .

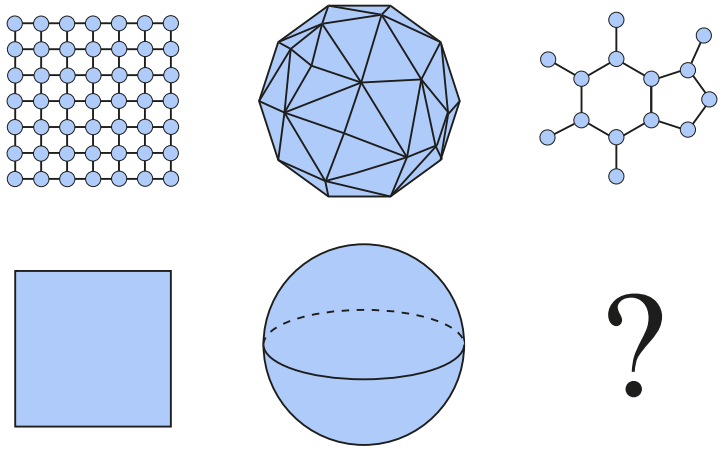
Is geometry all you need?

We must work with a chain of structural dependencies and not all spaces can be equipped with geometrical structure.



Geometry on graphs

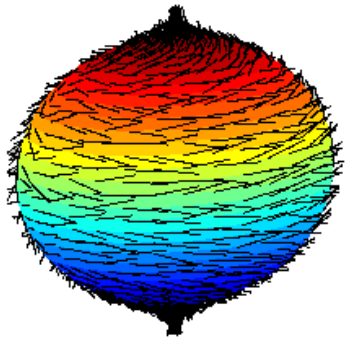
Graphs, the most prevalent space in GDL do not have a "natural" geometric structure[2].



[2]The diagram is inspired from Bronstein, *Graph Neural Networks through the lens of Differential Geometry and Algebraic Topology*, 2022

Topological Obstructions

The structure of the topological layer affects the geometrical layer. Therefore, the topology of the space also affect the properties of the models working on it.



The Hairy Ball Theorem (Source: wikipedia).