

# Regularization of Persistent Homology Gradient Computation

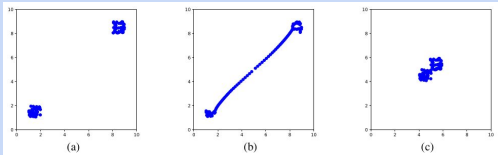
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## Problem

- Integrating Persistent homology with deep learning has much potential.
- However, in its native form, persistent homology is not differentiable.
- Computing gradients of persistent homology is an ill-posed problem with infinitely many solutions.

## Solution

- Propose a novel method for regularizing the computation of persistent homology gradients.
- Gradients are defined with respect to larger entities and not individual points.



The sets of points in (a) has an associated loss function measuring the distance between the two clusters. The results of minimizing this loss function without and with regularization are displayed in (b) and (c) respectively.