Extending Implications of Ambient-Latent Space Approach with Lagrange Multiplier Method

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Abstract

Recent study approach with Ambient-Latent Space resembles a new possibility of simulating dynamics with more accuracy. This paper aims to suggest idea also by adding temporary dimension (like in case of SVM) in learning given dynamics by optimization in additional to the recent study.
Extending Implications of Ambient-Latent Space Approach with Lagrange Multiplier Method

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Abstract
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1 Introduction
Recent research [1] on neural network presents fusion-able approach beyond current machine learning methodology, combining additional mapping and reverse mapping between neural network layers gives a new significant chance for correction of possible error by dimensional curvature (or additional dimension) in manifold.

As for a perspective of additional function and inverse function mediating each neural layer is a significant development, speaking of manifold-driven learning, additional Lagrange-based idea could be suggested. While additional function and reverse function between layers could be a horizontal approach, adding Lagrangian-motivated transformation and comparison at given functional state could be a vertical approach.

2 Lagrange Multiplier Method in Optimization
Lagrange Multiplier Method is an approach that could be applied when specific vector to be optimized with a temporary new dimension.

In given optimizing vector $\vec{v}$:

$$\min \| \vec{v} \| = \max \frac{1}{\| \vec{v} \|} = \min \frac{1}{2} \| \vec{v} \|^2$$

By extending additional vector space, method for optimization could more to be derived.

3 Application toward Optimization of Given Research
The paper presented additional space mapping between layers in training like [1]:

$$L = \frac{1}{|L_\alpha|} \sum_{i \in L_\alpha} \| f_\alpha(\phi_\alpha(x_i)) - \phi_\alpha(x'_i) \|^2_2$$

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And for minimizing function:
\[
\|\phi^\text{inv}_\alpha(\phi_\alpha(x)) - x - (\phi^\text{inv}_\beta(\phi_\beta(x)) - x)\| \leq \|\phi^\text{inv}_\alpha(\phi_\alpha(x)) - x\| + \|\phi^\text{inv}_\beta(\phi_\beta(x)) - x\|
\]

If assuming scalar x to extend in vector keeping ordinality as discussed in corollary discussed in Fermat’s Last Theorem [2] and Riemann Hypothesis [3]:
\[
\frac{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) - \|\phi^\text{inv}_\beta(\phi_\beta(\vec{x}))\|}{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) + \phi^\text{inv}_\beta(\phi_\beta(\vec{x}))\|} \leq \vec{1}
\]

Assuming specific ordinals could be kept in \(\forall \vec{x}\) as mentioned in the research paper:
\[
\text{Let scalar constant } \exists A > 0, \exists B > 0, \exists C > 0 \Rightarrow \frac{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) + A\| - \|\phi^\text{inv}_\beta(\phi_\beta(\vec{x})) + B\|}{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) + \phi^\text{inv}_\beta(\phi_\beta(\vec{x})) + C\|} \leq \vec{1}
\]

Expanding upper discussion:
\[
\frac{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) - \|\phi^\text{inv}_\beta(\phi_\beta(\vec{x}))\|}{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) + \phi^\text{inv}_\beta(\phi_\beta(\vec{x}))\|} + \frac{A - B}{\|\phi^\text{inv}_\alpha(\phi_\alpha(\vec{x})) + \phi^\text{inv}_\beta(\phi_\beta(\vec{x})) + C\|} \leq \vec{1}
\]

By utilizing this transformation with this approach of introducing constant, more study for optimization could be done.

4 Conclusion

1. Bring additional layers in extending numerical space of dynamic system could keep ordinal in its point of action.
2. By extracting constant amount from additional space mapping, more variety of approaches in optimization could be done.
3. Numerical ordinality could be applied in optimization within use of Lagrange Multiplier Method-based idea.

5 Acknowledgements

As sharing additional implications of the recent study, I would like to show respects to the authors of the recent study.

References

