Computational Statistics

Hyperspherical VAE

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Introduction

introduire la méthode et les contributions [DFDC$^+$]

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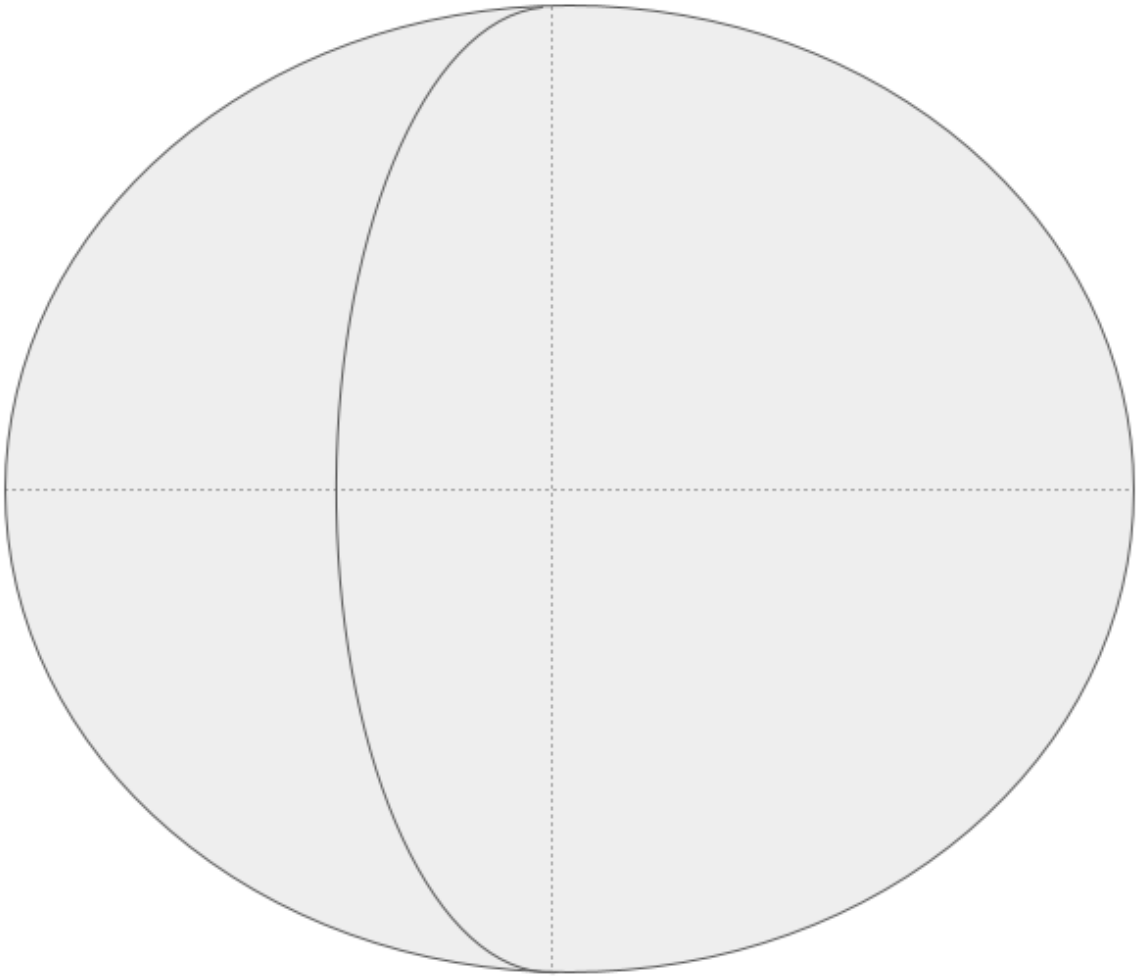
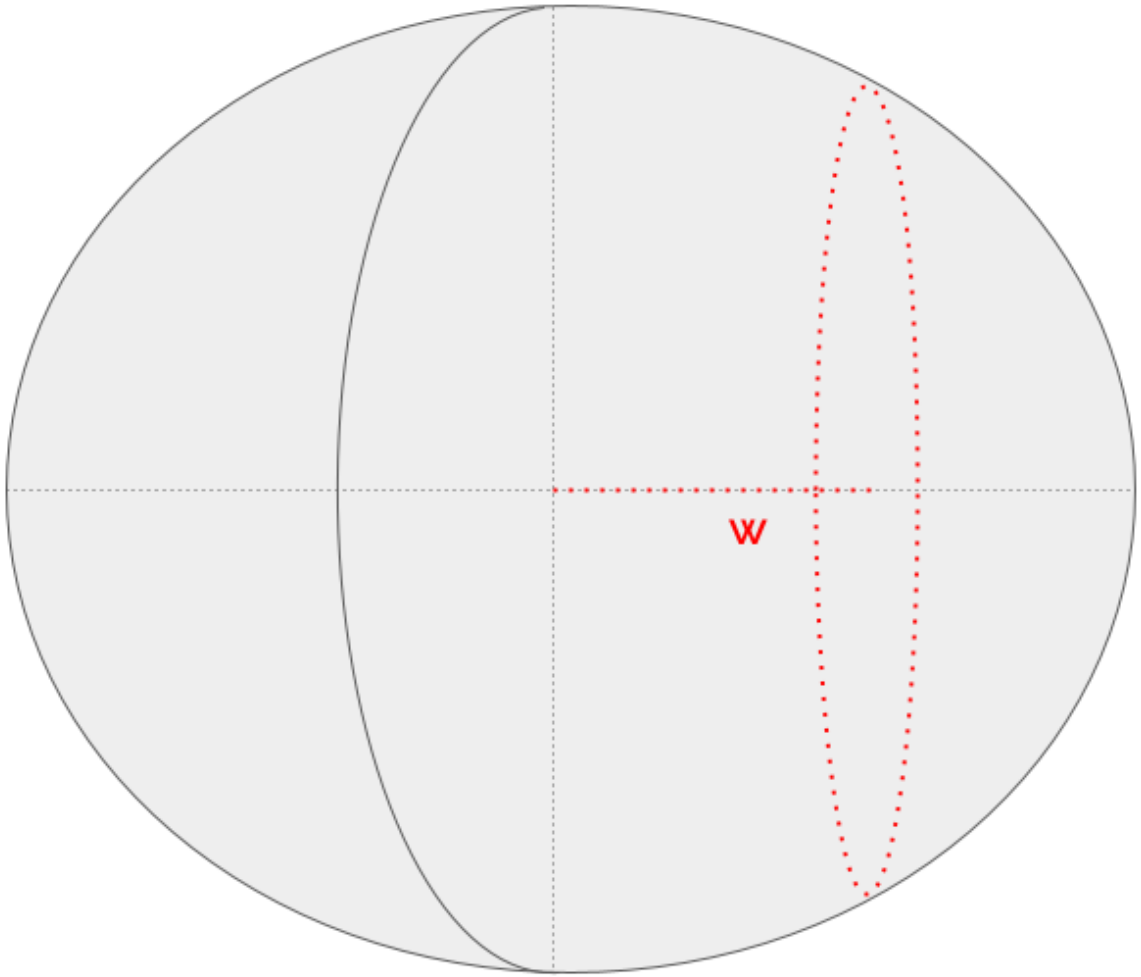
Démontrer que la méthode de sampling marche

Sampling w from $g(w|\kappa, \theta)$

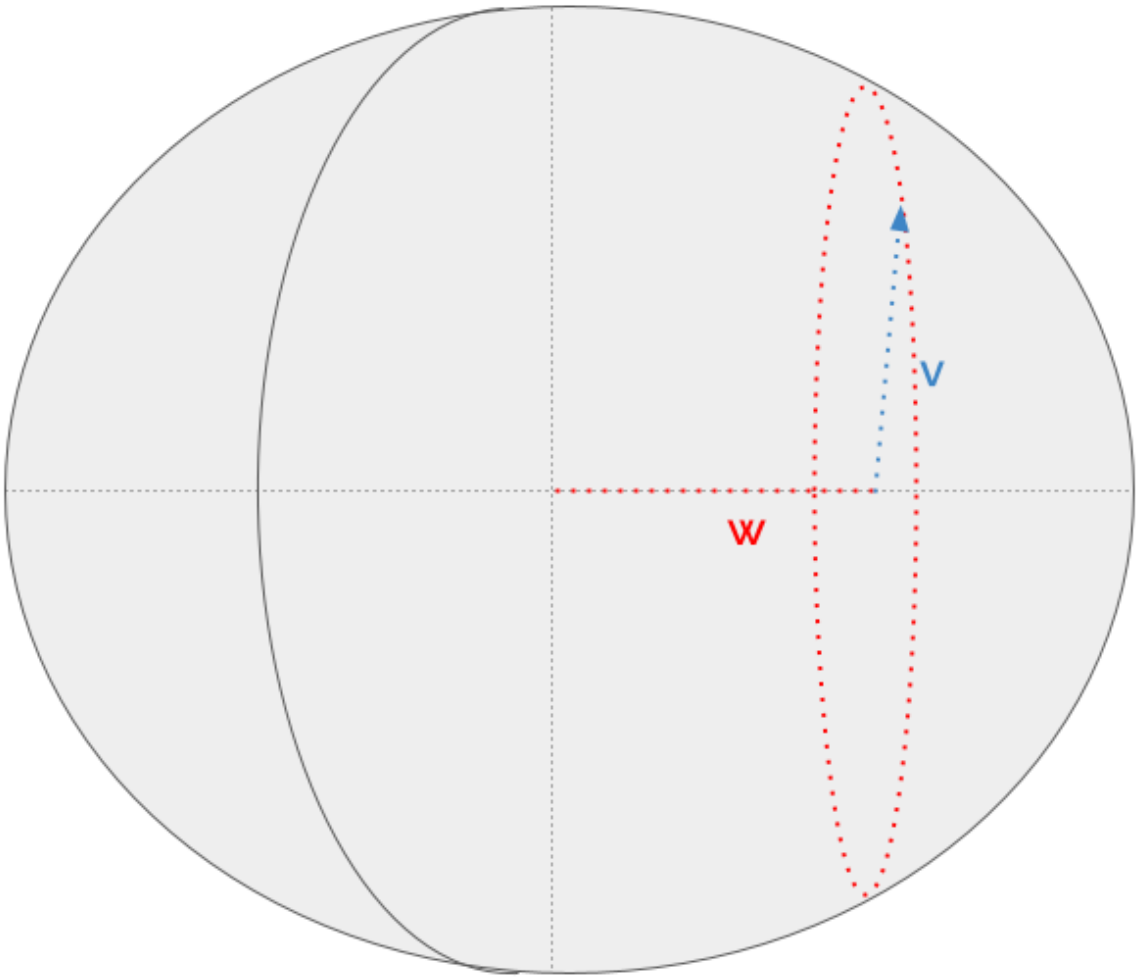


S^2 : unit sphere in $\mathbb{R}^3$

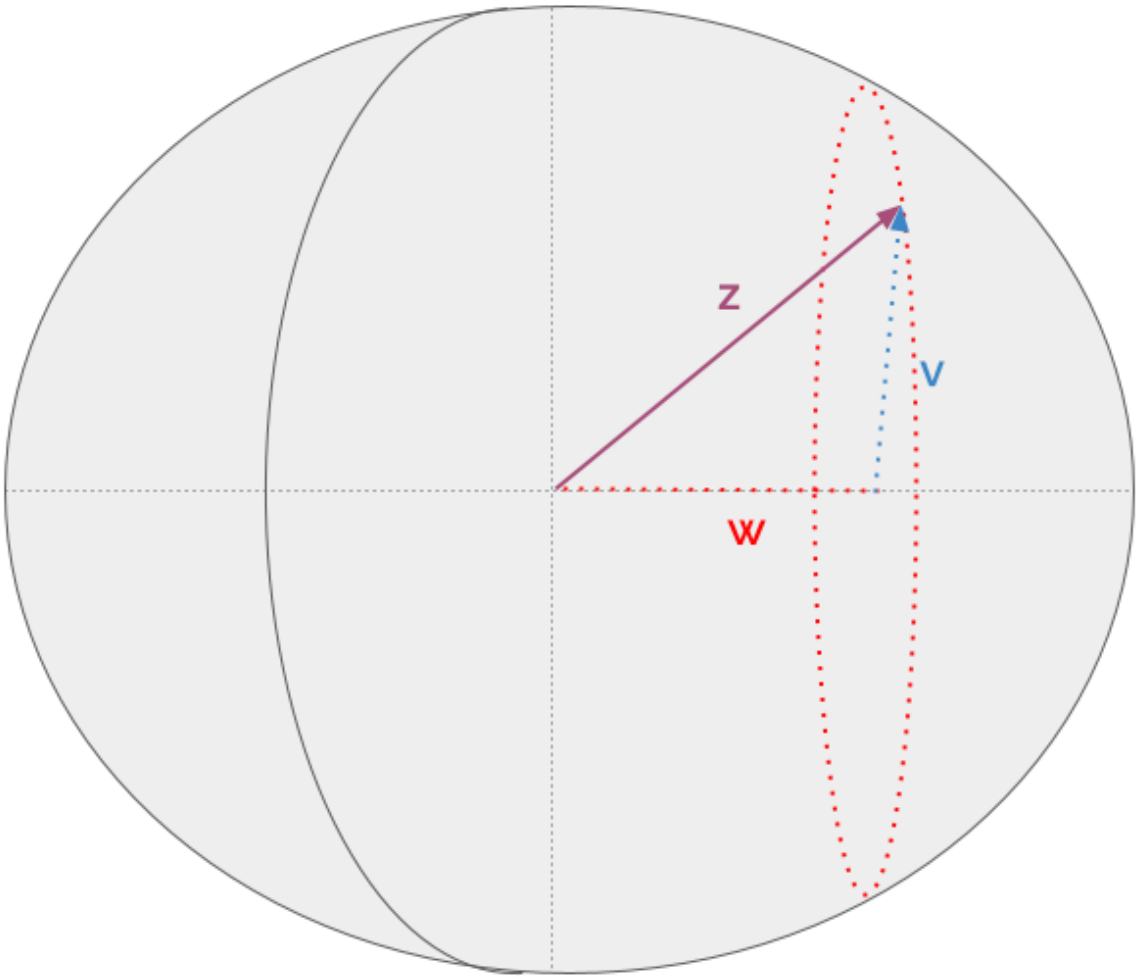
Sampling w



Sampling w



Sampling w



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Reparameterization Trick

The authors use a reparameterization trick that has been extended to distributions that can be sampled using rejection sampling [NRLB20].

Algorithm 1 Reparameterized Rejection Sampling (from [NRLB20])

$i \leftarrow 0$
repeat
  $i \leftarrow i + 1$
  Propose $\varepsilon_i \sim s(\varepsilon)$
  Simulate $u_i \sim \mathcal{U}[0, 1]$
until $u_i < \frac{g(h(\varepsilon_i,\theta);\theta)}{r(h(\varepsilon_i,\theta);\theta)}$
return ε_i

Monte Carlo estimation

By noting $\pi(\varepsilon|\theta)$ the distribution of the resulting ε, we have

$$\nabla_\theta \mathbb{E}_{g(\varepsilon|\theta)}[...] = \mathbb{E}_{\pi(\varepsilon|\theta)}[...] \text{ "} = \mathbb{E}_{(\varepsilon_i, U_i)_i}[...]\text{"}$$

Problem: $(\varepsilon_i, U_i)_{i\in\mathbb{N}}$ is not a random variable (it is a stochastic process)
No reference to a convergence proof in [DFDC$^+$, NRLB20, PBJ12, MG14]

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Experiments on link prediction

reproduire l'experience
- data (Ines)
- implementer les modèles (Victor VGAE)
- entrainement et evaluation

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Conclusion and Discussion

Limitations à la fin : discussion sur la grande dimension
vanishing surface problem
vérifier différentes dimension de l'espace latent
et algo vraiment utile en petite ou moyenne dimension ?

References


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Hyperspherical variational auto-encoders.


Andriy Mnih and Karol Gregor.
Neural variational inference and learning in belief networks, 2014.


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