SYDE 556/750
Simulating Neurobiological Systems
Lecture 9: Analysing Representation

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Based on lecture notes by
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Accompanying Readings: Chapter 7 of Neural Engineering

Contents

🚧 UNDER CONSTRUCTION 🚧

- **Observation:** Some functions are "harder" to decoder than others (larger error)
- **Goal:** Get a better understanding of the types of function that can be decoded
- Tuning curves are a set of basis functions; decoders combine these basis functions

$$\hat{x} = \sum_{i=1}^{n} d_i a_i(x) = \langle \mathbf{d}, \boldsymbol{\alpha}(x) \rangle$$

- Tuning curves are highly similar
- Find basis transformation $\mathbf{T}$ that maximises the information in the basis functions ⇒ PCA

$$\hat{x} = \langle \mathbf{d}, \mathbf{T}\boldsymbol{\alpha} \rangle = \langle \mathbf{d}\mathbf{T}^{-1}, \mathbf{T}\boldsymbol{\alpha} \rangle$$

- The scale Eigenvalues corresponding to the individual Principal Compnents is inversely proportional to the noise in the decoding ⇒ large Eigenvalue ⇒ this basis function can be decoded well