

Physical Chemistry Seminar

Virtual

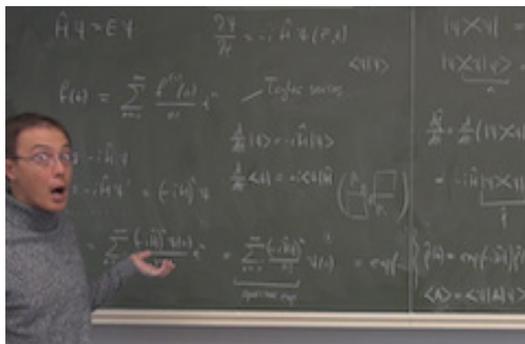
Zoom Link <https://udel.zoom.us/j/98093174367>

December 2, 4PM

Training and reverse-engineering neural nets on magnetic resonance simulations

The signalling between inner layers of fully connected neural networks is scrambled because back-propagation training does not require perceptrons to be arranged in any particular order. The input and the output inherit the order from the training database, but all internal signalling has the appearance of noise. The resulting lack of interpretability and trust is a much criticised feature of deep neural networks.

We recently found a group-theoretical procedure that brings the intermediate signalling into a human-readable form. Applied to magnetic resonance data processing networks, the method revealed unexpected internal sophistication: our networks spontaneously invented bandpass filters, notch filters, frequency axis rectifiers, frequency division multiplexing, spectral filtering regularisation, and a Fourier-like transform that maps harmonic functions into Chebyshev polynomials.



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