

development continues there is an urgent need for novel data acquisition concepts like compressive sensing.

There is an obvious intellectual achievement, in which compressive sensing and sparse representations play a key role: Advanced probability theory and (in particular) random matrix theory, convex optimization, and applied harmonic analysis will become and already have become standard ingredients of the toolbox of many engineers. At the same time, mathematicians will have gained a much deeper understanding of how to confront real-world applications. Furthermore, compressive sensing has advanced the development of ℓ_1 -minimization algorithms, and more generally of non smooth optimization. These algorithms find wide-spread use in many disciplines, including physics, biology, and economics.

6. Conclusion

To revolutionize technology we will need to develop hardware and algorithms via an integrated, trans disciplinary approach. Hence, in the future when we design sensors, processors, and other devices, we may no longer speak only about hardware and software, where each of these two components is developed essentially separately. Instead, we may have to add a third category, which we could call hybrid ware or mathematical sensing, where the physical device and the mathematical algorithm are completely intertwined and codesigned right from the beginning.

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