Diffractive imaging and information science

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The information technology has significantly contributed in sciences and engineering fields. A recent remarkable development of the technology in data science or artificial intelligence is expected in order to realize the utility analysis as a kind of computational solver for many remained difficult problems in these fields. The Fourier phase problem arises in the intensity measurements on scattering waves, and the lost phase is required to reconstruct the target image caused by the waves. The microscope using the diffraction pattern and reconstruction of the Fourier phase is called "diffractive imaging." The phase retrieval is indispensable for establishing the imaging, and the phase-reconstruction process is performed by the iterative Fourier transforms. Figure 1 presents a schematic picture for the imaging. A phase-received image is obtained by the diffraction pattern and phase reconstruction. The development of the phase retrieval algorithms has qualitatively supported to establish the imaging. The objective lens of the method consists of the high-speed processing hardware and the algorithms. Then the imaging is so called "digital lens microscope. "

In this presentation, the diffractive imaging is introduced as a typical research between material and information. Such kind researches are desired for utilizing the powerful computational tools and resolving their problems of ordinal scientific fields. As another story of the information-scientific motivated research, a recent endeavor between Hokkaido fisheries and information science is presented with an information-criterion based estimation of the salmon return.

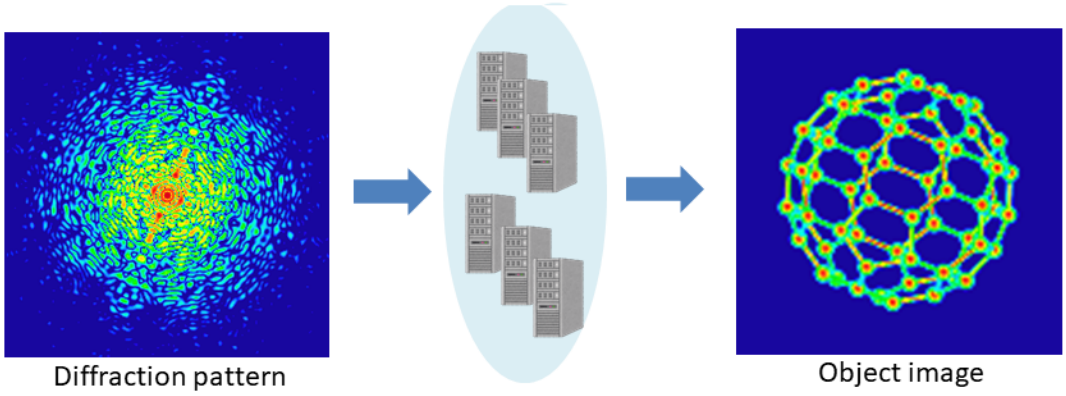

Figure 1: Schematic figure of diffractive imaging.