Human World and Wonder World of Inverse Problems: Scientific and Creative Challenges – Early Indication Systems for Human Brain and Human Heart and Human Mathematic in the Arts

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Abstract

In the presented works, we first in a "nutshell" tell about where Inverse Problems come from, what they are and how they are handled. We will do it by the beauty of questions from all areas of life which ask for a helping hand from mathematicians and lovers of mathematics. The first part of this 1-day lecture series demonstrates a powerful application of the Theory of Inverse Problems along with advanced Statistics, Data Science, Machine Learning, Operational Research, Artificial Intelligence and Neuroscience, namely for an improved "early indication" of the dementia disease which we call as "Alzheimer's".

In the second part of this 1-day lecture series we move from the brain to the heart and discuss our selected problem of medical imaging there as well. For both human heart and human brain we will look at the inverse problem and the corresponding forward problem of "generation". We shall pursue and overcome this dichotomy in our last big challenge, namely how mathematics, mathematical algorithms and computational machines can support us in the creation of Art. We shall mainly refer to the "Marbling Arts", notably "Ebru". We will understand more about the human-computer interaction, and that we humans are precious and irreplaceable. We will create "appetite" to study more, to find out more, to invent more, and to collaborate more.

During the entire 1-day lecture series we shall discuss some newest models and insights from cosmology, generalized space-time design and research, with beauty and wonders of the smallest and the biggest and including the spirit. For all of this we will need you – our friends and future.

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