INFORMATION BASED COMPLEXITY AND GRID COMPUTING

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Information Based Complexity (IBC) begins with [1].
Grid Computing (GC) begins with [2, 3].

We follow [4].

Let
X, Y be non-empty sets,
(G, d) be a metric space,
$S : X \to G$ be a mapping called as **a solution operator**,
$\eta : X \to Y$ be a mapping called as **an information operator**,
Φ be a set of mappings $\varphi : Y \to G$; an element of Φ is called as **an admissible algorithm**,
$e : G^X \times G^X \to [0, \infty]$ be a mapping called as **an error criterion**.

Using the information operator $\eta : X \to Y$ and an admissible algorithm $\varphi \in \Phi$ we can 'compute' the composition $\varphi \circ \eta : X \to G$ and view it as 'an approximation' for the solution operator $S : X \to G$.

Call an admissible algorithm $\varphi_0 \in \Phi$ *optimal* (for the error criterion e) if

$$e(S, \varphi_0 \circ \eta) \leq e(S, \varphi \circ \eta) \quad \forall \varphi \in \Phi \, .$$

Traditionally as an error criterion the functional e_∞ is chosen defined by the equality

$$e_\infty(S, T) = \sup_{x \in X} d(Sx, Tx) \, .$$

In IBC-theory a different error criterion plays an important role. It can be introduced as follows: fix a probability measure μ on a sigma-algebra of subsets of X, assume that all considered mappings are measurable and set

$$e_{2,\mu}(S, T) = \left(\int_X d^2(Sx, Tx) d\mu(x) \right)^{\frac{1}{2}} \, .$$

A result about existence and construction of an optimal algorithm for the error criterion $e_{2,\mu}$ contained in [1] was generalized in [4].

References

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3. Foster, Ian, and Carl Kesselman. *The Grid: Blueprint for a New Computing Infrastructure*, 1998 (Second Ed., Elsevier, 2004).
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