(B)

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Online Decision Making Based on Random Sampling

Takimoto, Eiji

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(2)   ZDD

ZDD

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We proposed high accuracy and efficient algorithms for various problems of online decision making, machine learning and combinatorial optimization, by using the methodology of random sampling. Among them we give two main achievements below. (1) We showed that the metrical task system problem over a combinatorial decision space can be reduced to the problem of random sampling over the decision space, and using the reduction we succeeded to give, for the first time, high accuracy and efficient algorithms for various combinatorial decision spaces such as paths of a graph. (2) We proposed a new approach toward large scale machine learning: compress the given training data into a ZDD, and simulate Boosting efficiently over the ZDD (without decompression), based on an online prediction method over the set of accepting paths as the decision space.

$t = 1, 2, \ldots, T$

d_t

x_t

$d_1^*, \ldots, d_T^*$

COLTS NIPSS
ICMLS ALT
15

t t d_t x_t

$d_1^* = d_2^* = \cdots = d_T^*$

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MTSS
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(2)

(3) ... Bradley-Terry ...

(4) MTS e8 _> E ô d_t ... x_t
d_{t-1}

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(5) ... (8 e8_PK ... n
x ... x
n ... x

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(9) NP T7 ... 8 PK ... v 8
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(10) ... 1 8_PK ... D7HIS ... /4
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