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A DETERMINISTIC APPROACH FOR ENHANCEMENT OF SEARCH PERFORMANCE

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ABSTRACT:

Numerous designs were proposed in the past few years for identification of an efficient packet classification solution. For the most of established applications necessitate maximum priority matching. Earlier decision tree algorithms show outstanding search performance by means of exploiting geometrical representation of rules within a classifier and search for a geometric subspace to which every input packet belong. In our work we suggest effective packet classification algorithm that is based on boundary cutting. The cutting in projected algorithm is deterministic to a certain extent than involving complex heuristics, and it is more successful in provision of enhanced search performance and more resourceful in memory necessity.

Keywords: Packet classification, Boundary cutting, Decision tree algorithms, Heuristics, Geometric subspace.

1. INTRODUCTION:

The concept of multi-match classification has become an important item due to rising need for network security, or else in new application programs. Usage of a high bandwidth as well as small on-chip memory whereas rule database for packet classification reside in capacity off-chip memory by means of proper partitioning is advantageous. Performance metrics in support of algorithms of packet classification include processing speed, as

packet classification has to be performed in wire-speed for each incoming packet [1]. Evaluation of processing speed by means of number of off-chip memory accesses necessary to determine class of packet since it is slowest operation within packet classification. The quantity of memory necessary to store packet classification table have to be considered. Our study analyzes a variety of decision-tree-based packet classification algorithms. When a decision tree is appropriately partitioned in order that internal tree nodes are accumulated in on-chip memory and a huge rule database is stored in off-chip memory. Decision tree algorithm can make available extremely high-speed search performance. Algorithms of decision tree enable highest-priority match as well as multimatch packet classification. In our work we propose effective packet classification algorithm that is based on boundary cutting. Cutting in proposed algorithm is on basis of disjoint space that is covered by each rule as a result packet classification table by means of proposed algorithm is deterministically build and does not necessitate complex heuristics used by means of previous decision tree algorithms [2][3]. The projected algorithm include two most important advantages such as first one is that, boundary cutting of projected algorithm is more effectual to that of previous algorithms because it is on basis of rule boundaries to a certain extent than preset intervals as a result quantity of necessary memory is considerably reduced. While cutting does not take place in absence of a boundary, unnecessary cutting is avoidable hence rule replication is decreased in Boundary cutting algorithm. While boundary cutting loses indexing capability at internal nodes, binary search at internal nodes make available superior search performance.

2. METHODOLOGY:

Previous decision tree algorithms such as HiCuts as well as HyperCuts choose number of cuts on basis of locally optimized decision that compromise searchspeed and memory necessity. Decision tree algorithm can make available extremely high-speed search performance. This process necessitates a reasonable amount of pre-processing, that involve complex heuristics associated to each specified rule set. The computation necessary for pre-processing consumes memory as well as construction time, making it tricky for those algorithms to be extended to huge rule sets due to memory

problems in construction of decision trees. The cutting is on the basis of fixed interval that does not imagine actual space that each rule covers; for this reason it is ineffective. Previous decision tree algorithms such as HiCuts as well as HyperCuts illustrate outstanding search performance by means of exploiting geometrical representation of rules within a classifier and search for a geometric subspace to which every input packet belong. On the other hand, decision tree algorithms involve complex heuristics for determining field and number of cuts and additionally, fixed interval-based cutting that is not relating to actual space that each rule cover is unsuccessful and results in a huge storage necessity. When compared to HiCuts algorithm, decision tree of Hyper Cuts algorithm usually has a smaller depth as numerous fields are used simultaneously in a particular internal node. Our work propose effective packet classification algorithm that is based on boundary cutting. The proposed algorithm finds out space that each rule covers and carries out cutting according to space boundary. Cutting in proposed algorithm is on basis of disjoint space that is covered by each rule as a result packet classification table by means of proposed algorithm is deterministically build and does not necessitate complex heuristics used by means of previous decision tree algorithms [4]. Comparison of proposed decision tree to the HiCuts decision tree shows that Boundary cutting algorithm does not make unnecessary cutting. The cutting in proposed algorithm is deterministic to a certain extent than involving complex heuristics, and it is more successful in provision of enhanced search performance and more resourceful in memory necessity.

3. AN OVERVIEW OF PROPOSED SYSTEM:

HiCuts and HyperCuts algorithms choose number of cuts on basis of locally optimized decision that compromise searchspeed and memory necessity. HiCuts algorithm offer high-speed search performance, however memory transparency for huge sets makes its usage not practical. HyperCuts algorithm moreover does not make available high-speed search performance or necessitate a vast amount of memory. Since HyperCuts algorithm usually incurs extensive memory transparency when compared to HiCuts algorithm, quite a lot of techniques were projected to improve algorithm. While HiCuts algorithm considers one field at a time for selection of cut dimension,

HyperCuts algorithm considers numerous fields simultaneously. In building of decision tree of HiCutsalgorithm, huge number of cuts get through more storage, and a minute number of cuts cause slow search performance. It is challenging to stabilze storage necessity as well as search speed. Compared to HiCuts algorithm, decision tree of Hyper Cuts algorithm usually has a smaller depth as numerous fields are used simultaneously in a particular internal node. In our work we propose effective packet classification algorithm that is based on boundary cutting. The cutting in projected algorithm is deterministic to a certain extent than involving complex heuristics, and it is more successful in provision of enhanced search performance and more resourceful in memory necessity. Cutting in this algorithm is on basis of disjoint space that is covered by each rule as a result packet classification table by means of proposed algorithm is deterministically build and does not necessitate complex heuristics used by means of previous decision tree algorithms. Boundary cutting of projected algorithm is more effectual to that of previous algorithms because it is on basis of rule boundaries to a certain extent than preset intervals as a result quantity of necessary memory is considerably reduced. While boundary cutting loses indexing capability at internal nodes, binary search at internal nodes make available superior search performance [5]. Comparison of proposed decision tree to the HiCuts decision tree shows that Boundary cutting algorithm does not make unnecessary cutting. No two leaves contain same set of rules. While cutting does not take place in absence of a boundary, unnecessary cutting is avoidable hence rule replication is decreased in Boundary cutting algorithm [6]. While cutting in earlier decision tree algorithms is based on normal interval, cutting in proposed algorithm is based on rule boundaries; thus, cutting in our algorithm is deterministic as well as extremely effective.

Fig1: An overview of average number of memory access at internal nodes.

4. CONCLUSION:

Decision tree algorithms involve difficult heuristics for determining field and number

of cuts and additionally, unchanging interval-based cutting that is not relating to actual space results in a huge storage necessity. HiCuts and HyperCuts algorithms carry out cutting based on an unchanging interval, and for this reason partitioning is useless in reducing number of rules that belong to a subspace. In our work we put forward effective packet classification algorithm that is based on boundary cutting. Boundary cutting of proposed algorithm is more capable to that of earlier algorithms since it is on basis of rule boundaries to a certain extent than preset intervals as a result quantity of necessary memory is considerably reduced. The cutting in projected algorithm is deterministic partially than involving complex heuristics and it is more successful in provision of enhanced search performance and more resourceful in memory necessity. While cutting does not happen in lack of a boundary, unnecessary cutting is avoidable hence rule replication is decreased in Boundary cutting algorithm. The projected algorithm finds out sp ace that each rule covers and carries out cutting according to space boundary.

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