*1. Summarize the (at most) 3 key main ideas.*

1. The paper provides an efficient path profiling algorithm. The algorithm iterates in reverse topological order over the basic blocks to gain the number of paths and subsequently the edge weights. The edge weights are then summed from header to exit to gain the path’s unique ID.
2. Further optimizations can be made to create a path profile instrumentation pass that is comparable to edge profiling speeds but with more accurate heuristics.
3. This technique can cover most paths and instructions found in full runs with just short, training datasets, further speeding up and accurately predicting the profiling.

*2. State the main contribution of the paper.*

The main contribution of the paper is a new, simple algorithm for path profiling instrumentation that is more efficient and provides better heuristics than previous edge or path profiling to better optimize code.

*3. State the limitation of the paper.*

Though path profiling may contain better heuristics than edge profiling, the average overhead of their efficient path profiling algorithm is 30.9% and is 2.8 times the amount of overhead than edge profiling. This slightly undermines the efficiency claims made by the author.

*4. Find at least one open question and try to answer it.*

Since this paper came out, has there been a more efficient path profiling algorithm or technique?

Laura Hiatt and Kevin Bierhoff in 2006 created an incremental approach to Ball & Larus’s Efficient Path Profiling technique in order to reduce the overhead introduced by this technique. Rather than instrumenting the whole program, they incrementally instrumented the “functions just enough to identify the hot path”. Their method claims to have always found the “true” hot path with “less overhead than full path profiling”.

http://www.cs.cmu.edu/~kbierhof/15745/