

# **A Preliminary Study of Probabilistic Argumentation**

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UUCS-17-001

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14 February 2017

## ***Abstract***

We investigate methods to define a probabilistic logic and their application to probabilistic argumentation<sup>1</sup>. We begin with a discussion of augmenting propositional calculus with probabilities. We start with a set of sentences,  $S$ , each with a known probability, and then the problem is to determine the probability of a query sentence that is a disjunction of literals appearing in  $S$ . First, we examine Nilsson's [15] solution based on the semantic models of the sentences; we develop two different approaches to solving the problem as posed: (1) using a linear solver, and (2) geometrically finding the intersection of a line with the probability convex hull (see below). However, Nilsson's approach only provides lower and upper bounds on the solution. We then propose a new approach which finds probabilities for the atoms found in the sentences, and then uses these probabilities to compute the probability of the query sentence. Finally, we describe how this probability representation method can form the basis for a probabilistic argumentation system.

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<sup>1</sup>This material is based upon work supported by the Air Force Office of Scientific Research under award number FA9550-17-1-0077.