

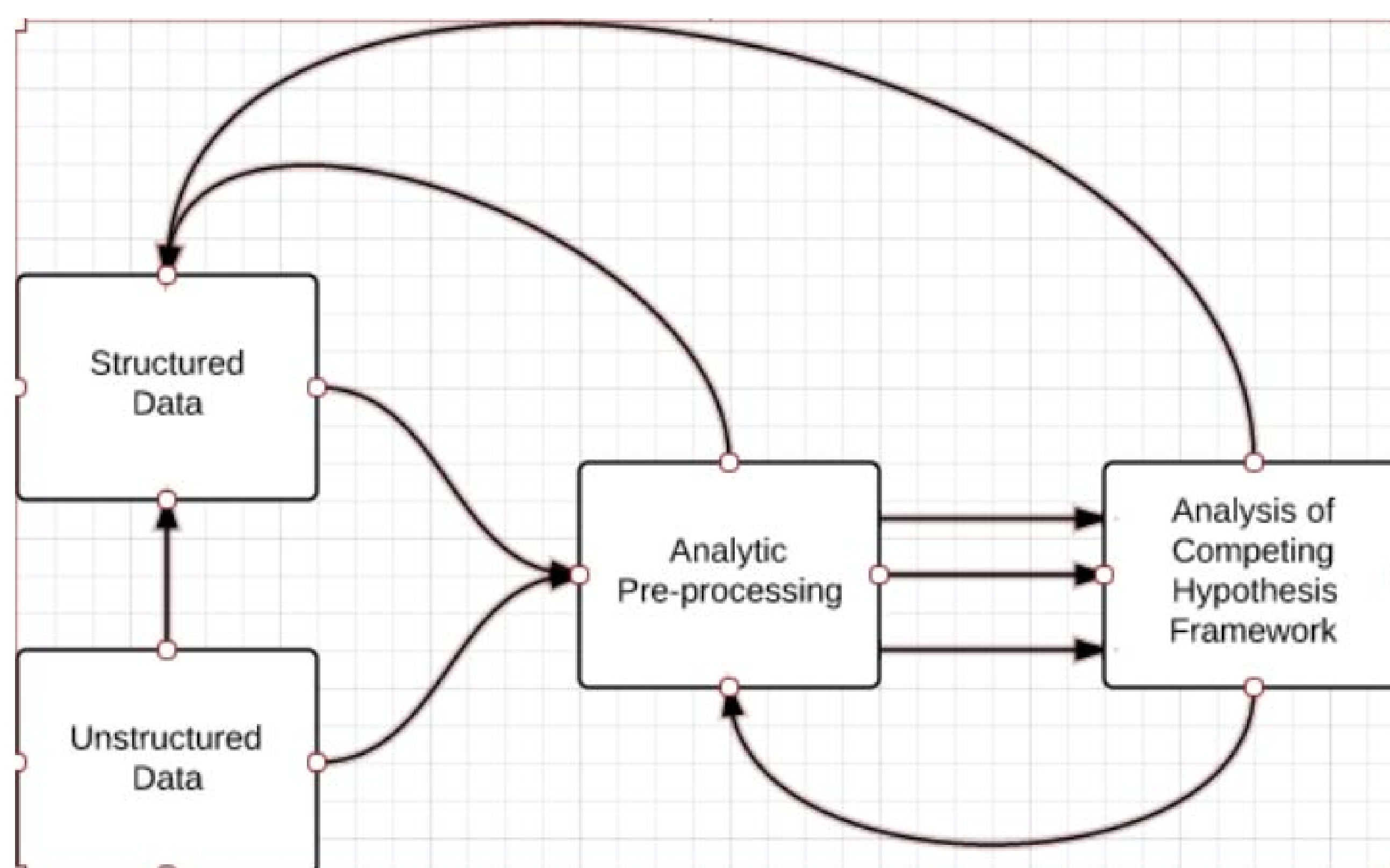
Implementing Bayesian Statistics from an Analysis of Competing Hypothesis Framework

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Summary

The Analysis of Competing Hypotheses system is a decision analysis tool developed by the intelligence community to aid analysts in decision making.



Goals

- Add Deception Detection
- Add Detection mechanisms for bias and other cognitive pitfalls

Solution

By implementing a Bayesian belief network and analyzing both the presence and the lack of evidence based on a hypothesis deception can be limited. Bias can be countered by quantifying past experiences and considered as error.

Classical

$$Probability = \sum Evidence_1 \dots Evidence_n | Hypothesis$$

ACH-CDB (Counter Deception and Bias)

$$Probability = \frac{\sum Evidence_1 \dots Evidence_n | Hypothesis}{Hypothesis | Evidence + Hypothesis | \neg Evidence} \pm \sum Bias(Evidence)$$

Example Implementation: Allied Invasion of Normandy, WWII

Standard ACH Method P(Evidence Hypothesis)	Percentage
Allied Invasion of Normandy	20%
Allied Invasion of Pas de Calais	77%
Other Allied Action	3%
Counter Deception P(Evidence Hypothesis)	
Allied Invasion of Normandy	85%
Allied Invasion of Pas de Calais	5%
Other Allied Action	10%