Decomposing the discriminator in the semilattice of modal operators

95. Arbeitstagung Allgemeine Algebra

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Let $M(B)$ be the set of modal operators on a nontrivial Boolean algebra B, and $\mathcal{L}$ be the bounded semilattice $\langle M(B), \vee, f^{\mathbf{0}}, f^{1}\rangle$, where $f^{\mathbf{0}}(x) \equiv 0$, and

$$f^{\mathbf{1}}(x) = \begin{cases} 0, & \text{if } x = 1, \\ 1, & \text{otherwise.} \end{cases}$$

Observe that $f^{\mathbf{1}}$ is the unary discriminator on B. A *discriminator decomposition algebra* (DDA) is a bimodal algebra $\langle B, f, g\rangle$ in which $f \vee g = f^{\mathbf{1}}$; DDAs have a close relationship to weak mixed algebras of [2]. A *decomposition of* $f^{\mathbf{1}}$ is a pair of modal operators $\langle f, g\rangle$ on B such that $\langle B, f, g\rangle$ is a DDA.

We investigate the question how the discriminator can be decomposed. Emphasis is given to minimal pairs (i.e. minimal elements of $\mathcal{L} \times \mathcal{L}$), and dual pseudocomplements in $\mathcal{L}$. In particular we address the question under which conditions $\mathcal{L}$ is dually pseudocomplemented.

References

[1] Düntsch, I., Dzik, W., and Orłowska, E. (2017). Decomposing the discriminator in the semilattice of modal operators. Preprint.

[2] Düntsch, I., Orłowska, E., and Tinchev, T. (2018). Mixed algebras and their logics. *Journal of Applied Non-Classical Logics*. To appear.

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