1139-20-125   **Jonathan Gryak*** (`gryakj@med.umich.edu`), **Robert M. Haralick** and **Delaram Kahrobaei**.
Solving the Conjugacy Decision Problem via Machine Learning.

Machine learning and pattern recognition techniques have been successfully applied to algorithmic problems in free groups. In this talk, we seek to extend these techniques to finitely presented non-free groups, with a particular emphasis on polycyclic and metabelian groups that are of interest to non-commutative cryptography.

As a prototypical example, we utilize supervised learning methods to construct classifiers that can solve the conjugacy decision problem, i.e., determine whether or not a pair of elements from a specified group are conjugate. The accuracies of classifiers created using decision trees, random forests, and N-tuple neural network models are evaluated for several non-free groups. The very high accuracy of these classifiers suggests an underlying mathematical relationship with respect to conjugacy in the tested groups. (Received February 05, 2018)