1125-14-619 **Sara Shirinkam***, sara.shirinkam@utsa.edu, **Adel Alaeddini**, adel.alaeddini@utsa.edu, and **Elizabeth Gross**, elizabeth.gross@sjsu.edu. *Numerical algebraic geometry for identifying the number of components in Gaussian Mixture Models.*

Gaussian Mixture Models (GMM) are among most statistically mature methods for clustering and density estimation with numerous successful applications in science and engineering. GMM parameters are typically estimated from training data using the iterative Expectation-Maximization (EM) algorithm, which requires the number of Gaussian components apriori. In this study we proposed a numerical algebraic geometry approach to identify the optimal number of Gaussian components in GMM. The proposed approach transforms GMM models with various number of components into equivalent polynomial regression splines and uses homotopy continuation methods to find the model or equivalently the number of components which is most compatible with training data. The proposed approach also identifies the location of all local maxima of the equivalent polynomial regression model which accurately estimates the location of Gaussian components centers. We compare the performance of the proposed approach against popular methods in the literature which are based on Akaike information criterion (AIC) and Bayesian Information Criterion (BIC) using extensive simulation. (Received September 08, 2016)