

(SB-54) AN OVERVIEW OF THE APPLICATION OF ARTIFICIAL INTELLIGENCE-BASED APPROACHES IN BIOMASS-RELATED AREAS

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Biomass which is known as the first primordial energy source of humankind has the great advantage of being a sustainable alternative to fossil fuels among renewable energy sources. Although biochemical and thermochemical conversion are accepted as two foremost conversion paths of biomass into energy, fuels, and bio-products, thermochemical conversion of biomass including techniques like pyrolysis, gasification, and combustion is a promising process. While biomass-based energy products are limited due to problems related to feedstock variability, conversion economics, and supply chain reliability, biomass with billions of tons of available resources available every year as a feedstock is always worth investigating in terms of energy demand and environment friendly issues for carbon neutral characteristics. As the importance of data and its evaluation possibility got attention in the past decade, the peak in the concepts like “Big Data”, “data mining”, and “artificial intelligence (AI)” has been achieved especially in different fields of science and technology. AI research has produced multiple important technologies, for instance Natural Language Processing (NLP), Machine Learning (ML), planning, and exploration, with a wide range of applications. This paper reviewed 16 selected articles published in the last 6 years that used various AI techniques applied to the biomass-related areas. The issues investigated in the selected articles are simulating and predicting the selectivity and yield of pyrolysis gas products, estimating biomass higher/gross higher heating value from ultimate or proximate analysis, modeling pyrolysis product yields, etc. According to these studies, AI is beneficial in developing comprehensive models that are useful in biomass-related areas and improving models for biomass conversion or product yield prediction. As a result, the selected articles can be accepted as important steps to develop standardized and practical procedures across biomass-related areas.

Keywords: *Artificial intelligence, Biomass, Machine learning, Pyrolysis.*