

Dominik Hörauf, “Artificial Intelligence for the Assessment of Creativity: An Introduction to Semantic Text-based Creativity Analysis”

Abstract: Creativity has been defined as a complex construct (Feldhusen & Goh, 1995) that creates a product or response “that (a) [...] is both novel and appropriate, useful, correct, or valuable [...] to the task at hand, and (b) [...] is heuristic rather than algorithmic.” (Amabile, 1996). As this, for the past decades creative capability was to be achieved and assessed by humans, not machines. With the fast and comprehensive spread of artificial intelligence (AI) applications throughout private, industry, and scientific sectors (Acemoglu & Restrepo, 2019; Mehr, 2017), this perspective is found under growing pressure. When algorithms become able to observe and learn, their outcomes may not be solely based on predefined rules, but rather on heuristics as well. Therefore, questions arise about how (e.g., supportive, evaluative, generative) AI challenges our current understanding of thinking creatively and evaluating creativity.

Creativity evaluation employs several factors (e.g., Dumas & Dunbar, 2014; Hocevar, 1979) of which some (e.g., fluency: how many ideas are created in a certain period?) are easier to be evaluated by computational capacity than others (e.g., originality: How different is one idea from others?). For text-based creativity (e.g., literature, idea databases), the latter requires an understanding of both, syntactic and semantic nearness of words. For example, for the word “king” a second word “kingdom” would be syntactically near and thus rated not very original. The same is true for the word “queen”, yet this semantic nearness is harder to capture. Thus, creativity evaluation is largely based on structured tests (e.g., Torrance test, creative function test, etc.) which are typically executed by humans, often placing limitations, e.g. through biases.

Representing words in vector spaces is an efficient way to address this challenge (Mikolov et al., 2013a & 2013b) and allow for text-based creativity assessments by AI tools such as word2vec. Here, words are estimated as vectors consisting of several hundred inputs, which are trained on their contexts. Based on these vectorized representations, the algorithm can predict nearby words and understand semantic in addition to syntactic nearness. Applying AI tools to a creativity evaluation context potentially unlocks new and highly relevant capabilities. For that, it is important to conceptualize and understand the intersection of AI with creativity and its assessment and find ways to execute creativity assessment methods by word-vectorizing AI tools. This depicts the core of this research project. Based on this understanding, new implications can be expected for both, scientific (e.g., pushing for more AI-based creativity research) and managerial (e.g., AI applications for idea assessment and idea management) contexts, guiding towards a conceptualized understanding of *creative artificial intelligence*. As this research project is a work-in-progress, the workshop presentation will focus on presenting the underlying research idea and discussing possibilities to use word-vector-based AI tools for the assessment of text-based creativity.

Dominik Hörauf works at the Institute of Entrepreneurship and Innovation Science at the University of Stuttgart. His research focuses on creativity, innovation management, and AI-based creativity assessment. The presented research is part of his master thesis research, advised by Professor Dr. Alexander Brem. Previous research includes articles at *Creativity and Innovation Management (CIM)* and *R&D Management Conference*.