REDIAL - Relevant Emergent communication between Distributed Intelligent Adaptive Learners

Traditional communication systems are optimized in a neutral way, separating the transmission of data from their meaning. However, 6G is leading to a paradigm shift toward semantic communication: data-hungry applications such as cooperative automated driving overcome even 5G's capabilities, and their strict latency requirements require not just to deliver as much information as possible as quickly as possible, but also to focus on the most relevant data, omitting redundant or irrelevant information. In this context, REDIAL targets the so-called "ef ectiveness problem" of jointly optimizing a communication system and the target application, prioritizing transmissions that can make a significant dif erence in the latter's performance. The envisioned scenario is a cooperative network of agents that have to learn not only how to act optimally in an environment, but also how to exchange information in order to maximize context awareness and, in turn, further improve their actions. REDIAL's first goal is to coordinate communication in such a network: agents with partial knowledge of the environment need to figure out which piece of information is needed by which other agent at which time. In complex scenarios, determining the relevance and timeliness of data is non-trivial, and coordinating communication can be even more complex. Secondly, we aim at designing a looser, linguistic-based protocol structure to ef iciently transmit the relations between data points and objects in complex, structured representation such as knowledge graphs, enabling semantic communication by using more flexible protocols. This builds on the initial ideas of the original DIALECT proposal, which was based on implicit, contextual communication, and extends it by building on the latest results. REDIAL can yield novel and interesting theoretical results, as well as solutions and schemes potentially applicable in 6G and beyond networks and in Industry 5.0 cooperative robotic applications.