The rapid progress of the Covid-19 pandemic demonstrates the dire need for quick and effective drug discovery. Drug-repurposing is a drug discovery paradigm that uses existing drugs for new therapeutic indications. It has the advantages of significantly reducing the time and cost compared to *de novo* drug discovery. Drug-repurposing represents a promising strategy for Covid-19 treatment.

Prof. Xia Ning with a team of scientists from the University of Minnesota, Hunan University, and Amazon’s AWS AI laboratories in Shanghai and Palo Alto have created the **Drug Repurposing Knowledge Graph** (DRKG) and a set of machine learning tools that can be used to prioritize drugs for repurposing studies.

DRKG is a comprehensive biological knowledge graph that relates human genes, compounds, biological processes, drug side effects, diseases and symptoms. DRKG includes, curates, and normalizes information from six publicly available databases and data that were collected from recent publications related to Covid-19. It has 97,238 entities belonging to 13 types of entities, and 5,874,261 triplets belonging to 107 types of relations.

The machine learning tools use the state-of-the-art deep graph learning methods ([DGL-KE](https://github.com/awslabs/dgl-ke)) to compute embeddings of DRKG entities and relations, and use these embeddings to predict how likely a drug can treat a disease or how likely a drug can bind to a protein associated with the disease. When tested against the human proteins associated with Covid-19, these tools identified with high scores many of the Covid-19 drug candidates that are currently under clinical trials.

Prof. Ning and her collaborators have made DRKG publicly available on [github](https://github.com/gnn4dr/DRKG) along with the set of machine learning tools and pre-computed embeddings. This free infrastructure will facilitate researchers to conduct computational drug repurposing more efficiently and effectively for Covid-19 and for other diseases (e.g., Alzheimer’s disease).

