

Part IV
Statistical Methods

Even before the computer, as we will see in this part, people were counting words, for various purposes. And like in Kubrick's *2001: A Space Odyssey*, the bone thrown by the ape becomes a space station, here also we have a technological miracle: word counting has resulted in ChatGPT. In this part we will briefly look at some intermediate steps of this evolution. Before deep learning, ordinary machine learning algorithms were used for NLP. At that time the most exciting task was data preprocessing, to achieve a form that could be handled by the machine learning algorithm. These methods were not very performant, compared to deep models, but were (at least partly) transparent. After that we entered the era of deep learning and nothing was ever the same again. Text is embedded into high-dimensional spaces with miraculous properties and models will read terabytes of data and endlessly go back and forth across millions of elementary cells in order to get trained. The results are known. ChatGPT appeared on *Time Magazine*'s cover on February 20, 2023. We asked it whether it is the technological singularity that Hawking has predicted, and which will result in the end of humanity. The reader can check its answer on p. 452.