Summary

The COVID-19 pandemic has highlighted the need for accurate and efficient diagnosis, prompting research into using artificial intelligence (AI) models for diagnostic classification of COVID-19 patients based on their chest X-ray images.

The dissertation includes three original research articles on the application of deep learning-based methods to classify healthy and COVID-19 patients based on chest X-ray images. The successfully developed deep learning models accurately distinguish between COVID-19 positive and negative cases with high levels of accuracy, sensitivity, specificity. The dissertation also explored the impact of data augmentation techniques and pre-processing methods on classification abilities, and the use of deep learning models for feature extraction and comparison with tree-based models.

Ethical considerations were discussed, including the potential benefits and drawbacks of relying on machine learning (ML) models for medical decision-making and the implications of routine AI/ML implementation in clinical practice. One of the key ethical considerations is the potential impact of these technologies on the quality of medical decision-making. Although AI/ML models have shown promising results in several medical applications, their transparency, reliability, and accuracy need to be carefully evaluated to ensure that they do not compromise the quality of patient care. To address these ethical considerations, it is important to establish guidelines and regulations for the development, deployment, and use of AI/ML technologies in healthcare.

Despite challenges and ethical considerations, AI models have great potential to improve medical imaging and patient outcomes. The potential benefits of using AI models in medical imaging are numerous and have been well-documented in various studies.

In conclusion, while the implementation of AI models in medical imaging poses challenges and ethical considerations, the potential benefits are significant and cannot be ignored. As the technology continues to evolve and improve, it is essential that these concerns are addressed and ensured that the use of AI in medical imaging is done in a responsible and ethical manner. With careful consideration and collaboration between researchers, practitioners, and stakeholders, the full potential of AI can improve patient outcomes and revolutionize medical imaging.