

**Thesis Proposal**

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| **Title** | ： | **Neural networks in mobile applications** |
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| **Student** | **：** | **Chen Qichen** |
| **Advisor** | **：** | **A.A.Deryushev** |
| **Specialty** | **：** | **Mathematics and Computer Science** |
| **Faculty** | **：** | **Mechanics and Mathematics Faculty** |

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**Thesis Proposal to Belarusian State University**

**Dissertation Title (Neural networks in mobile applications)**

**Student: Chen Qichen**

**Advisor: A. A.Deryushev**

**Belarusian State University**

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**Neural networks in mobile applications**

# ABSTRACT

The object of this research is to explore the application of deep learning techniques, specifically neural networks, in mobile applications. The subject of this study is the development and optimization of neural network models that can efficiently operate on mobile devices. In recent years, with the widespread use of mobile devices and the increasing demand for intelligent applications, the application of deep learning to mobile applications has become a natural trend. This research focuses on utilizing GPU capabilities on mobile devices, collaborative computing engines, optimizing Convolutional Neural Network (CNN) models, Deep Learning Inference Accelerators, Binary Neural Network Inference Engines, and Efficient Convolutional Neural Network Architectures. These approaches provide effective solutions for achieving efficient neural network inference and training on mobile devices, meeting the needs of mobile applications while reducing latency and power consumption.

**Key Words**: **Neural Network Models GPU Mobile Devices**

**Chapter 1 Introduction**

## Research Background

The object of this research is the application of neural networks in mobile applications, which is developing rapidly. The subject of this study includes the challenges and solutions associated with deploying deep learning models on mobile devices. In recent years, with the widespread use of mobile devices and the increasing demand for intelligent applications, the application of deep learning to mobile applications has become a natural trend. Applying deep learning to mobile devices faces some challenges, including the contradiction between the miniaturization of mobile devices and the resource requirements of deep neural networks, as well as the privacy and security issues of personal data. However, in the past few years, this field has made significant progress. The application of deep learning in mobile applications mainly includes two aspects: efficient reasoning on mobile devices and training using data collected by mobile devices. These two aspects cover the main tasks of deep learning.

## 1.2 Research Purpose

The object of this research is to analyze the challenges and solutions of deploying deep learning on mobile devices. The subject of this study is the optimization of neural network models and deployment plans, considering privacy and security issues. Analyzing these challenges and their solutions is important for promoting the development of mobile applications. Exploring the future development direction of neural networks in mobile applications is also a key focus, as the continuous improvement of hardware performance and algorithm optimization broadens the application prospects of neural networks in mobile applications. This research aims to provide reference and guidance for mobile application development, which is of great significance for promoting the development of mobile application technology and improving the intelligence level of mobile applications.

## 1.3The main content of this project

Efficient reasoning on mobile devices and training using data collected by mobile devices：Compression and optimization techniques for running deep convolutional neural networks (CNNs) on mobile devices；Deployment methods of neural networks in mobile applications；Specific application scenarios of neural networks in mobile applications；Application of neural networks in mobile network environments.

in summary, the application of neural networks in mobile applications is constantly expanding, with both technical challenges in deploying neural network models on mobile devices and application scenarios for mobile network environments.

## 1.4 Methodology

the main methods for efficient neural network inference and mobile data training on mobile devices include utilizing mobile GPUs, collaborative cloud computing, local deep learning model deployment, software accelerator optimization, and efficient network architecture design. These methods can effectively improve the deep learning performance on mobile devices and meet the needs of mobile applications.

## 1.5 Expected outcomes

It maybe has the one of four:

Efficient execution of deep learning models on mobile devices, significantly improving inference speed and energy efficiency

Deep learning systems that collaborate between mobile devices and the cloud, reducing the computational burden and communication overhead on mobile devices

Training deep learning models suitable for mobile devices using data collected on mobile devices

Realizing deep learning applications on mobile devices, such as emotion recognition and user identification

## 1.6 References

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