Topic: Investigation of the Relationship Between Sleep and Preterm Birth Using Wearable Device Data

Preterm birth, defined as the birth before completing 37 weeks of gestation, is a serious public health concern that affects 10% of newborns [1]. It is the leading cause of perinatal morbidity and can cause lifelong health problems, including neurological disabilities and developmental delays [1]. Several factors can contribute to preterm birth including maternal health conditions, sociodemographic factors, multiple pregnancies and sleep disorders [1, 2].

Previous studies have shown that sleep disorders such as poor sleep quality and variation in sleep duration may increase the risk of preterm birth [1, 3]. However, most studies rely on self-reported metrics or retrospective evaluations, which may not fully reflect real-world sleep characteristics during pregnancy [4].

Thus, the aim of this thesis is to analyze sleep data collected from both wearable devices and survey questionnaires to quantify relevant sleep parameters, assess differences, investigate their relationship with the risk of preterm birth, and explore the possibility of estimating the birth date using machine learning models. Consequently, the research questions of this thesis are: i) How sleep parameters change across different gestational periods, ii) what the relationship between certain sleep parameters and the risk of preterm birth is, and iii) how sensor-based and participant-reported data measures differ in terms of their correlation with preterm birth.

In the light of that objective, this work consists of the following parts:

- Literature review regarding the areas of preterm birth and sleep disorder during pregnancy.
- Extraction of sleep parameters from sensor-based and subjective sleep data collected during the SMART start study.
- Definition of at least six hypotheses regarding the aforementioned research questions.
- Evaluation of the significance and validity of the proposed hypotheses through statistical analysis.

The thesis must contain a detailed description of all developed and used algorithms as well as a profound result evaluation and discussion. The implemented code has to be documented and provided. An extended research on literature data, existing patents and related work in the corresponding areas has to be performed.

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References
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