Wearable XAI: a knowledge-based federated learning framework

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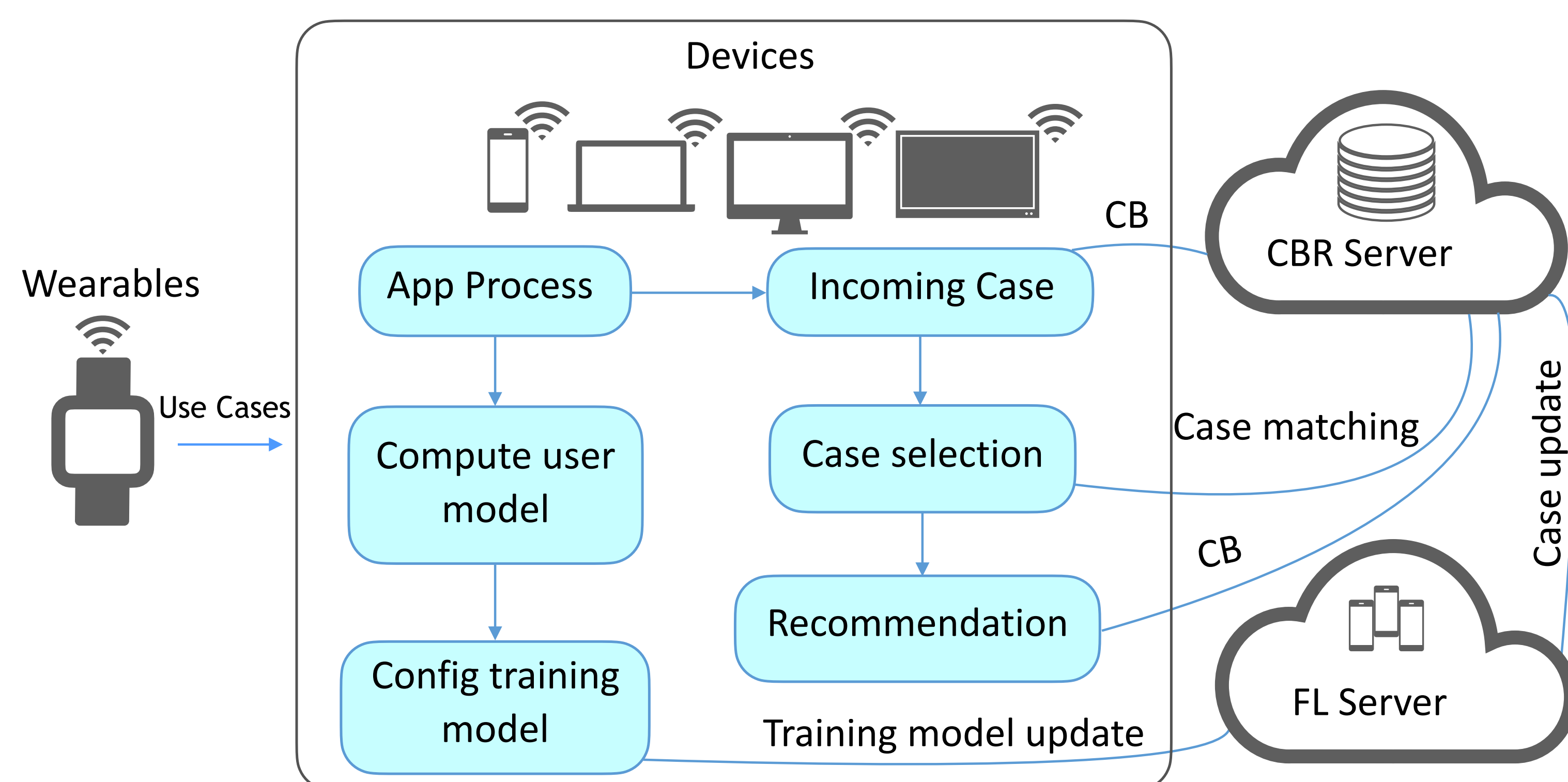
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Abstract

Federated learning is a knowledge transmission and training process that occurring in turn between user models at edge devices and the training model at the central server. Due to privacy policies, concerns and heterogeneous data, this is a widespread requirement in federated learning applications. In this work, we use knowledge-based methods and in particular case-based reasoning (CBR) to develop a wearable explainable artificial intelligence (XAI) framework. CBR is a problem-solving AI approach for knowledge representation and manipulation which considers successful solutions of past conditions that are likely to serve as candidate solutions for a requested problem. It enables federated learning when each user owns not only his/her private data, but also uniquely designed cases. New generated cases can be compared to the knowledge base and the recommendations enable the user to communicate better with the whole system. It improves users' task performance and increases user acceptability while they need explanations to understand why and how AI algorithms arrive at these solutions which is the best decision.

Keywords: explainable artificial intelligence; wearable AI; mobile edge computing; case-based reasoning; transparency; acceptability

Wearable Usability and Acceptability

Data protection and data unchained, data adopted from [1, 2]; and Customer trust, which is a consumer pulsing survey in the US, UK, China and Brazil, adopted from [3].

A wearable's position, application and type, data adopted from [4, 5].

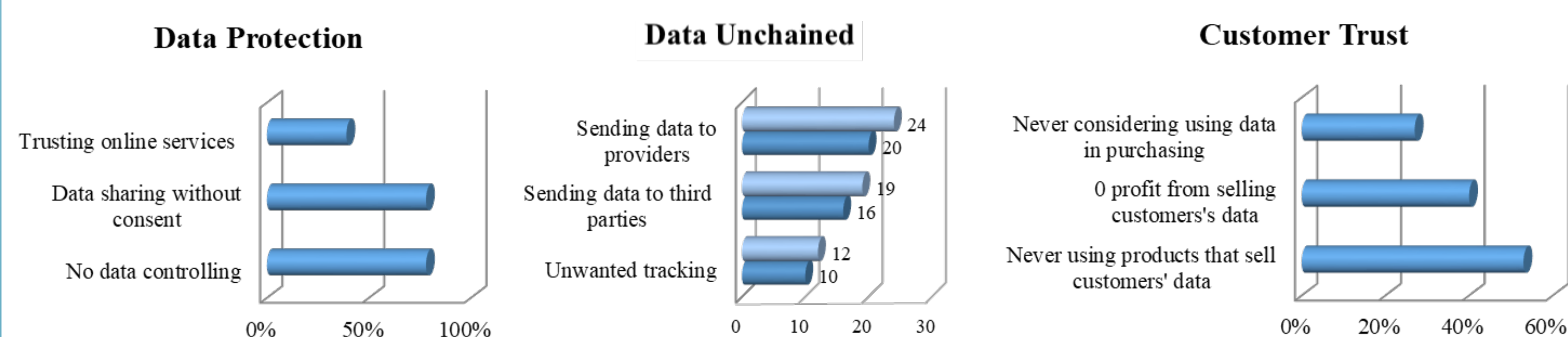## Knowledge-based Federated Learning

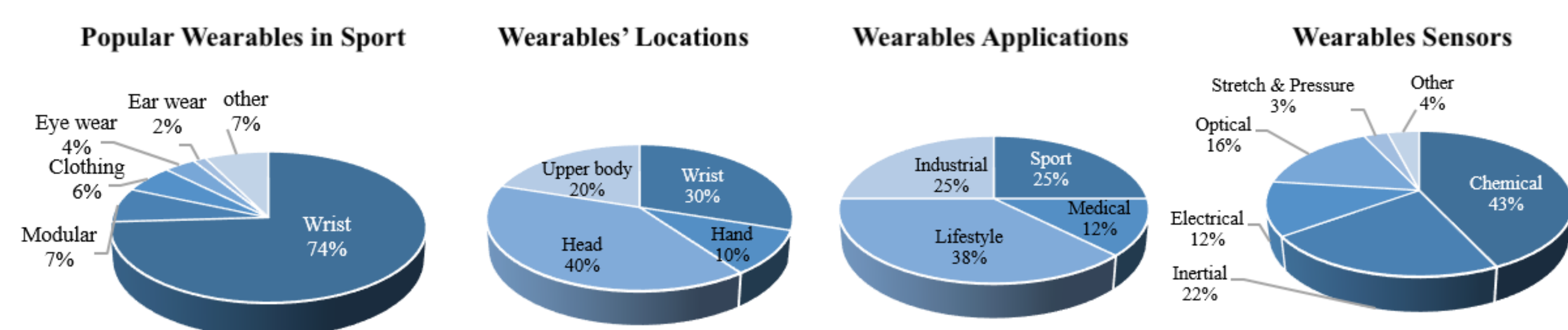An overview of CBR-federated learning (FL) as a wearable XAI framework.

Conclusion

As a result, although some works looked into the plausibility of actualising on-device machine learning models and changing existing algorithms to fit into the asset obliged gadgets, CBR-FL allows for smarter models, higher acceptability, lower latency, less power consumption and with the higher level of usability, all while ensuring privacy. Explainable AI enabled wearables which we called wearable XAI, are not designed to track the information, but moreover characterises what the client must do and how they ought to perform and to progress their tasks among other bits of knowledge.

References

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