Using Federated Transfer Learning to correlate sleeping health to digital wellbeing

Data:
- Sleep monitoring data with inferred sleep quality and stress level at intervals.
- Screentime, app usage activity in mobile computers, brightness, average audio level (internal).

Prediction:
- Activity that might reduce sleep quality upto certain confidence levels.
- Effect of health on usage patterns (2). For example doom scrolling, patience.

Reference methodology:
- Y. Chen, X. Qin, J. Wang, C. Yu, and W. Gao, "Fedhealth: A federated transfer learning framework for wearable healthcare," IEEE Intelligent Systems, 2020. (one direction)
- C. Ju, D. Gao, R. Mane, B. Tan, Y. Liu, and C. Guan, "Federated transfer learning for eeg signal classification," arXiv preprint arXiv:2004.12321, 2020. (other direction, methodology)
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General idea:
Saha, Sudipan, and Tahir Ahmad. "Federated transfer learning: concept and applications." Intelligenza Artificiale 15.1 (2021): 35-44.

Algorithms:

- Braintorrent
- Transfer learning
- Federated learning

Explanation:

- Why federated: private data doesn't accumulate anywhere
- Why transfer learning:
  - inference from one usage pattern/sleep disorder can be used to train a similar model/(subset fixing)
  - For (2)

Improvements:

- Implementation: afaik no existing except theoretical considerations
- New algorithm: see if provision of initially supervised model and hyperparameter tunables improve or bias transfer learning in federated scenario