Ethical issues associated with the development of an ear biometric tool for patient identification in Zambia
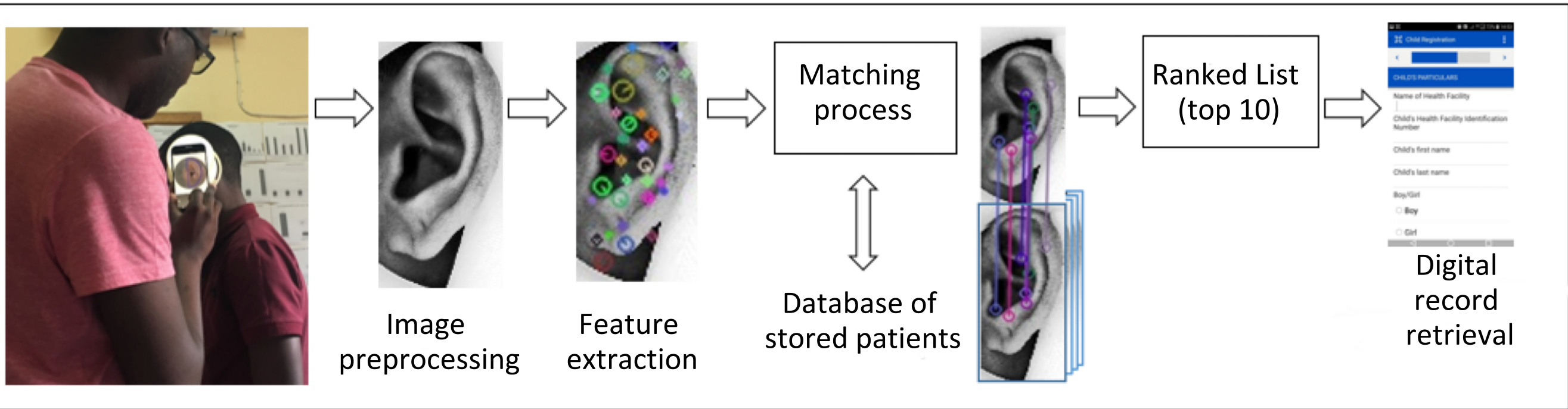
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Background

- Challenge of identifying patients through the biometric analysis of ears.

- Why ears? Facial scans cause more privacy concerns compared to ear scanning, iris scanners are expensive and can frighten children and fingerprint scans perform poorly in children younger than five years old.

- Child health visits are entirely paper-based.
- Some facilities are digital-first for ART units.
- Growing support from the Ministry of Health to transition from paper-based to digital systems.

Image preprocessing

Feature extraction

Matching process

Database of stored patients

Ranked List (top 10)

Digital record retrieval

PROJECT
SEARCH
BOSTON UNIVERSITY | UNIVERSITY OF ZAMBIA

Issue #1

Fairness and equity

- Publicly accessible datasets of darker-coloured ears captured in controlled conditions could not be found early on in our work. We were limited to using datasets we had collected at the Museum of Science in Boston to finetune the biometric tool.

- Initial tests conducted on a small dataset collected in Lusaka saw a large drop-off in performance. It was clear that our progress would be limited if we kept training our tool using datasets that were not representative of the intended use-case population.

- This necessitated a data collection exercise which was conducted at Chawama First Level Hospital in Lusaka from November 2019 to April 2020. A longitudinal dataset was created comprising 224 infants. The infants were captured as they attended vaccination visits at the named facility.

- Consent forms approved by both the Boston University IRB and the University of Zambia Biomedical Research Ethics Committee were translated into two local languages.

- Failure to notice this issue would have resulted in us building a tool that would go on to perform poorly in it's targeted setting.

Issue #2

Transparency and engagement

- A series of focus group discussions were conducted with mothers and health officials in Zambia's rural and urban settings. The University of Zambia Biomedical Research Ethics Committee granted ethical approval for this activity.

- The key focus of this activity was to engage the stated stakeholders and gain an understanding of how receptive the community would be to the app being developed.

- Conducting community engagement this early in the project, prior to the implementation stage, might seem a bit premature. But we felt that it was important to get the views of the key stakeholders early on.

- With that in mind, we had included this activity in our grant application submitted to our funding agency prior to the beginning of this phase of the project.

- Even though an EHR system has been used in some public health facilities across the country, we felt that the 'people-facing' nature of our tool necessitated this engagement.

- Mothers pointed out that getting their partners to provide consent for the tool to be used on their child was a potential barrier. They cited that their partner's aversion towards 'western' technology would be a possible issue.

- A fear of malicious intent and a general unwillingness to divert from the status quo were some of the issues brought up.

- Further engagement is needed to overcome the various sociocultural barriers that stand in the way of an eventual rollout.

- Knowing what the issues are early on means that we can plan our activities leading up to the implementation stage to get over as many of these barriers as possible.

Conclusions

- Community sensitization will be key in tackling the sociocultural issues causing the hesitance toward proposed digital solutions. Capturing biometric data is inherently invasive. This goes on to further heighten fears around technology.

- The task of conducting this engagement must be shared by both researchers and the Ministry of Health.

- The Ministry of Health has an important role in dispelling any fears that the populace might have towards AI tools and new technologies as a whole.

- Researchers need to continuously emphasise the benefits their tool will bring. In trying to combat any hesitance to change, it is important to put that at the front of every discussion.

Thank you