DRNNAGE in Santiago: an evaluation of the adult age-estimation method

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SUMMARY

The newly proposed multi-trait adult age estimation method DRNNAGE is evaluated on a sample from Chile. Preliminary results place DRNNAGE as the best performing adult age-estimation method evaluated on this sample.

Keywords: artificial neural network, skeletal age-estimation, Colección Osteológica Subactual de Santiago

Introduction

A new multi-trait adult age-at-death estimation method based on Deep Random Neural Networks (DRNNAGE) was proposed by Navega et al (2022). The method uses 64 macroscopic developmental and degenerative traits from the entire skeleton. The cross-validated results are more precise than other adult age estimation methods; across the entire age span there is a ~6 year mean absolute error (MAE).

Objectives

Test the performance of DRNNAGE for adult age estimation on a sample from Chile (South America) and compare the results to other multi-trait and single-trait age estimation methods.

Methods

DRNNAGE (osteomics.com/DRNNAGE/) was used on a sample of 50 individuals from the Colección Osteológica Subactual de Santiago (COSS) (Meza-Escobar et al 2023). Performance was evaluated using the MAE (mean absolute error), Bias (systematic error), Validity (if known age is contained within predicted interval), and Efficiency (narrowest interval size maintaining validity).

Results and Discussion

Despite a wide-ranging completeness of the skeletonized individuals, preliminary results indicate a low overall MAE (~10 years) and high validity (~94%). Prediction intervals ranged from an average of 30 years for younger individuals and 40 years for the older. Considering the compromise between accuracy and precision, the DRNNAGE method reports the best performance in estimating the age of the adult individuals in the COSS sample.

Conclusion

Multi-trait computational methods are becoming the future of macroscopically-based skeletal age-estimation. Their evaluation with different samples is necessary to validate their use and contributes to the discussion regarding choice of traits and statistical approaches in adult age estimation.

Bibliographic references

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