Explainable Machine Learning-based Models for Age-at-Death Estimation Using Entheseal Changes: A Computational Social Science Approach

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Table 1: Revised and Proposed Method - Zone 1

Zone 1	**DESCRIPTION**	**PERCENTAGE**	**SCORE**
BONE FORMATION (BF)	[leftmargin=*,noitemsep]The margin exhibits no significant alterations, maintaining a smooth and uniform aspect. The normal morphology of the surface is preserved, characterized by a clear and well-defined margin. The margin's edge is sharp, yet lacks any lipped appearance.	0%	0
	[leftmargin=*,noitemsep]The margin begins to show slight alterations; however, it is possible to preserve approximately 30-40New bone formation is in its early stages (10In some cases, Zone 1 may exhibit a lipped (irregular bony growth) appearance along its edge. Osteophytes are not extensive or elevated, typically measuring ¡1 mm.	10 - 30%	1
	[leftmargin=*,noitemsep]New bone formation is prominent and distinctive along the margin's surface. Prominent osteophytes are observed, exhibiting elevations of up to ¿1 mm. The margin no longer maintains its smoothness, and the normal morphology is no longer readily discernible. In the most severe cases, the margin exhibits numerous irregularities. In some cases, there might be areas retaining a portion of the normal morphology; however, 20 - 25	40 - 50%	2
EROSION (E)	[leftmargin=*,noitemsep]The surface exhibits no significant alterations, maintaining a smooth and uniform aspect. Retain the normal morphology of the surface.	0%	0
	[leftmargin=*,noitemsep]Minor discontinuities are observed on the surface, appearing as superficial depressed pits with irregular edges. These incipient irregularities alter, to the naked eye, the otherwise smooth and uniform appearance of the surface. The erosions observed on the surface may appear isolated and focused on specific sectors of the entheses, without extensively extending along them. A significant portion of the morphology with a normal appearance is retained (30 - 40	10 - 20%	1

	[leftmargin=*,noitemsep]Discontinuities are observed on the margin, interpreted as superficial depressed pits with irregular edges that visibly disrupt the smooth and uniform appearance of the entheses. The bone surface displays a worn and untidy appearance. There are few areas where a surface with limited wear is retained (20In the most severe cases, the margin exhibits pronounced wear, and the trabecular tissue may be completely exposed.	40 - 50%	2

Table 2: Revised and Proposed Method - Zone 2

Zone 2	DESCRIPTION	PERCENTAGE	SCORE
BONE FORMATION (BF)	[leftmargin=*,noitemsep]The surface maintains a smooth and uniform appearance without any visible alterations, displaying a dense and compact bone morphology.	0%	0
	[leftmargin=*,noitemsep]Incipient presence of new bone formation (10The formations of new bone are not highly pronounced, measuring less than 1mm in diameter. The new bone formation may be localized and clustered in certain areas of the surface, without extensively spreading across it. The surface still retains areas without alterations (40 - 45	10 - 30%	1
	[leftmargin=*,noitemsep]In the most severe cases, the formation of new bone is notable and prominent, with formations that may reach sizes greater than 1 mm. Areas devoid of new bone formation may exist; however, these do not exceed approximately 20 - 25	40 - 70%	2
	[leftmargin=*,noitemsep]The surface maintains a smooth and uniform appearance without any visible alterations, displaying a dense and compact bone morphology.	0%	0
EROSION (E)	[leftmargin=*,noitemsep]Discontinuities on the surface are observed, interpreted as superficial depressed pits with irregular edges, which incipiently (10There may be areas on the surface where no erosion is observed (30 - 40The areas by erosion tend to be isolated or concentrated on a portion of the surface, without extensively spreading. The erosion present only affects the cortical tissue, while the trabecular tissue remains unexposed in any area.	10 - 30%	1
	[leftmargin=*,noitemsep]Discontinuities are observed on the surface, interpreted as superficial depressed pits with pronounced and distinctive irregular edges. The surface exhibits an irregular and worn appearance, with clear exposure of the trabecular tissue. The erosion is distributed across a significant portion of the surface, no longer confined to localized areas. In the most severe cases, the surface is pitted and irregular.	40 - 60%	2
TEXTURAL CHANGE (TC)	[leftmargin=*,noitemsep]The surface exhibits no significant alterations, maintaining a smooth and uniform appearance. There is an absence of a granular texture.	0%	0
	[leftmargin=*,noitemsep]A diffuse and very fine granular texture can be observed. The fine granularity prevails, with a diameter of 0.5 mm. Fine granularity may appear focalized and concentrated in certain areas of the surface in an incipient manner (10In some cases, the enthesis may still retain some areas of the surface without alterations in texture (30 - 50	10 - 20%	1
	[leftmargin=*,noitemsep]Fine granularity transitions into a dense appearance akin to compact bone, expanding across the surface. Upon tactile examination, the surface presents a rough texture. The present granularity is coarser, predominantly 0.5 mm in diameter. In the most severe cases, there might be approximately 10-20	40 - 60%	2
MICROPOROSITY (FPO)	[leftmargin=*,noitemsep]The surface does not exhibit microporosities, maintaining a uniform appearance.	0%	0

	[leftmargin=*,noitemsep]The surface shows pores ¡1mm in diameter. The microporosities observed may be localized in a specific area on the surface and generally do not extend or cover the entirety of it; however, for the microporosities to be assessed, they must possess the characteristic of being visible to the naked eye.	10 - 20%	1
	[leftmargin=*,noitemsep]The surface shows pores ¡1mm in diameter. This must maintain the characteristic of being visible to the naked eye. In the most severe cases, a significant portion of the surface may exhibit microporosities distributed across multiple areas.	40 - 50%	2
MACROPOROSITY (MPO)	[leftmargin=*,noitemsep]The surface does not exhibit macroporosities, maintaining a uniform appearance.	-	-
	[leftmargin=*,noitemsep]The observed macroporosities appear as perforations that do not surpass the cortical tissue, displaying rounded traits with smooth edges, resembling a channel. The internal area of the surface is not visible. They may measure approximately ¿1 mm in diameter. The surface may display one or two macroporosities.	-	-
	[leftmargin=*,noitemsep]The observed macroporosities appear as perforations that do not surpass the cortical tissue, displaying rounded traits with smooth edges, resembling a channel. The internal area of the surface is not visible. They may measure approximately ¿1 mm in diameter. The surface may display more than two macroporosities.	-	-
CAVITATION (CA)	[leftmargin=*,noitemsep]Without cavitations on the surface.	-	-
	[leftmargin=*,noitemsep]A cavity, appearing as a large perforation, is observed on the cortical tissue, displaying smooth and well-defined edges. The internal aspect of the surface is easily observable. The surface may present at least one cavity, characterized by a measured diameter of 2 mm, rounded edges, and a visible internal area of the surface.	-	-
	[leftmargin=*,noitemsep]A cavity, appearing as a large perforation, is observed on the cortical tissue, displaying smooth and well-defined edges. The internal aspect of the surface is easily observable. The surface may present two or more cavities, characterized by a measured diameter of 2 mm, rounded edges, and a visible internal area of the surface.	-	-