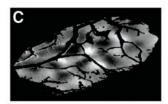**A** Orientation preference map

B Pseudo-random orientation preference map

C Iso-orientation map (0 degrees)

D Pseudo-random iso-orientation map

SUPPLEMENTARY FIG. S2. For each ferret, an orientation preference map **(A)** was generated from evoked datasets. An artificial map **(B)** was also used in analysis as a control. A mask was applied in both cases to exclude blood vessels and bone. IOMs representing the activation patterns for a single orientation were generated by taking the cosine of the orientation preference map **(C)**. These maps were used as a reference for the spatial correlation analysis. Additional angles were tested by adding an appropriate phase shift to the sinusoid. Artificial IOMs **(D)** were also generated using the artificially generated orientation maps and used in analysis as a negative control. IOMs, iso-orientation maps.