

A Comparison of Image Type, Compression, and Caliper Presence in Radiomics-Based Study Design

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Background

- Ultrasound images can be extracted in **various formats** including TIFF, DICOM and JPEG either directly from the machine or as a compressed format from a cloud-based reporting system.
- Radiomics features are hand crafted quantitative features e.g. volume, shape, pixel intensity, which can be extracted from an ultrasound image and inputted into a radiomics based **classification model**¹.
- Ultrasound images can also contain information embedded on the image, including callipers.

Objectives

Determine if the radiomics feature patterns change between ultrasound image types, in the presence of callipers and compression (screenshot).

Methods

- An adnexal mass image was extracted in five formats: TIFF, DICOM and JPEG (native), PNG and TIFF format (compressed). Images were evaluated with and without callipers.
- The same image in five different formats were manually segmented in '3D slicer' and radiomics features were extracted within TexLab.
- Intraclass correlation coefficient, to determine the consistency of features between file formats. ANOVA and Kruskal-Wallis tests to determine if feature values differed between formats. Wilcoxon signed rank tests evaluated the impact of callipers in both native and compressed formats.

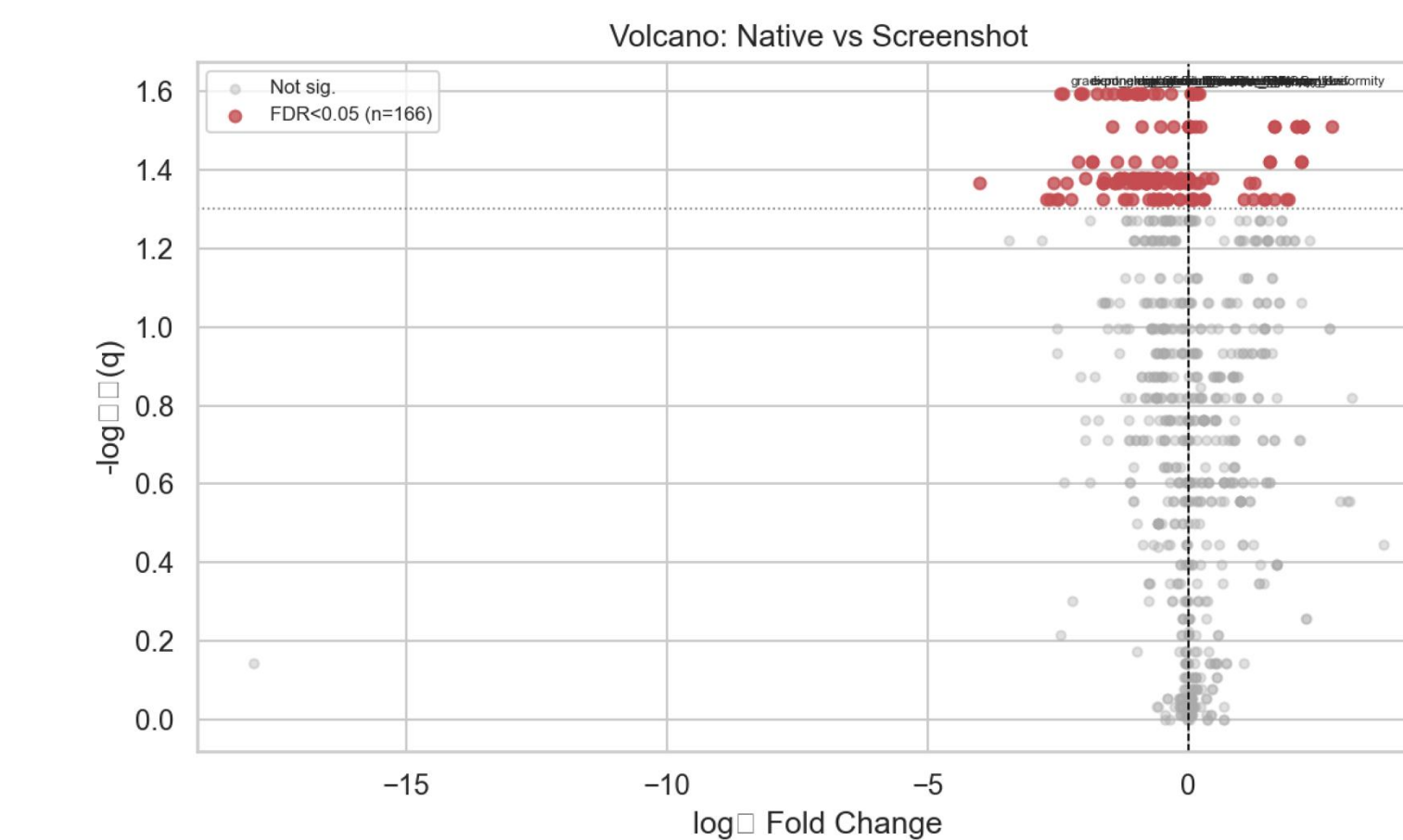
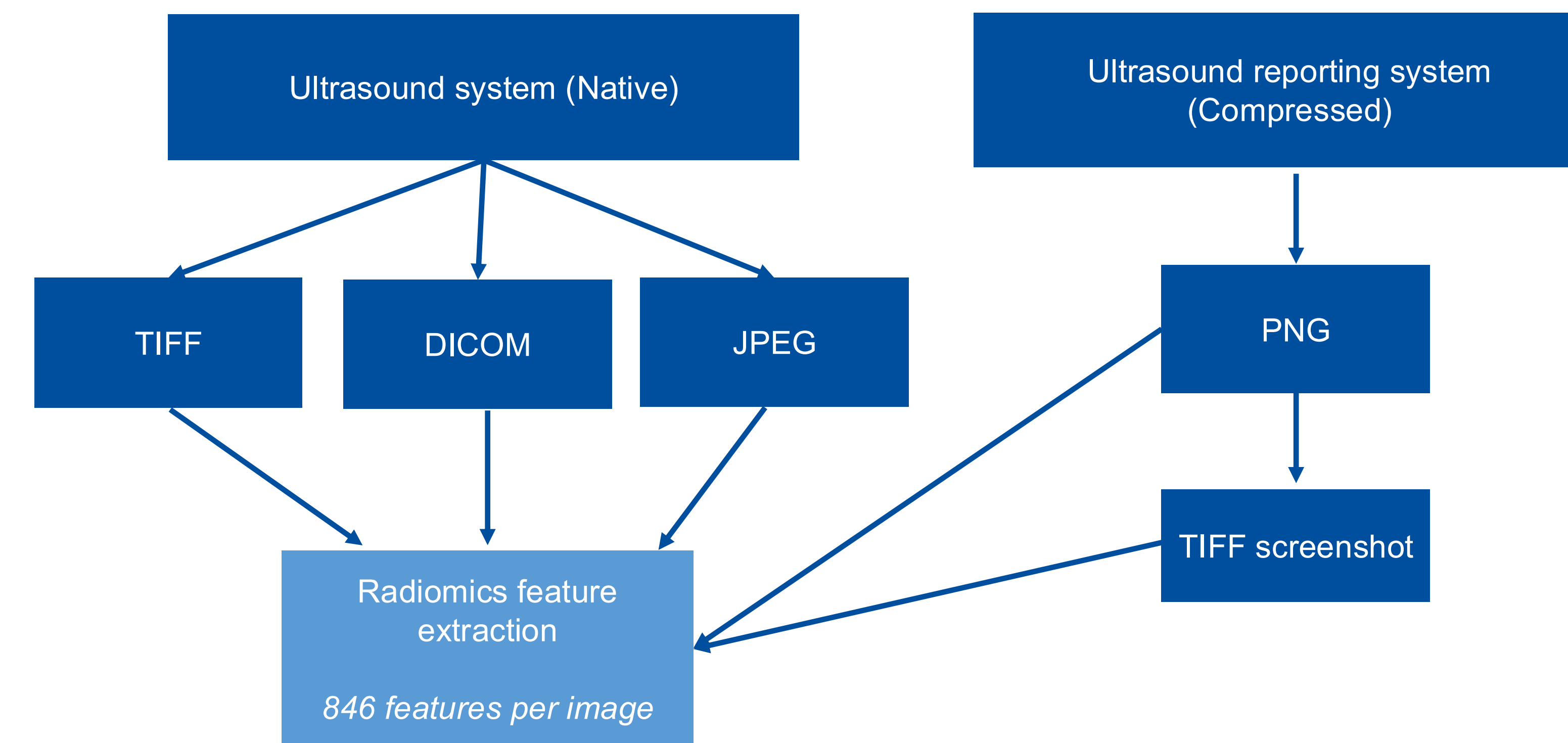


Figure 1: Comparison of radiomics features between native and compressed file formats

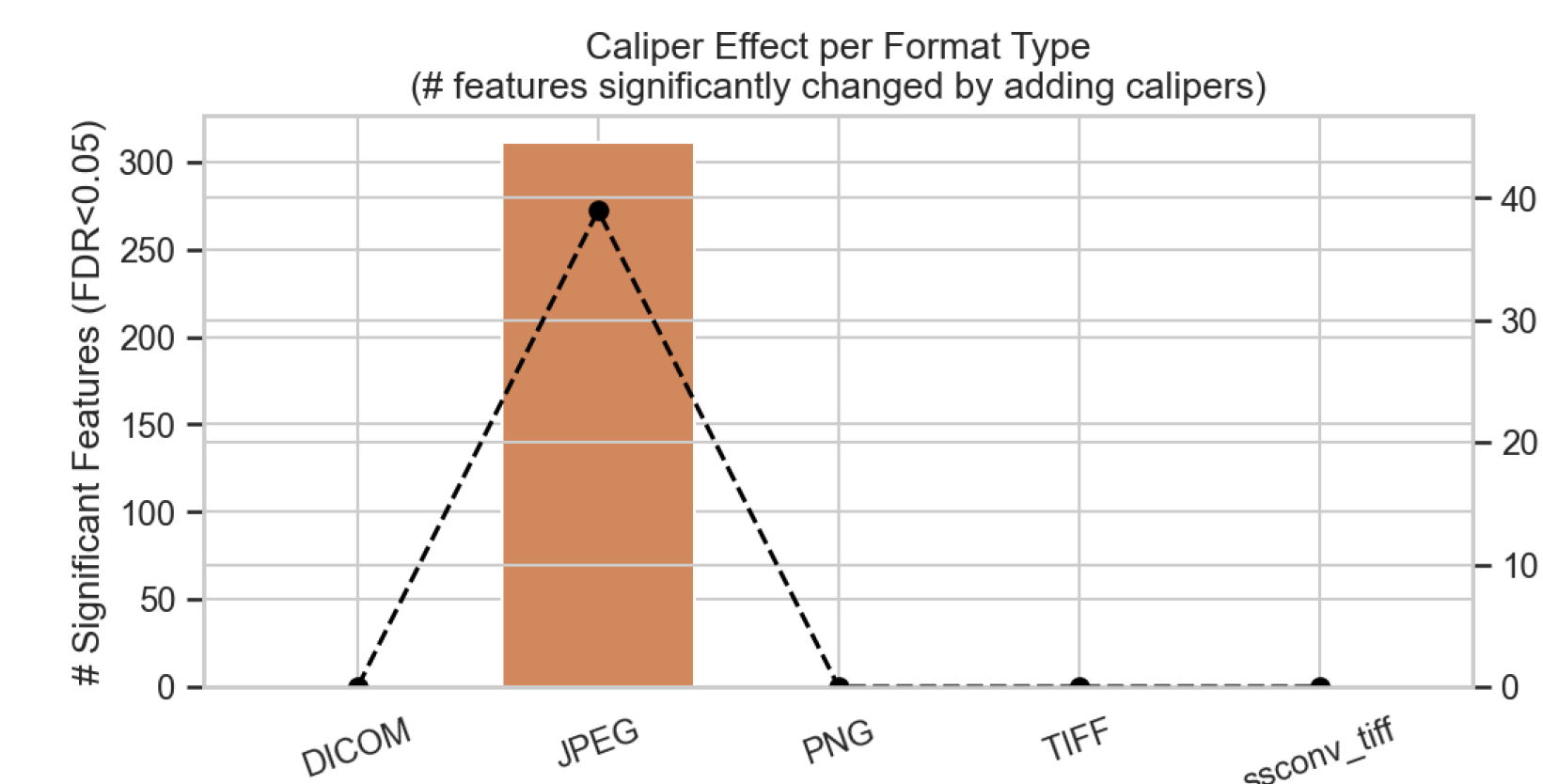
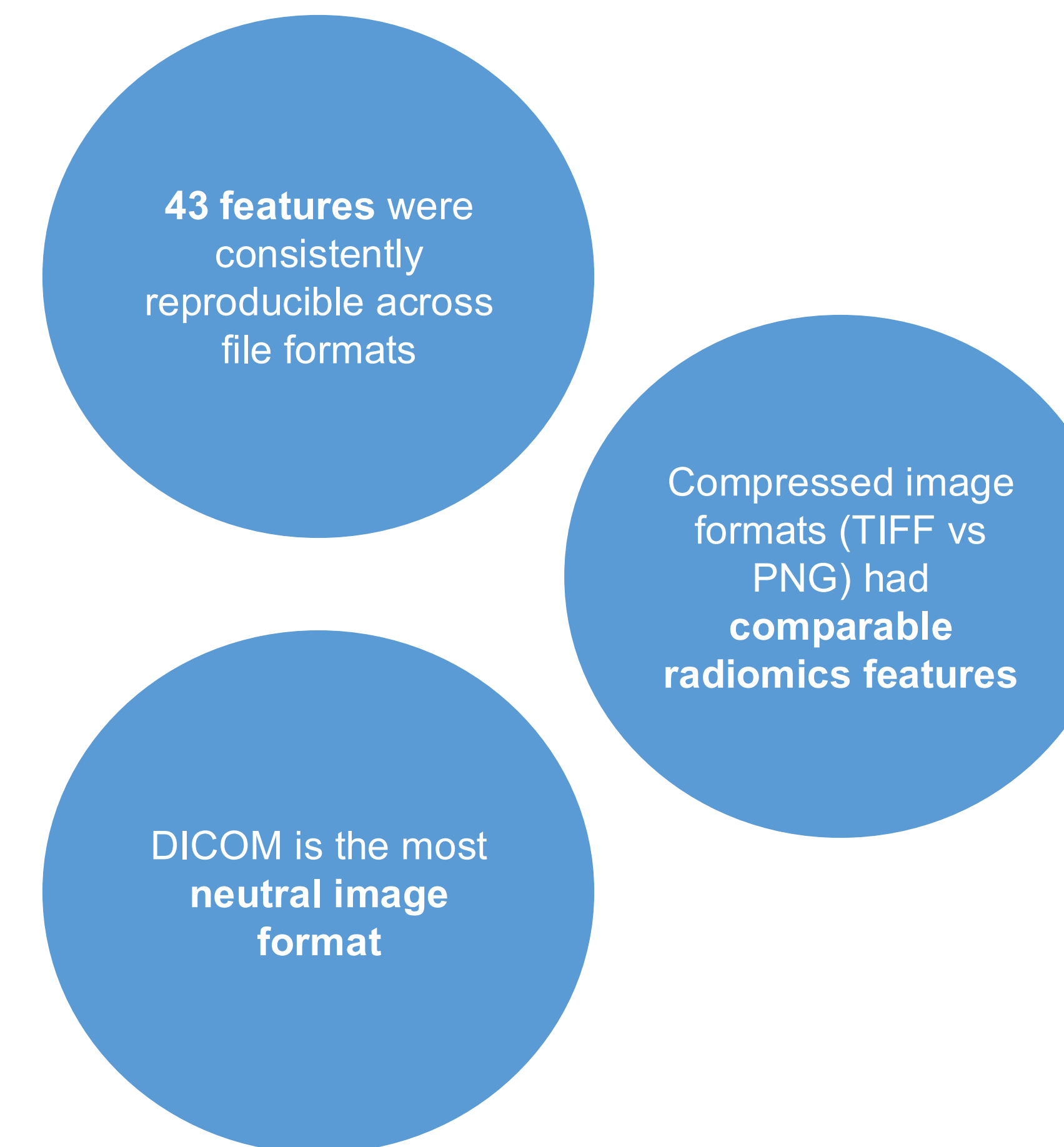


Figure 2: Impact of calipers on the radiomics features



Results

- 11 cases were extracted in 85 different file formats
- 83% of radiomics features **differed significantly** across the **different file formats**
- **Calipers** only significantly **affected JPEG**, not DICOM, PNG or TIFF formats
- Texture-based features **varied the most** between file formats

Conclusion

- **Different image formats altered the radiomics feature patterns**, with the most variation seen in texture-based features.
- **Callipers should be avoided** if using JPEG formats, but do not appear to significantly affect the radiomics feature profile in TIFF, PNG or DICOM image formats.
- **Avoid compressing** images, as it alters the radiomics feature patterns.
- Further work is needed to determine whether this variation in feature patterns affects model performance.