

MASARYKOVÁ  
UNIVERZITA

PŘÍRODOVĚDECKÁ FAKULTA

# Graph-based modelling of spatial distribution of lymphocytes

Bakalářská práce

ANETA BÖHMOVÁ

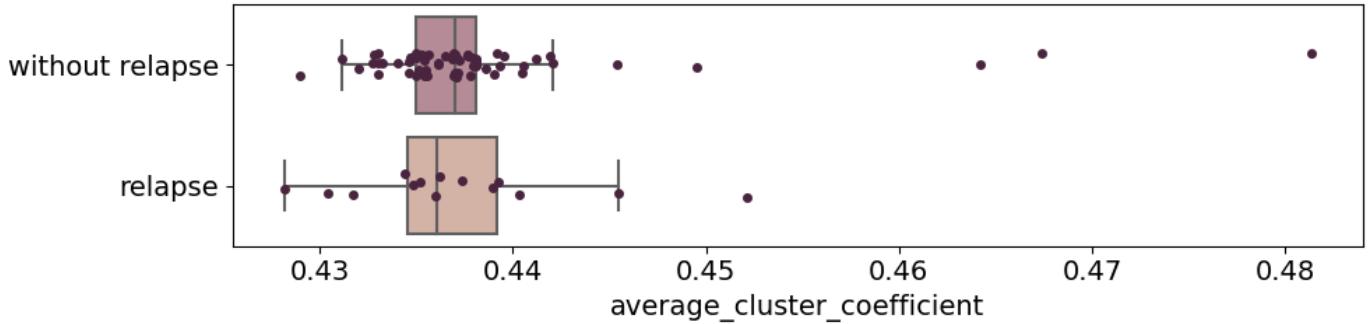
Vedoucí práce: doc. Ing. Vlad Popovici, PhD

RECETOX  
Program Matematická biologie a biomedicína

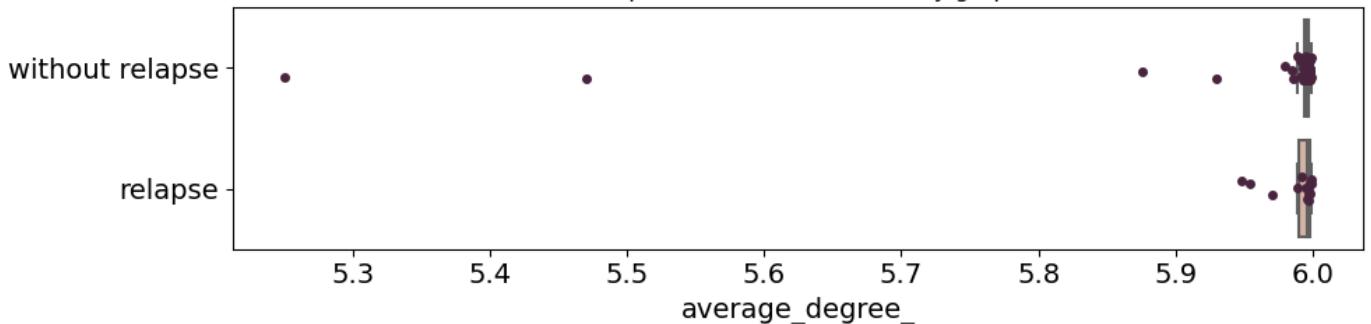
Brno 2024

# **Clinical outcomes**

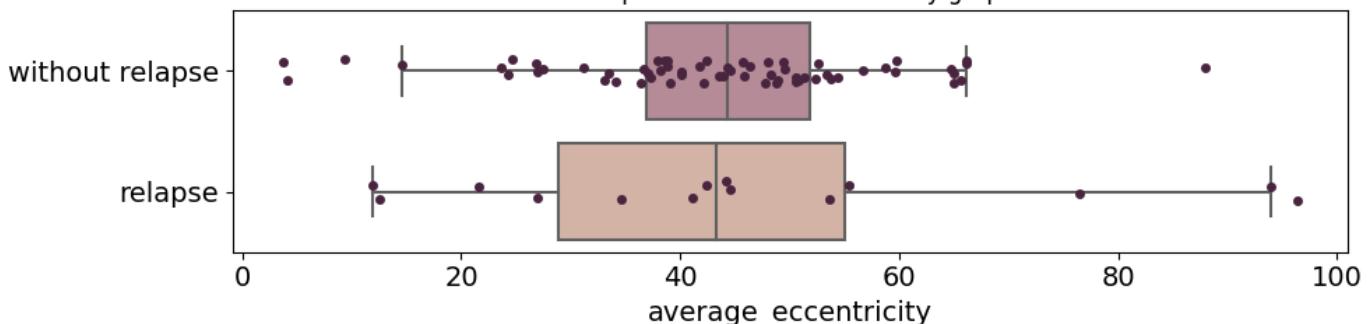
Boxplot of average\_cluster\_coefficient by Relapse free survival  
CD3 positive cells and Delaunay graph



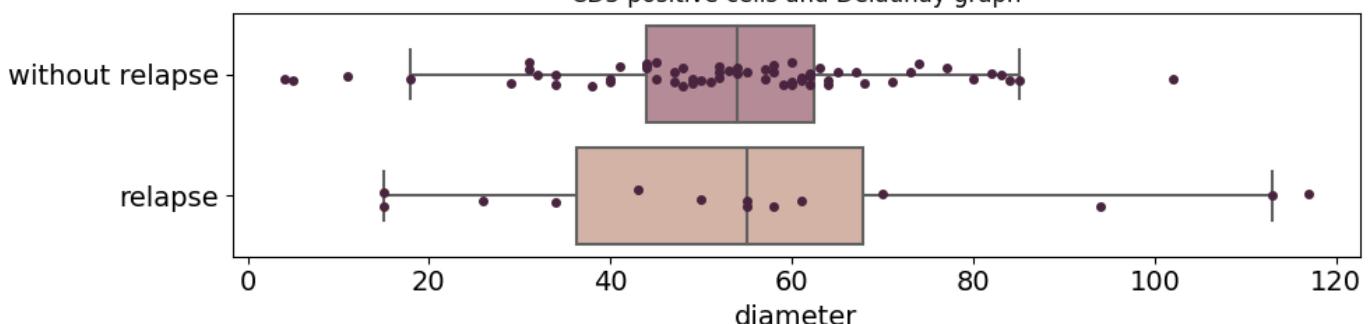
Boxplot of average\_degree\_ by Relapse free survival  
CD3 positive cells and Delaunay graph



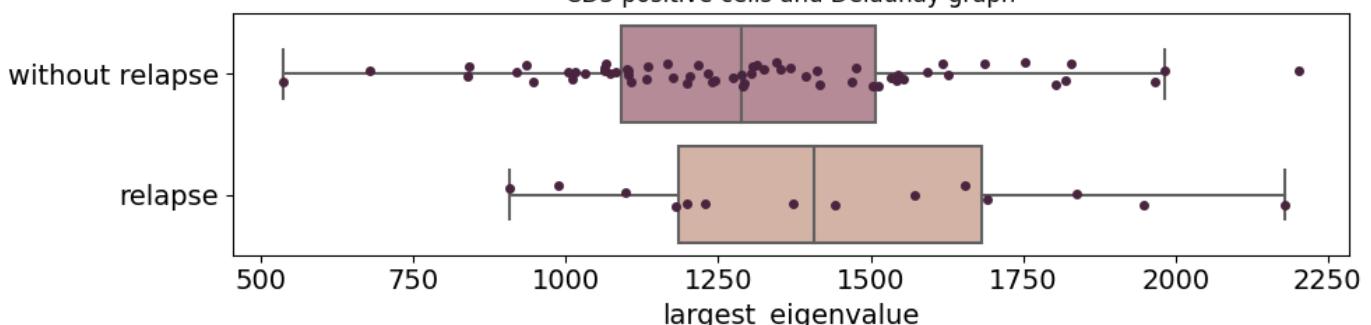
Boxplot of average\_eccentricity by Relapse free survival  
CD3 positive cells and Delaunay graph



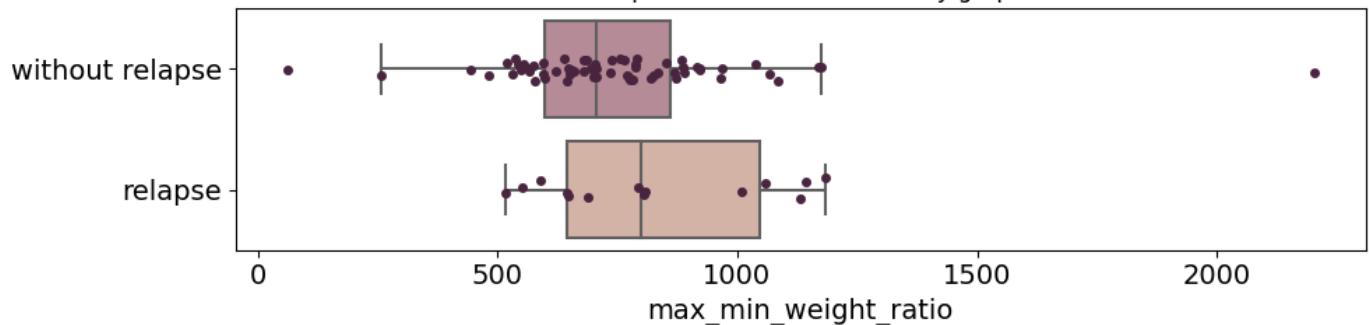
Boxplot of diameter by Relapse free survival  
CD3 positive cells and Delaunay graph



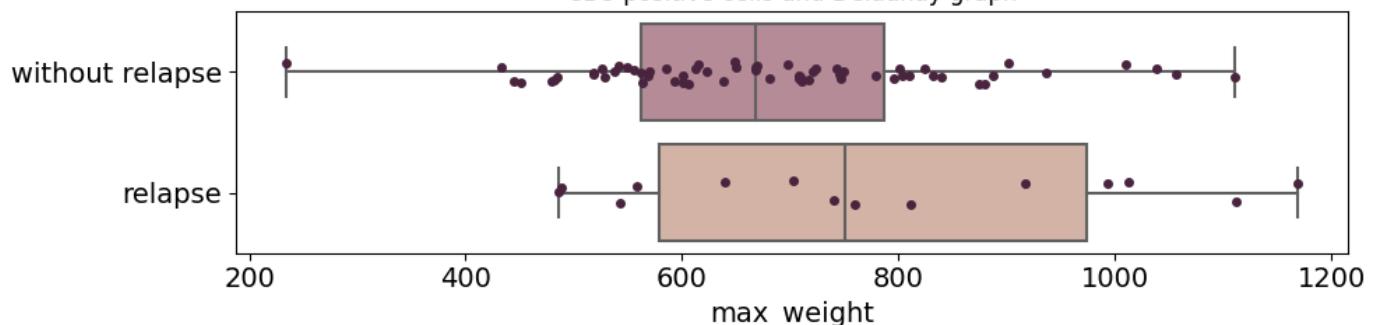
Boxplot of largest\_eigenvalue by Relapse free survival  
CD3 positive cells and Delaunay graph



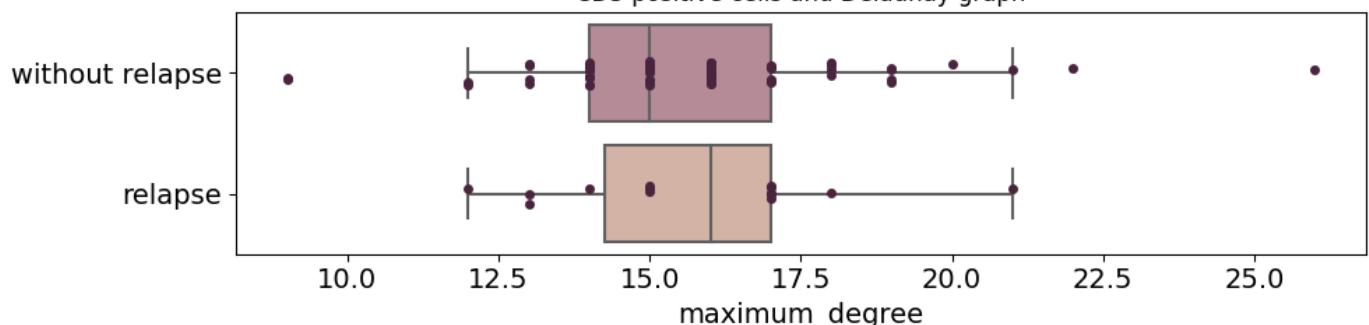
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD3 positive cells and Delaunay graph



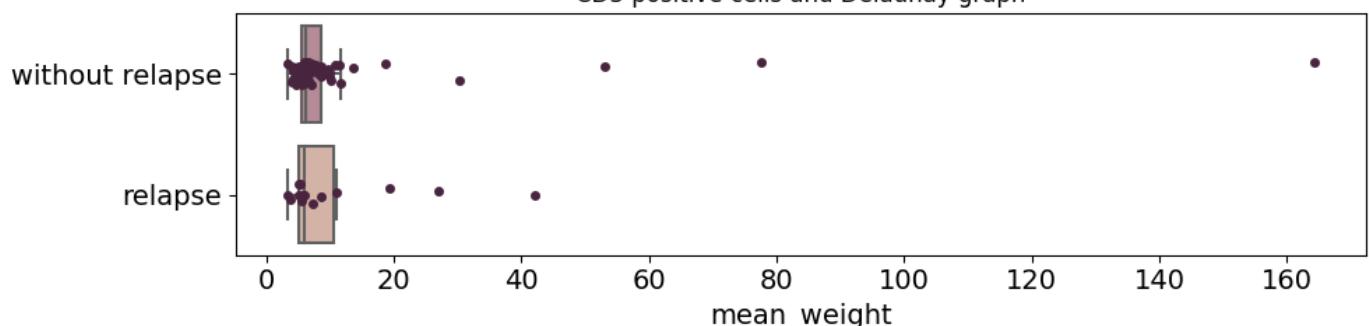
Boxplot of max\_weight by Relapse free survival  
CD3 positive cells and Delaunay graph



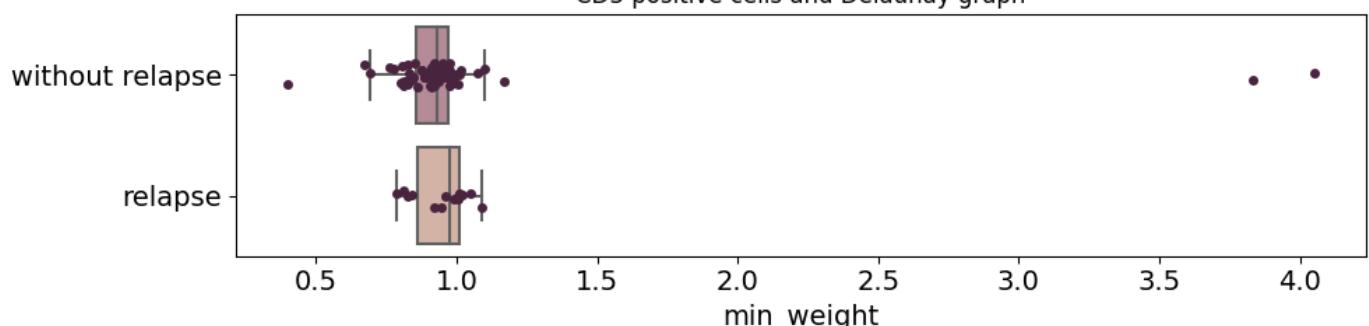
Boxplot of maximum\_degree by Relapse free survival  
CD3 positive cells and Delaunay graph



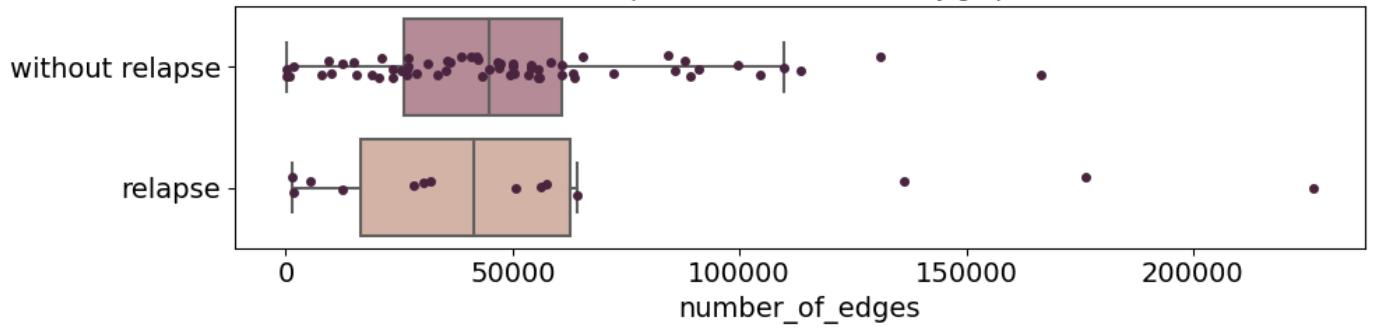
Boxplot of mean\_weight by Relapse free survival  
CD3 positive cells and Delaunay graph



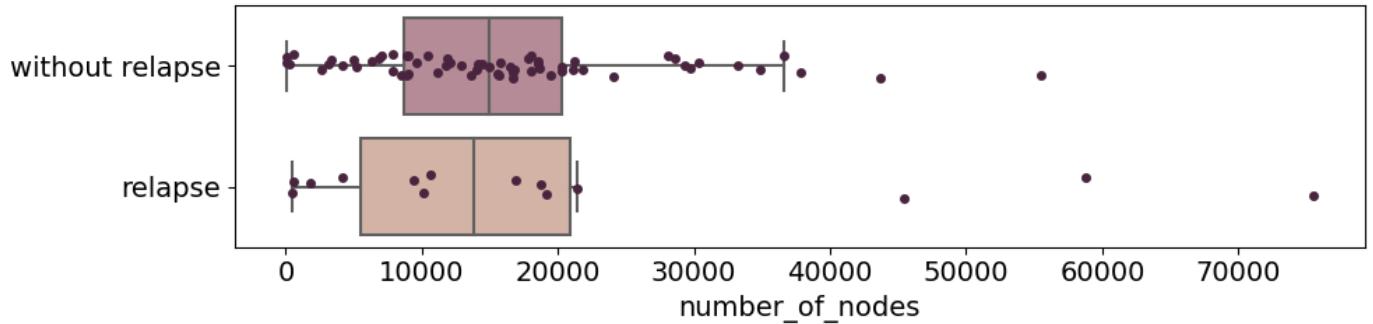
Boxplot of min\_weight by Relapse free survival  
CD3 positive cells and Delaunay graph



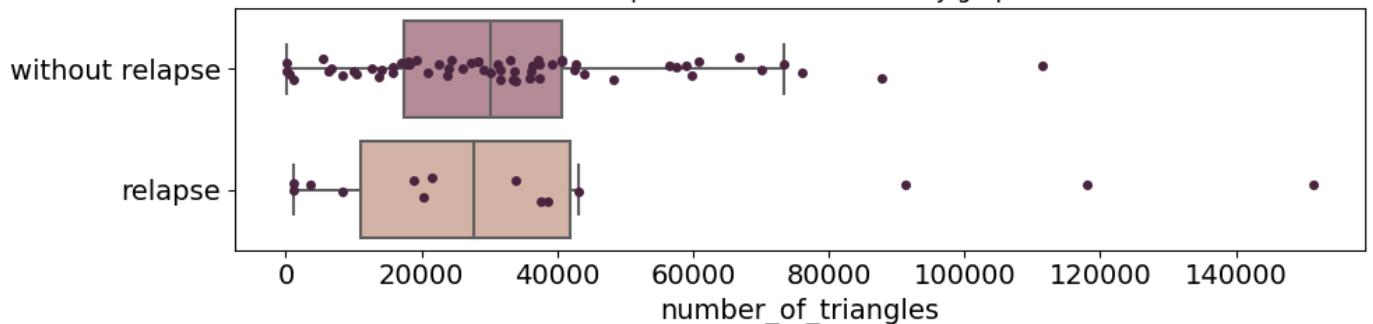
Boxplot of number\_of\_edges by Relapse free survival  
CD3 positive cells and Delaunay graph



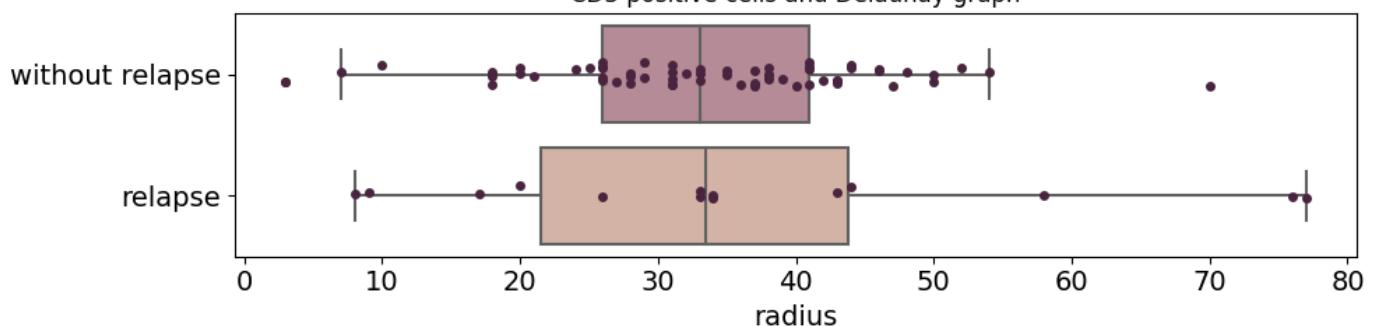
Boxplot of number\_of\_nodes by Relapse free survival  
CD3 positive cells and Delaunay graph



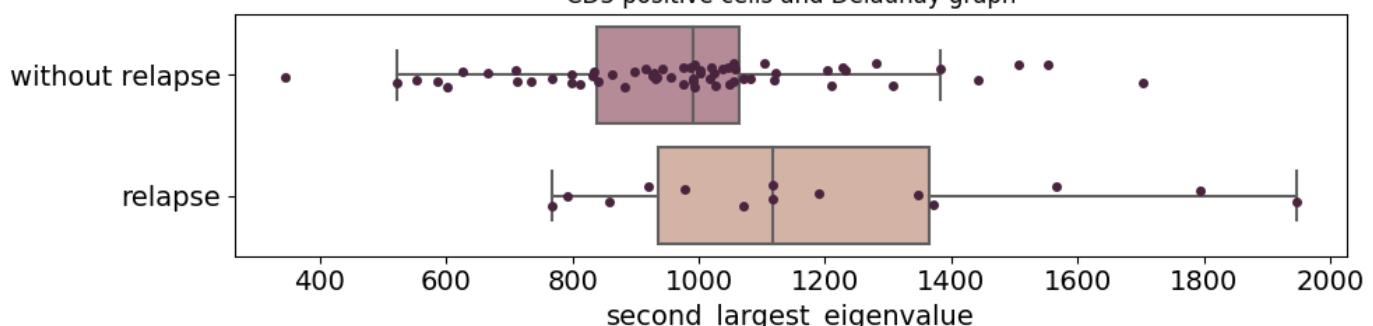
Boxplot of number\_of\_triangles by Relapse free survival  
CD3 positive cells and Delaunay graph



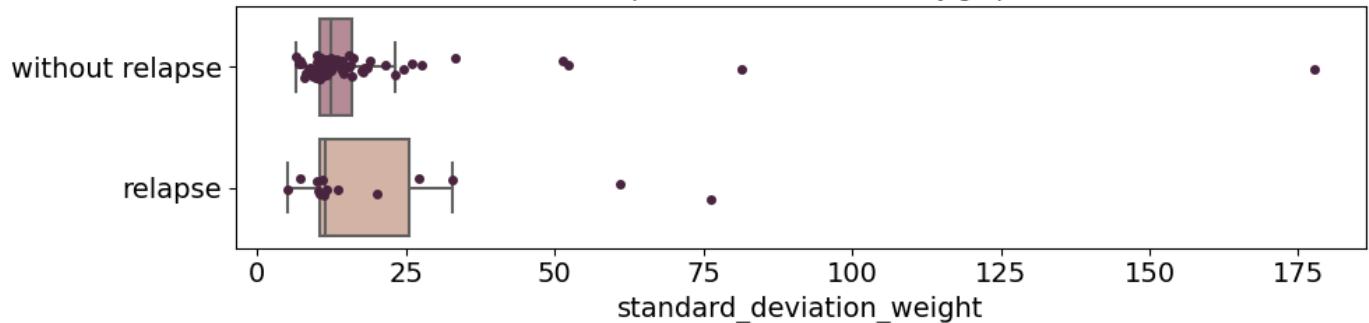
Boxplot of radius by Relapse free survival  
CD3 positive cells and Delaunay graph



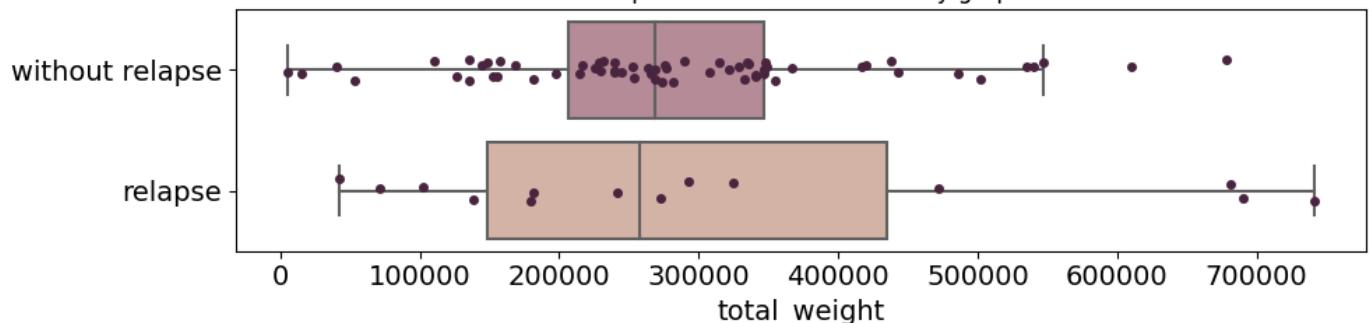
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD3 positive cells and Delaunay graph



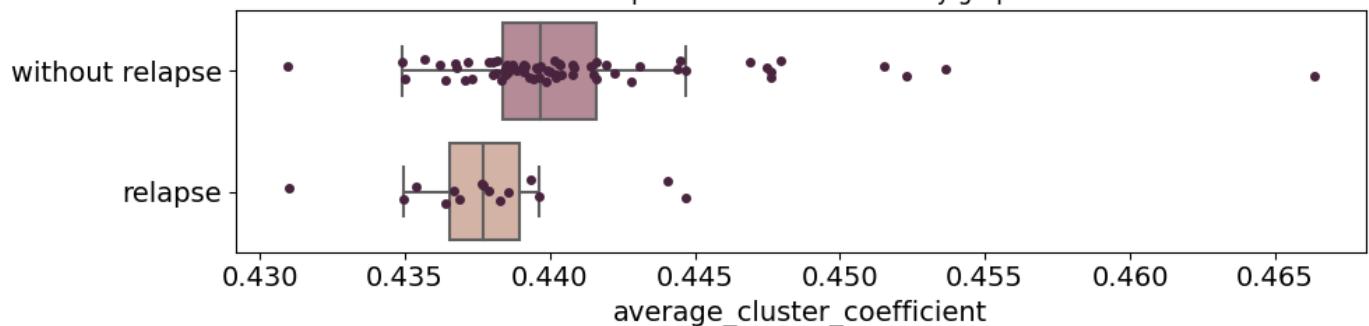
Boxplot of standard\_development\_weight by Relapse free survival  
CD3 positive cells and Delaunay graph



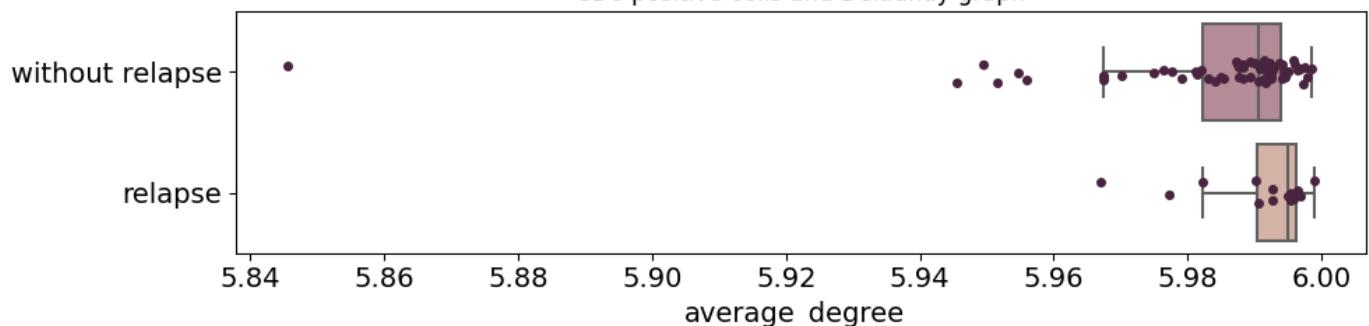
Boxplot of total\_weight by Relapse free survival  
CD3 positive cells and Delaunay graph



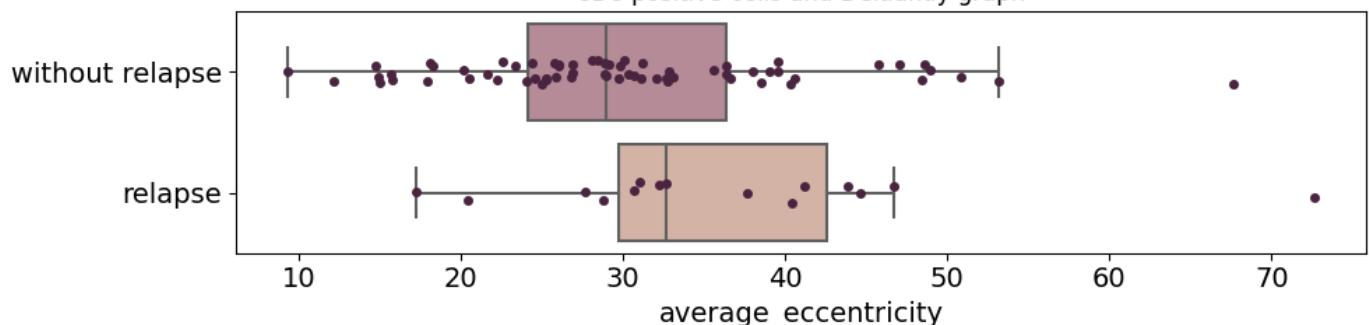
Boxplot of average\_cluster\_coefficient by Relapse free survival  
CD8 positive cells and Delaunay graph

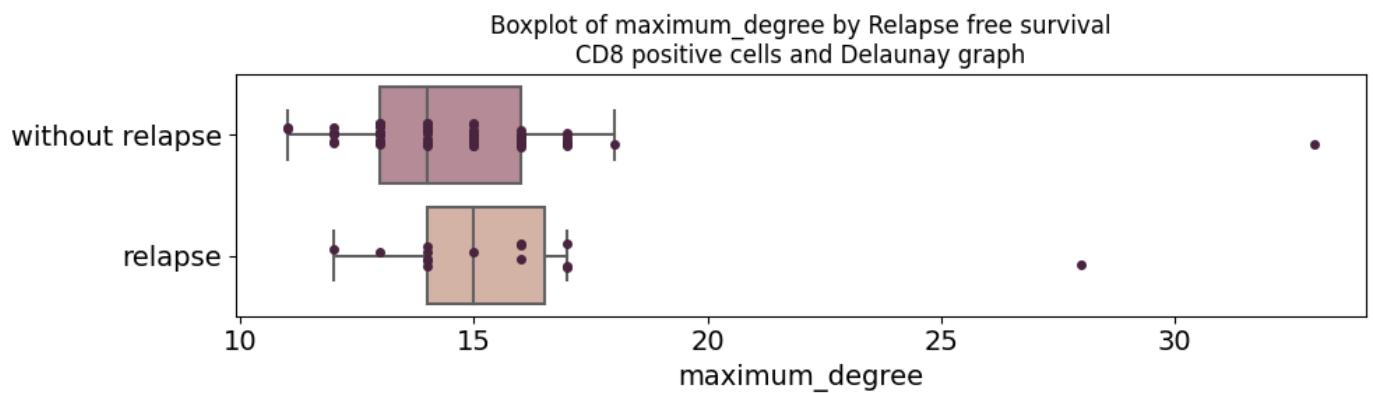
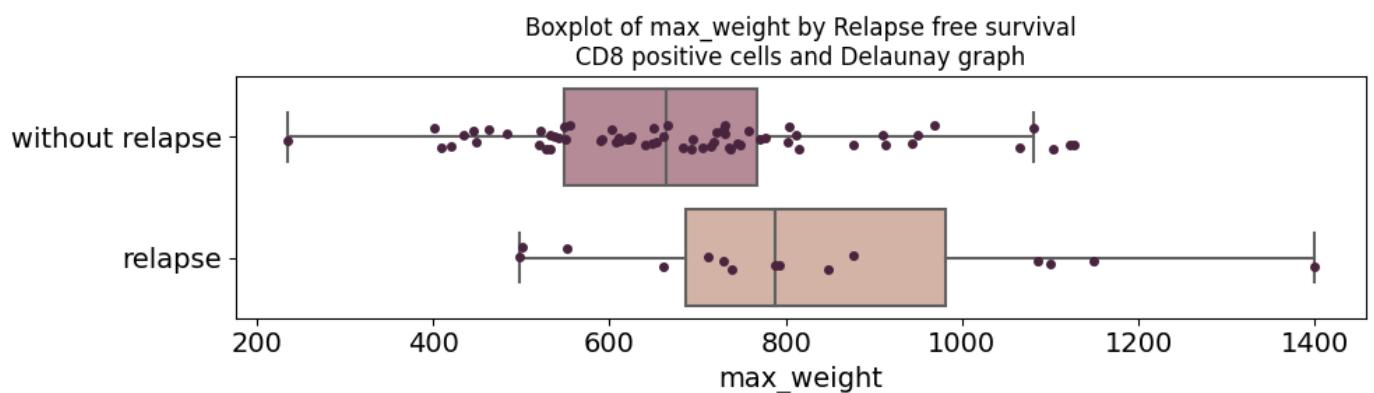
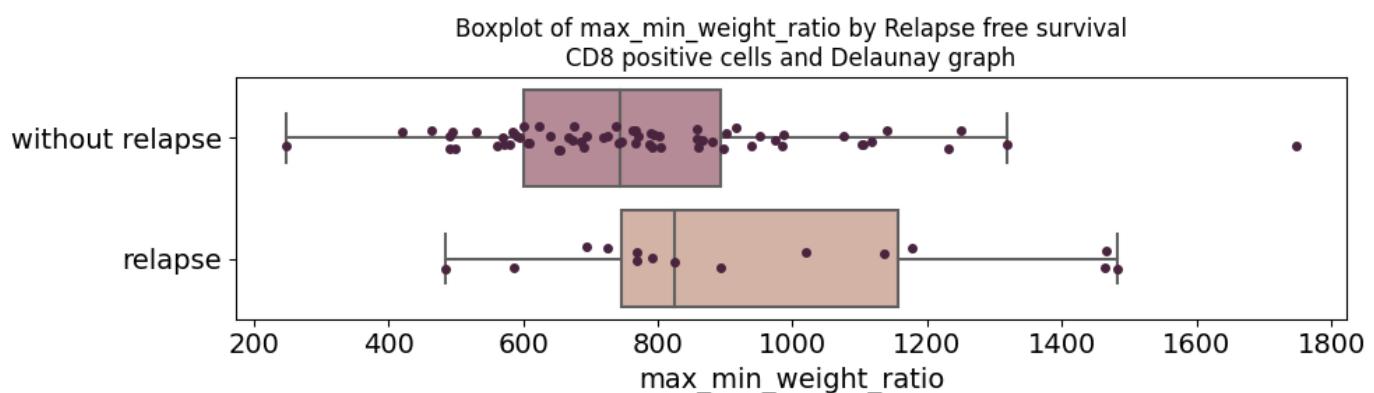
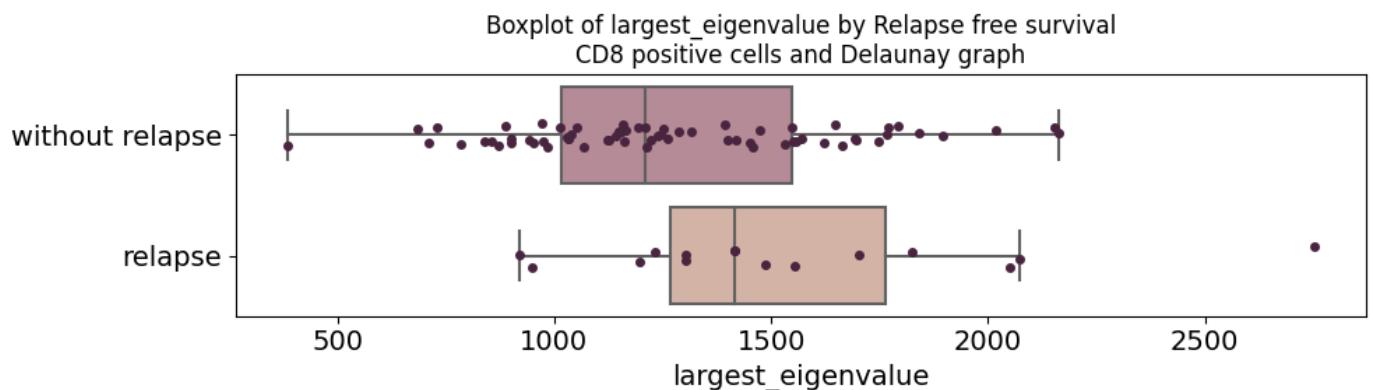
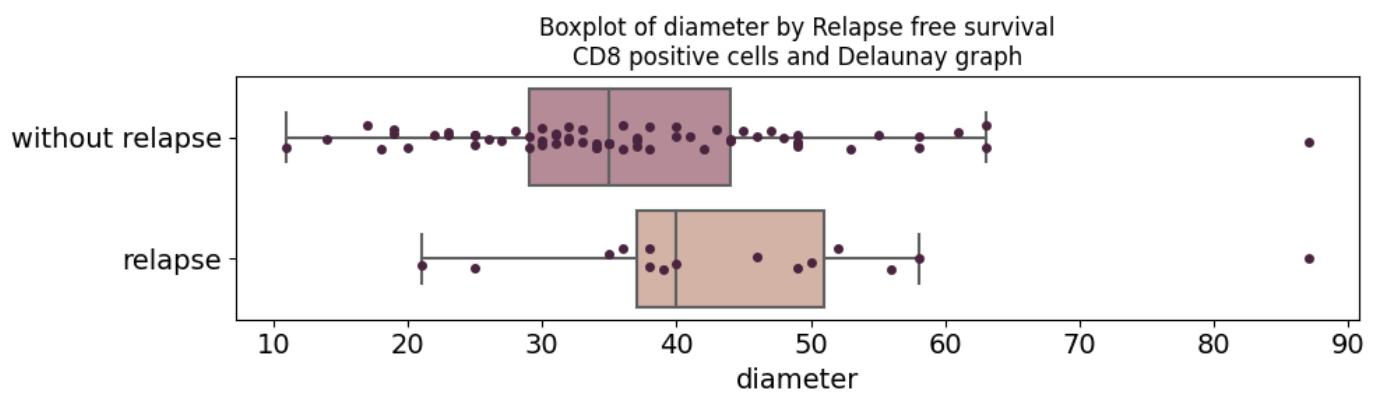


Boxplot of average\_degree\_ by Relapse free survival  
CD8 positive cells and Delaunay graph

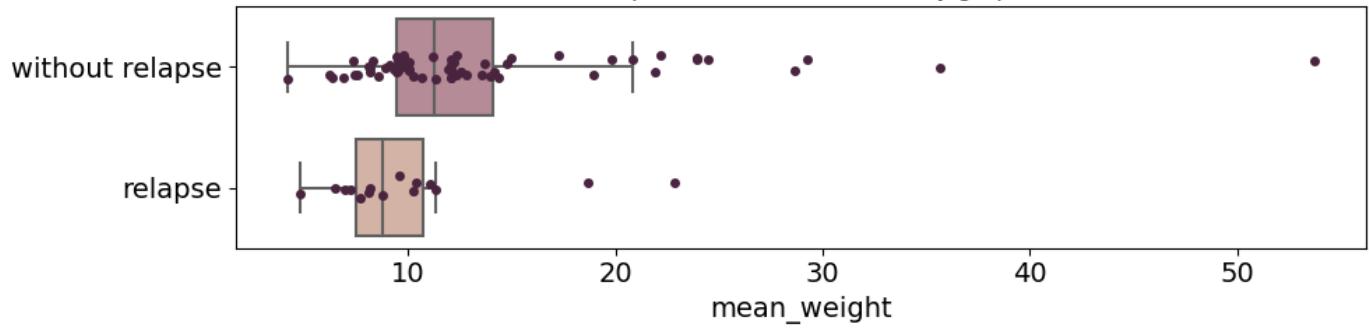


Boxplot of average\_eccentricity by Relapse free survival  
CD8 positive cells and Delaunay graph

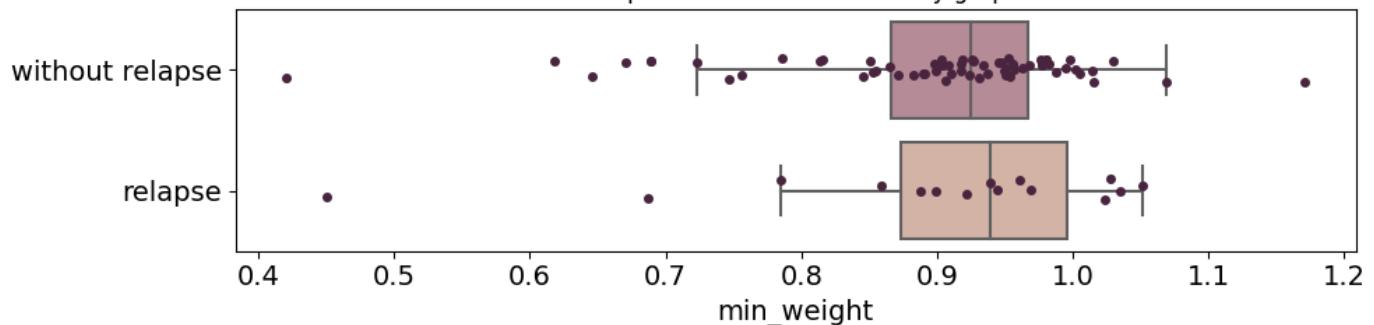




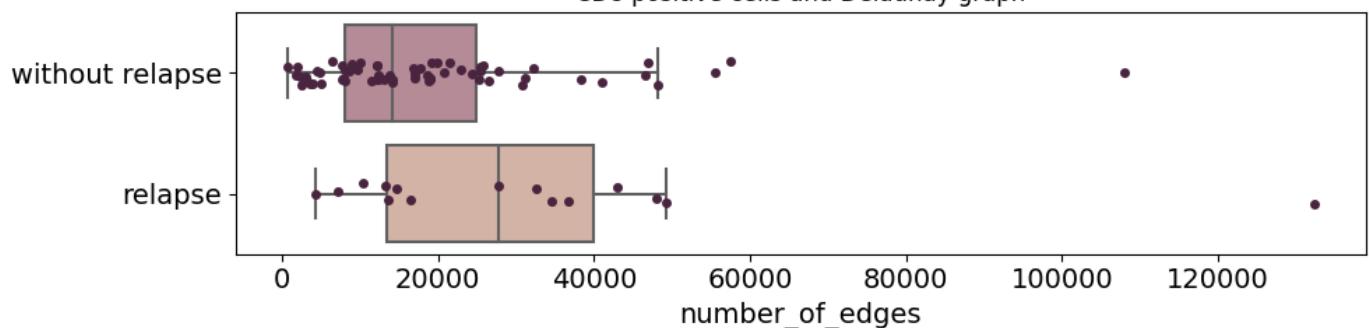
Boxplot of mean\_weight by Relapse free survival  
CD8 positive cells and Delaunay graph



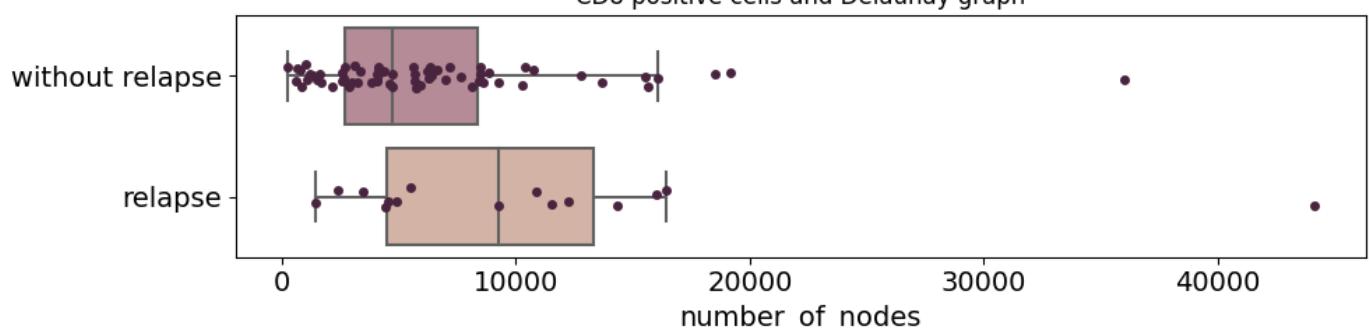
Boxplot of min\_weight by Relapse free survival  
CD8 positive cells and Delaunay graph



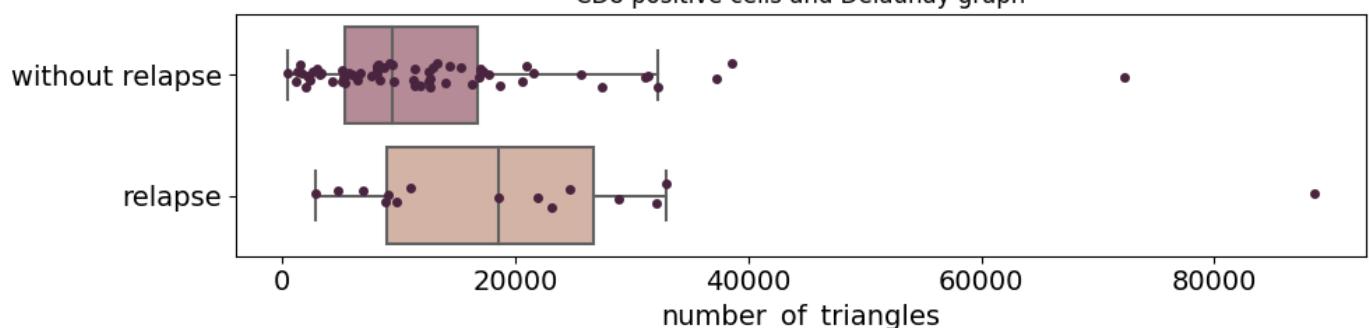
Boxplot of number\_of\_edges by Relapse free survival  
CD8 positive cells and Delaunay graph

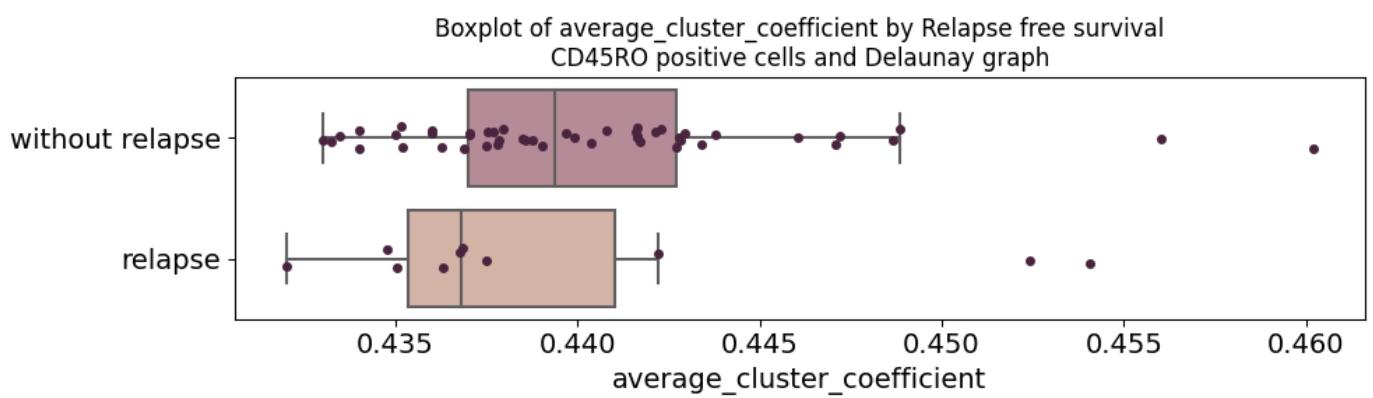
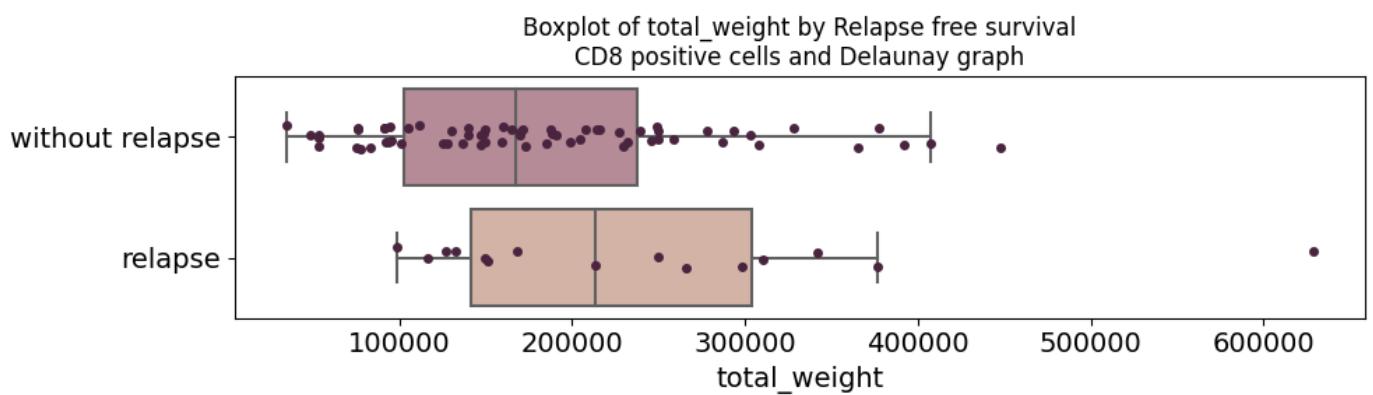
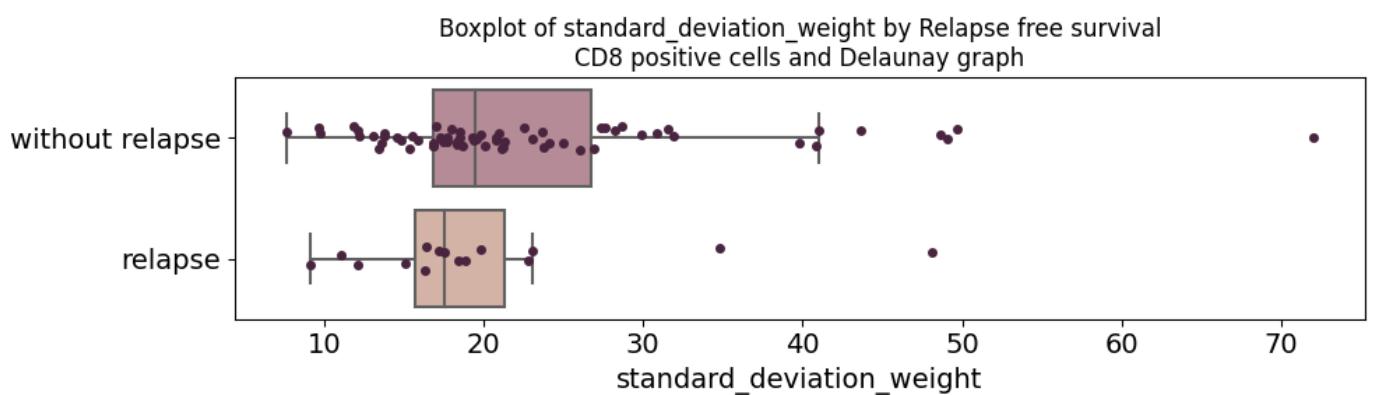
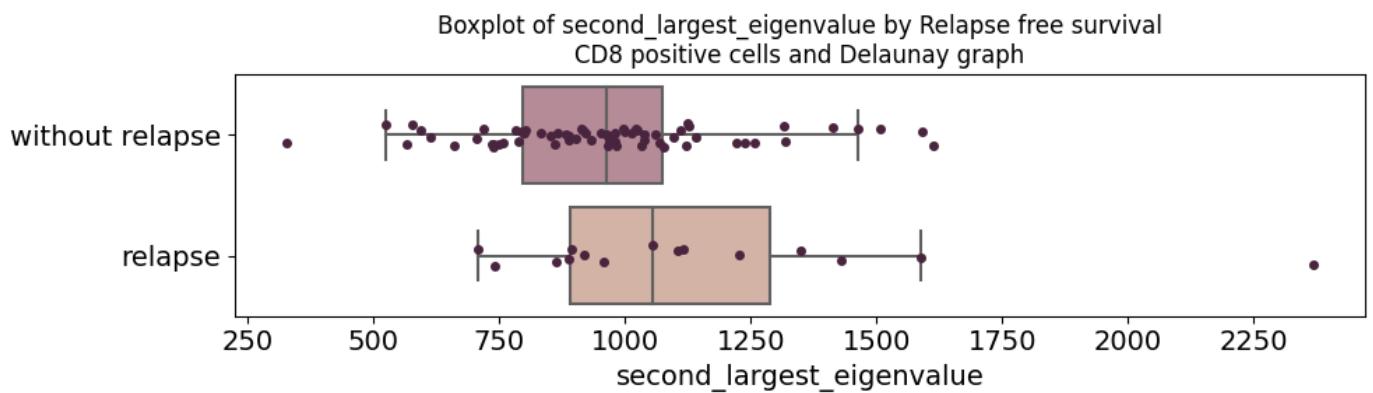
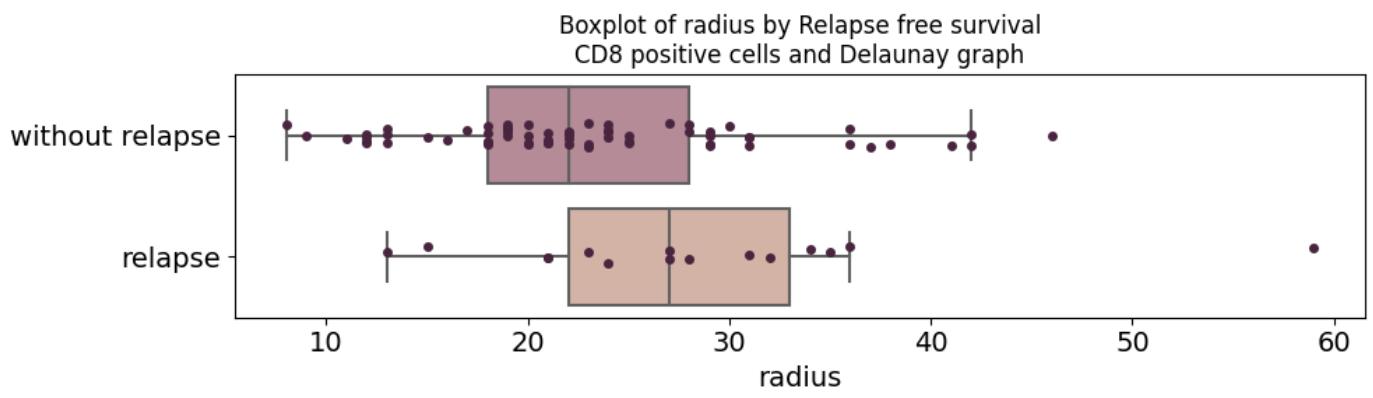


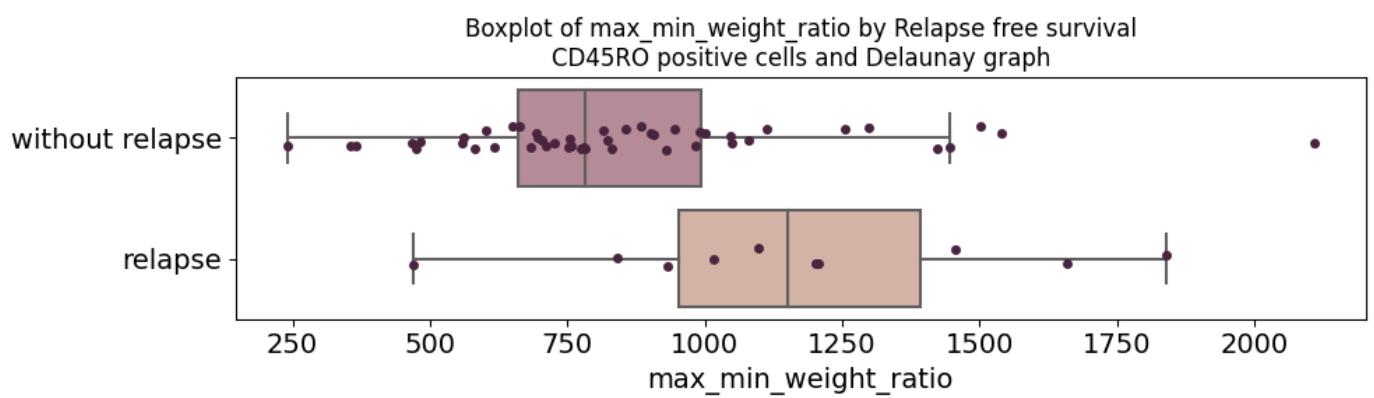
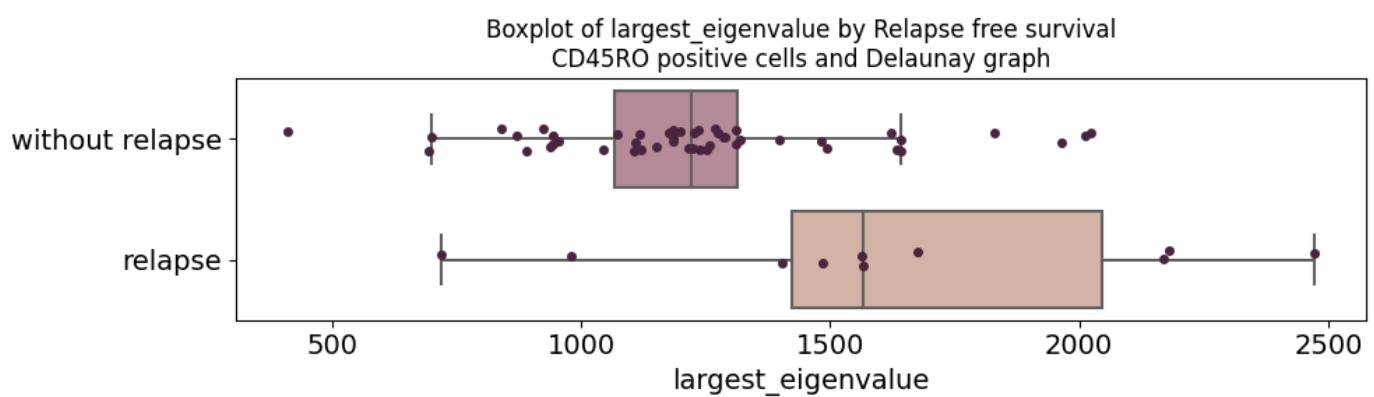
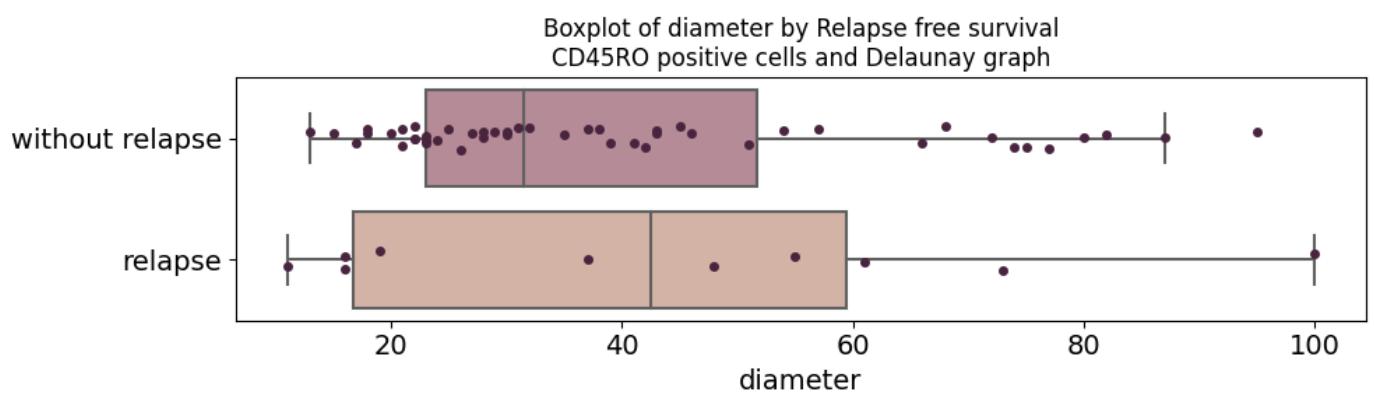
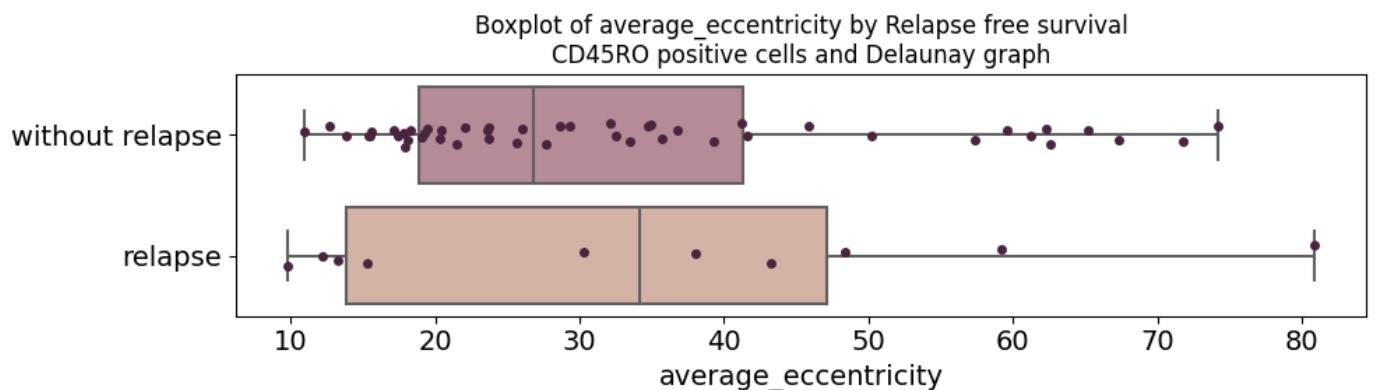
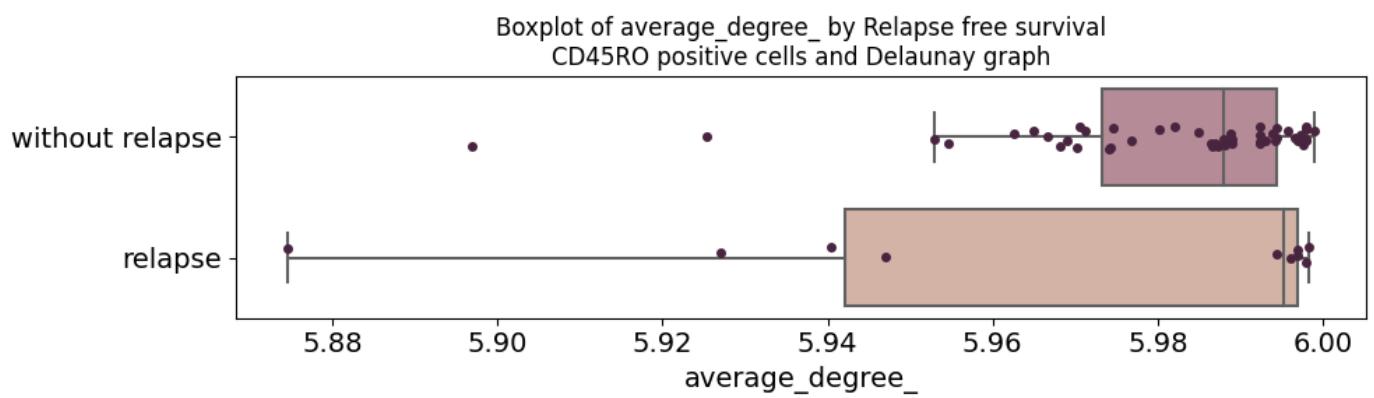
Boxplot of number\_of\_nodes by Relapse free survival  
CD8 positive cells and Delaunay graph

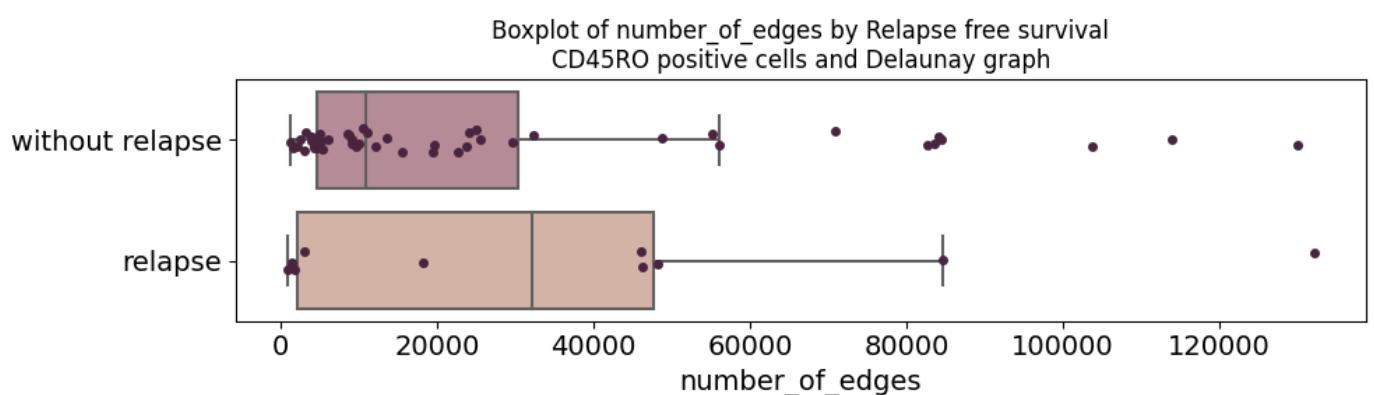
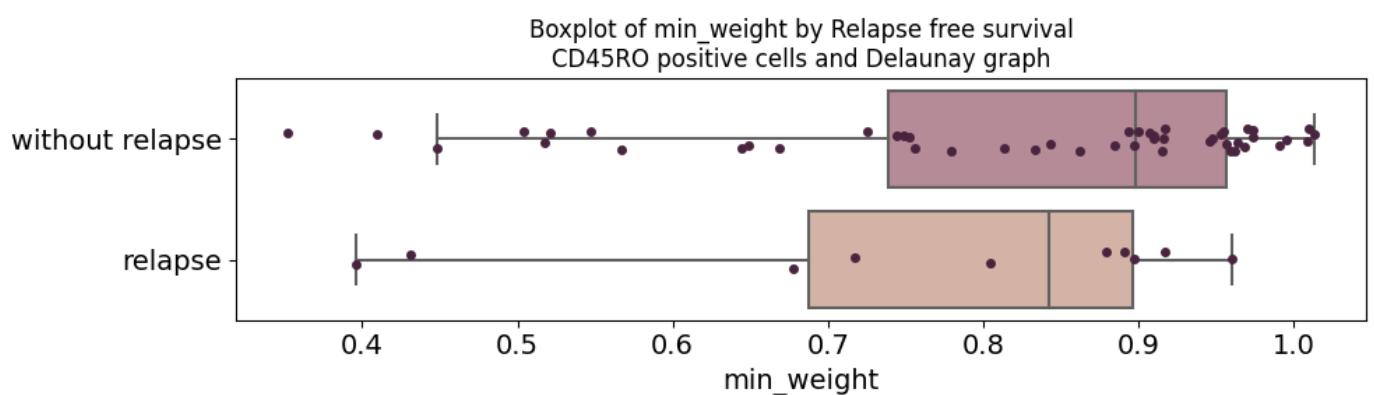
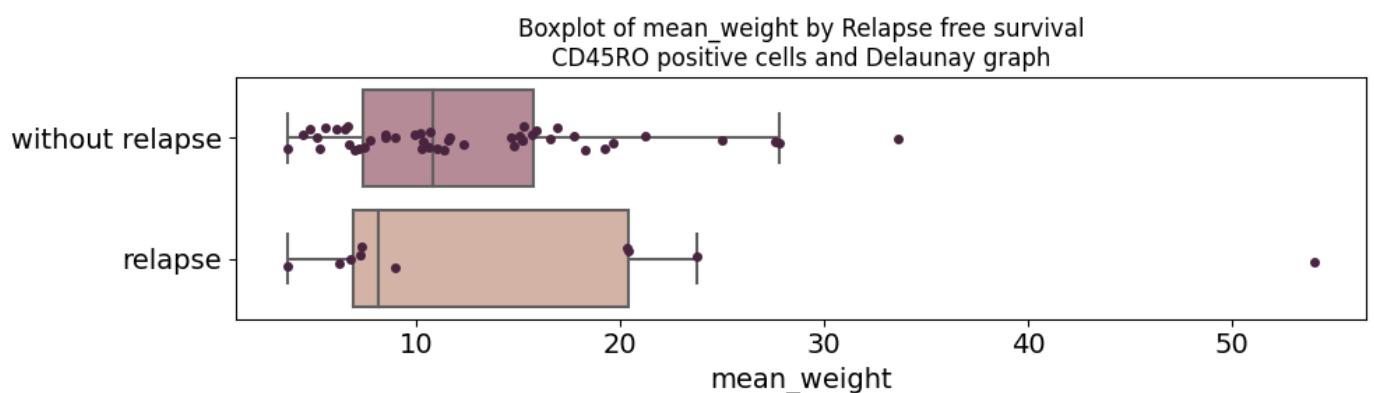
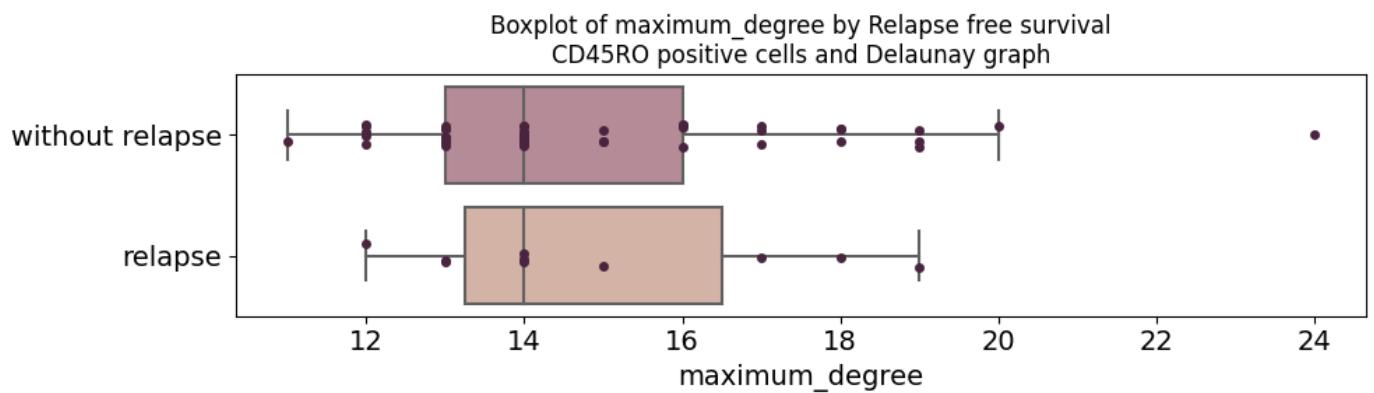
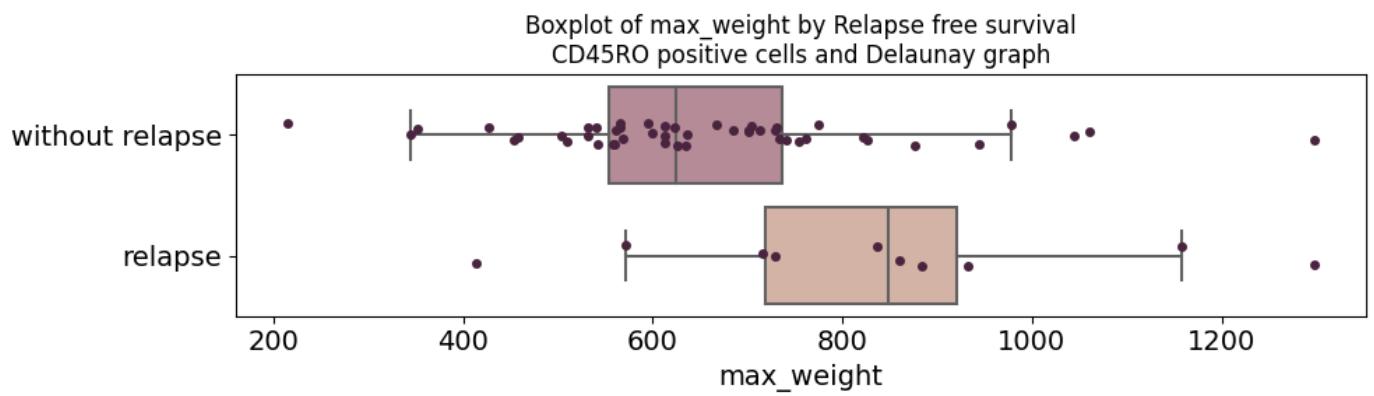


Boxplot of number\_of\_triangles by Relapse free survival  
CD8 positive cells and Delaunay graph

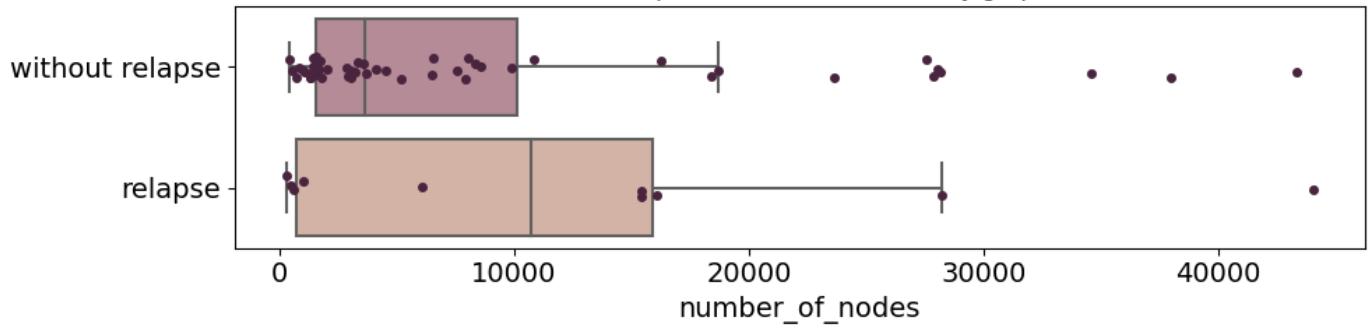




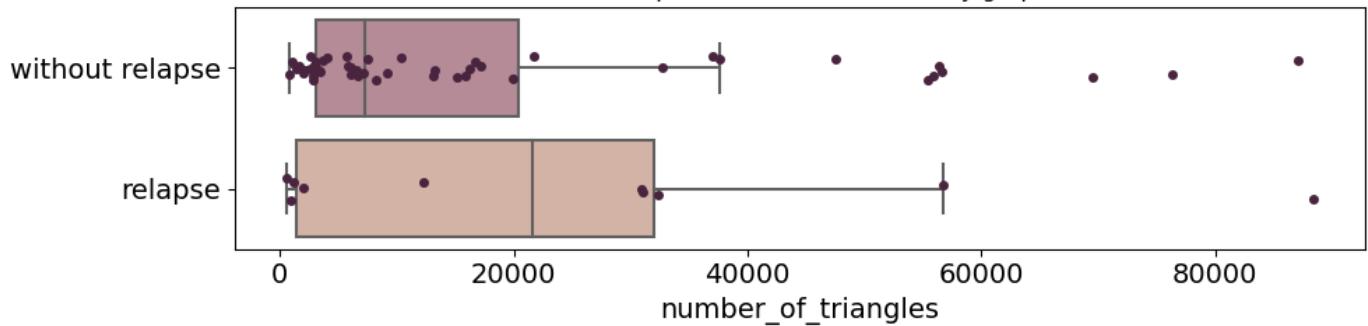




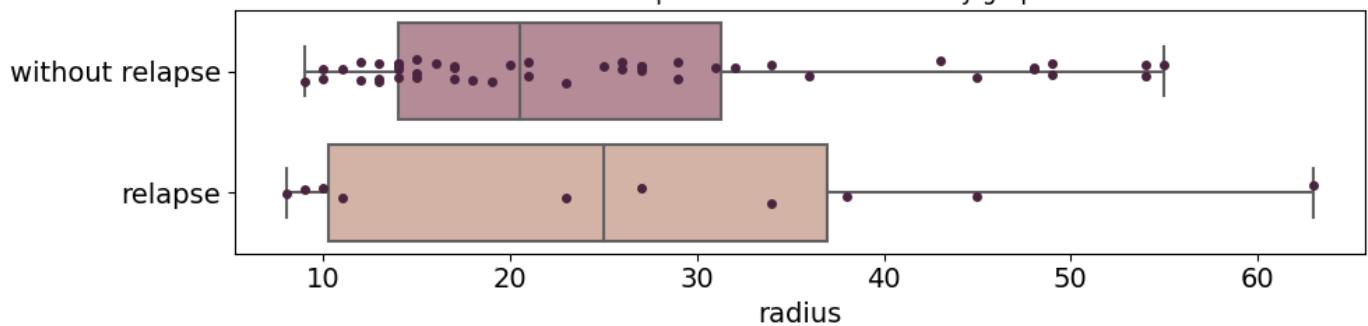
Boxplot of number\_of\_nodes by Relapse free survival  
CD45RO positive cells and Delaunay graph



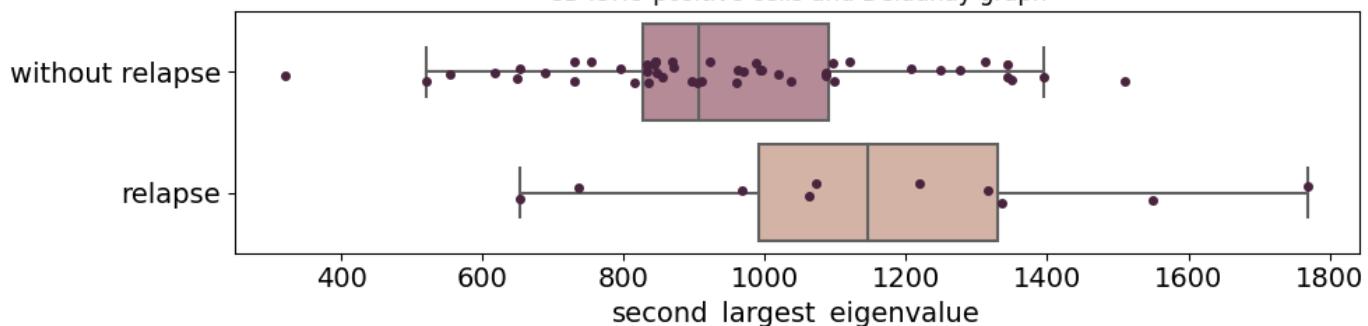
Boxplot of number\_of\_triangles by Relapse free survival  
CD45RO positive cells and Delaunay graph



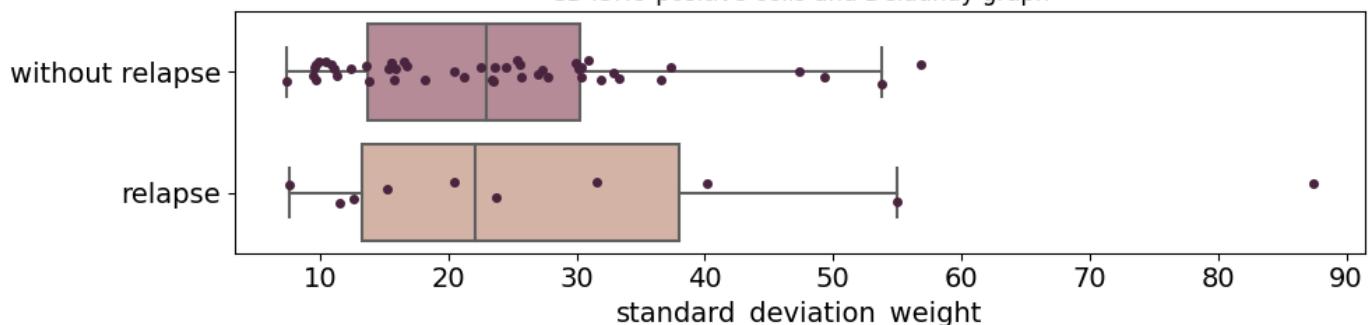
Boxplot of radius by Relapse free survival  
CD45RO positive cells and Delaunay graph

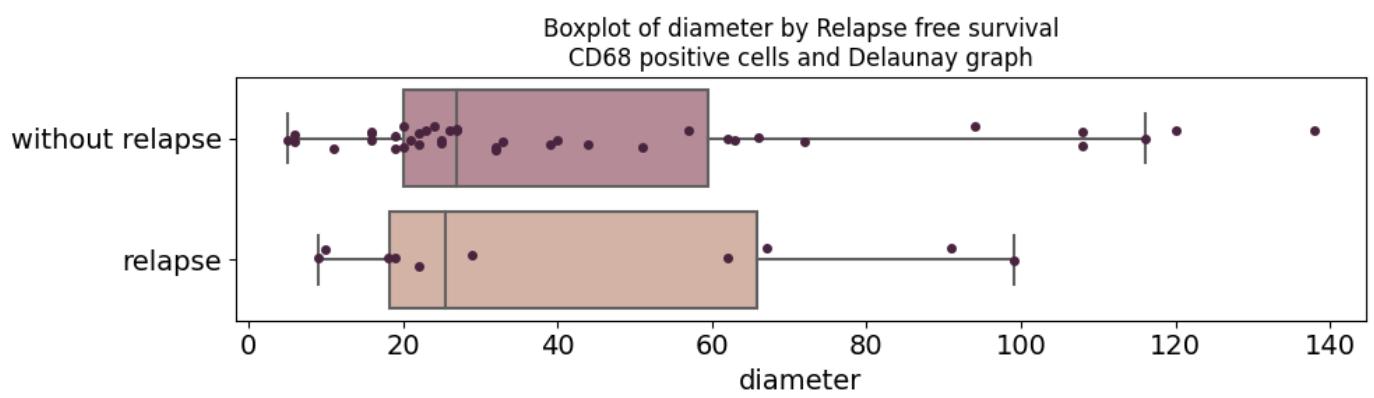
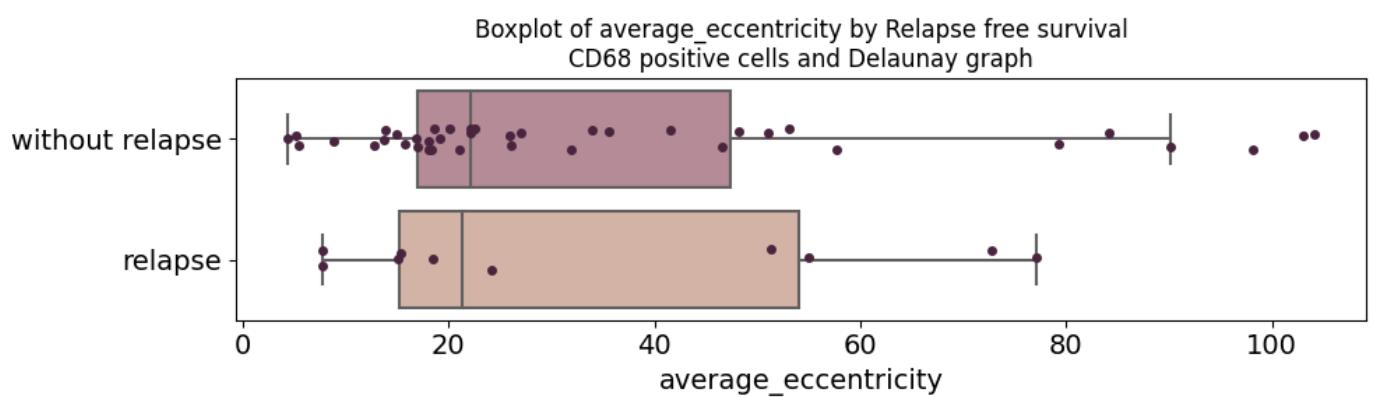
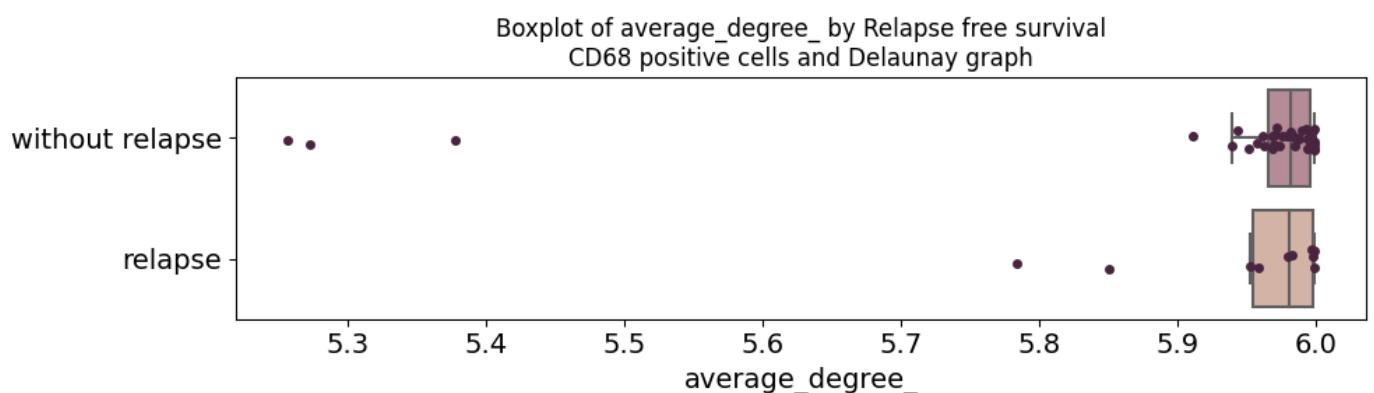
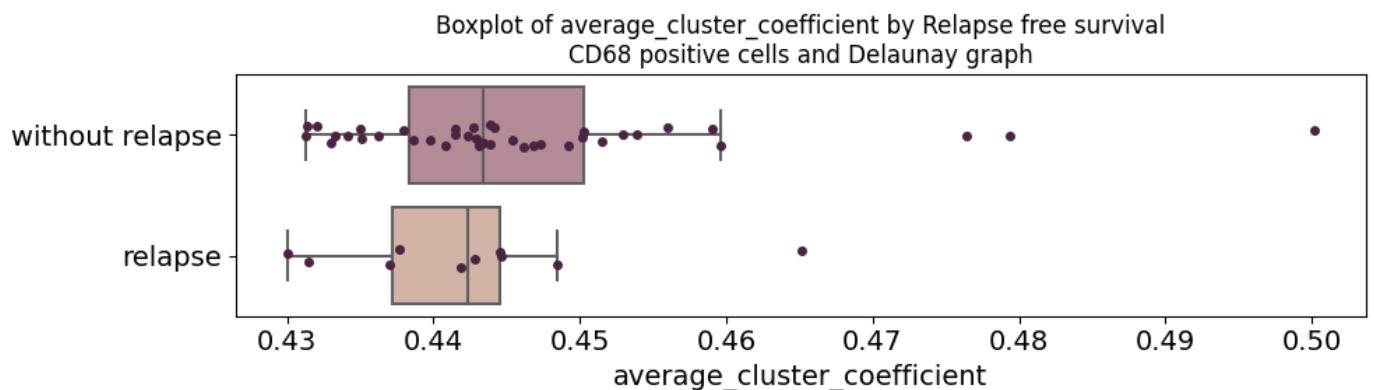
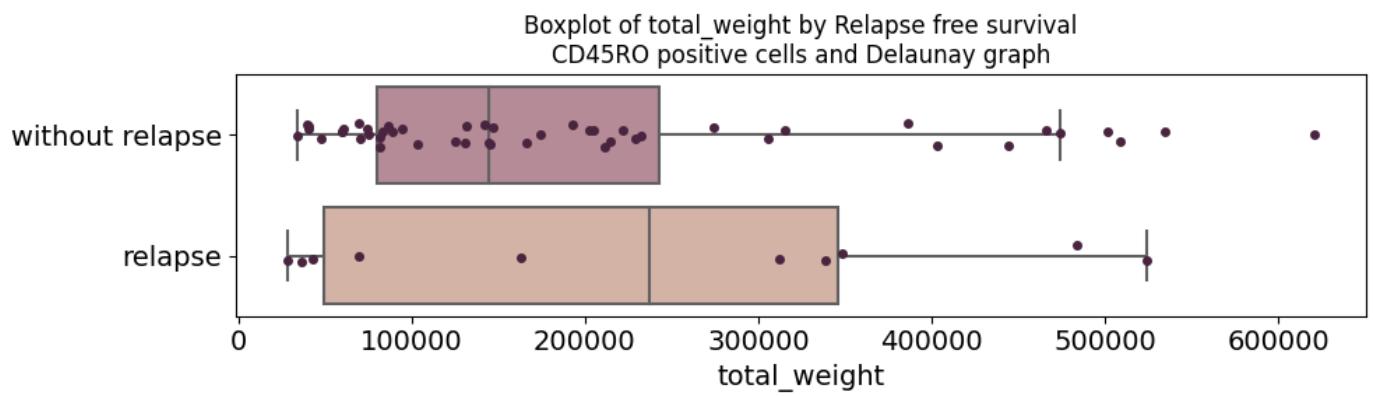


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD45RO positive cells and Delaunay graph

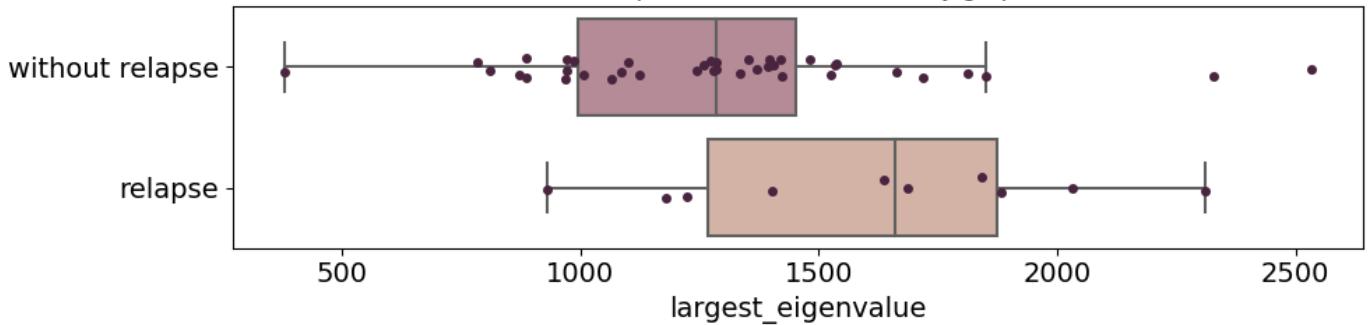


Boxplot of standard\_deviation\_weight by Relapse free survival  
CD45RO positive cells and Delaunay graph

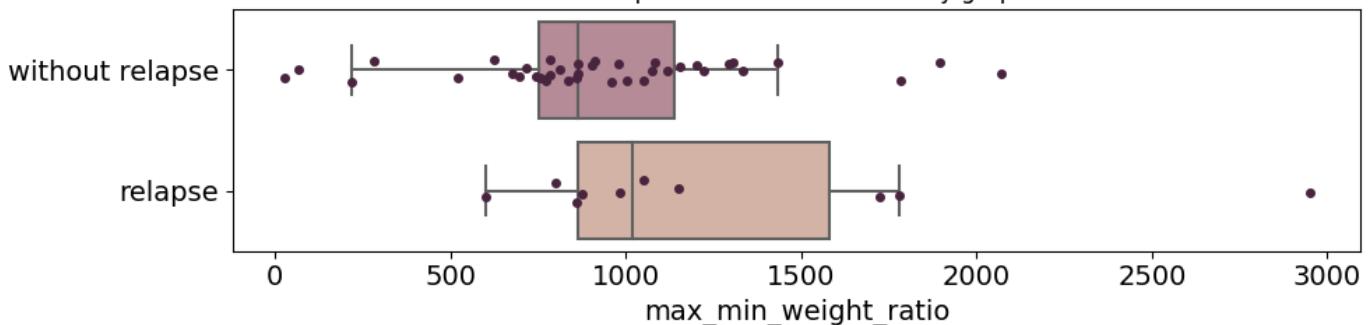




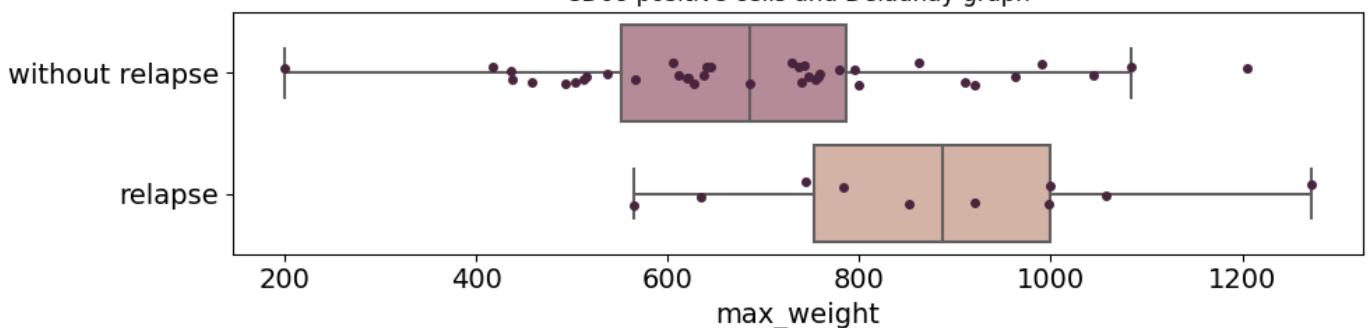
Boxplot of largest\_eigenvalue by Relapse free survival  
CD68 positive cells and Delaunay graph



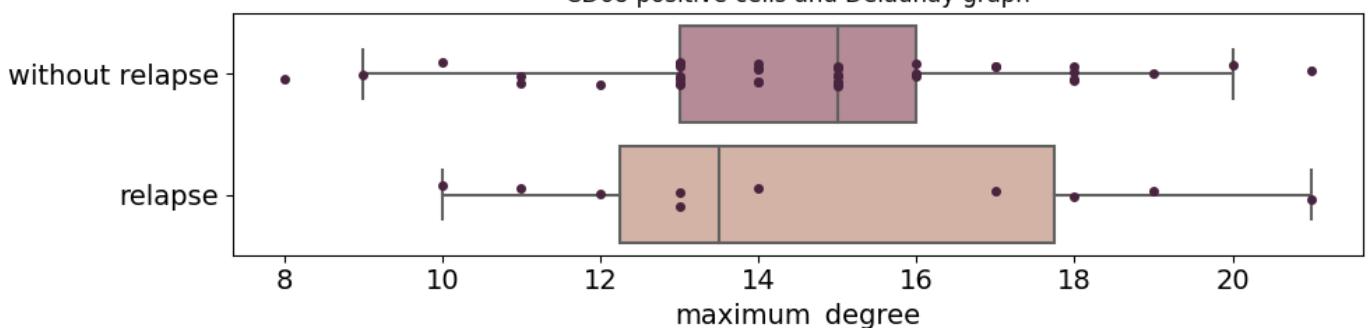
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD68 positive cells and Delaunay graph



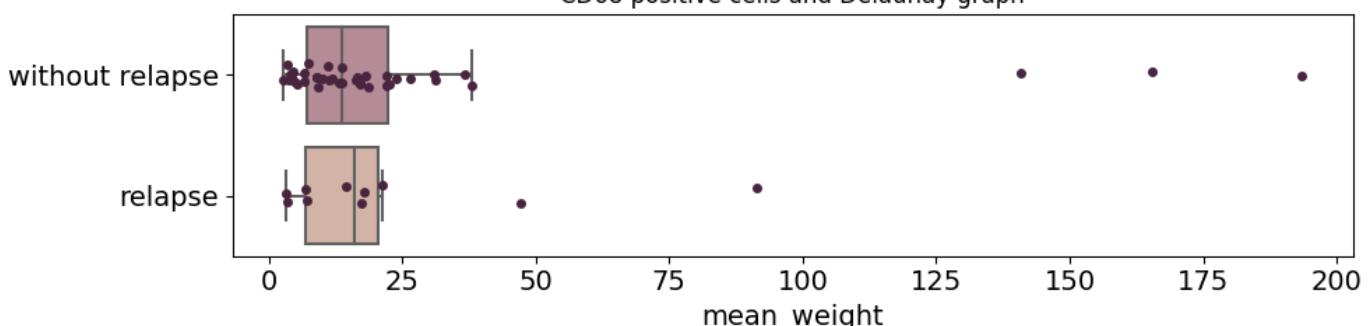
Boxplot of max\_weight by Relapse free survival  
CD68 positive cells and Delaunay graph

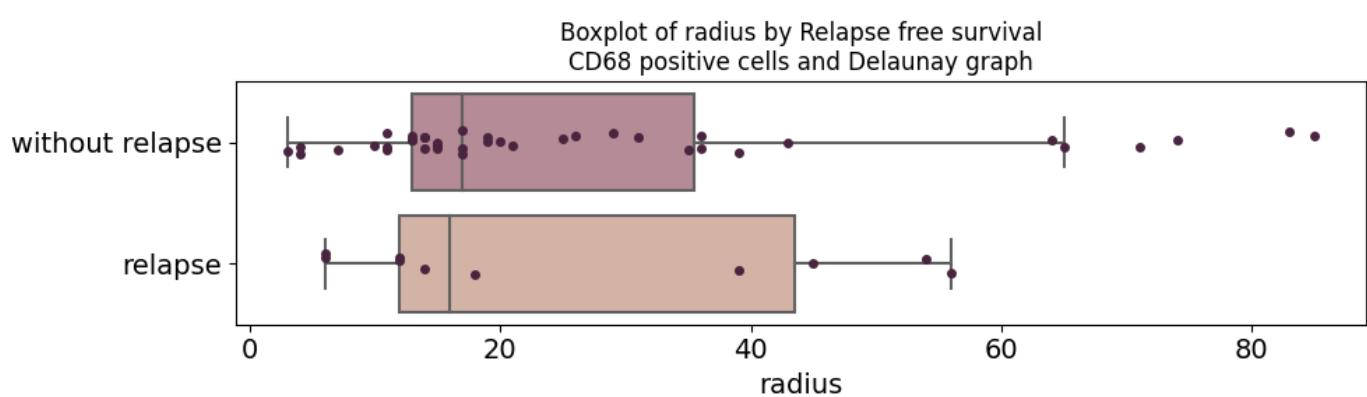
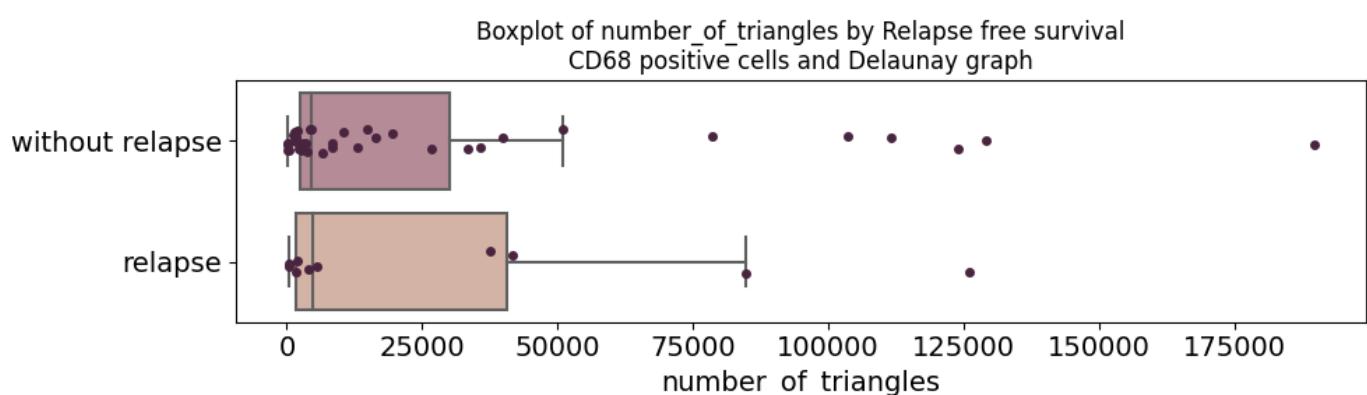
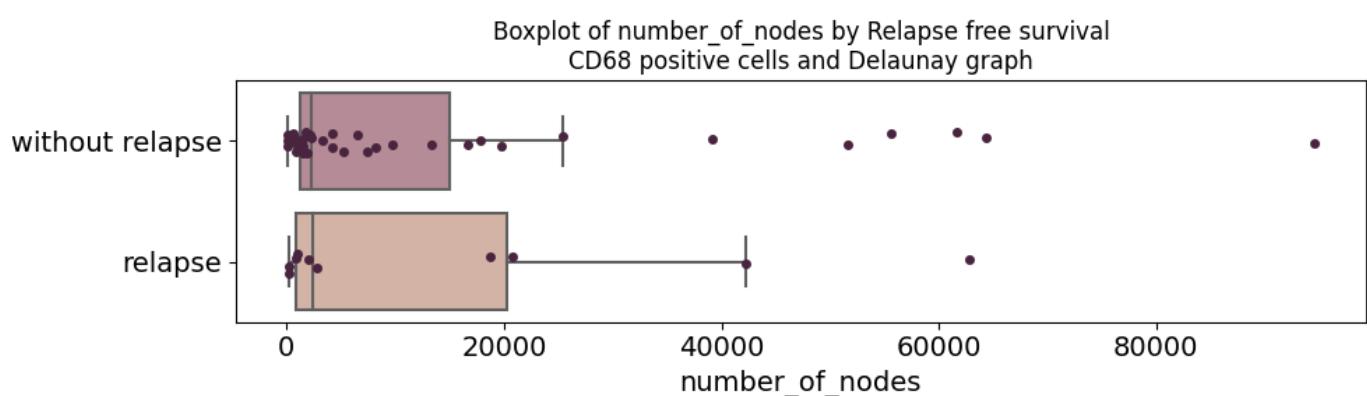
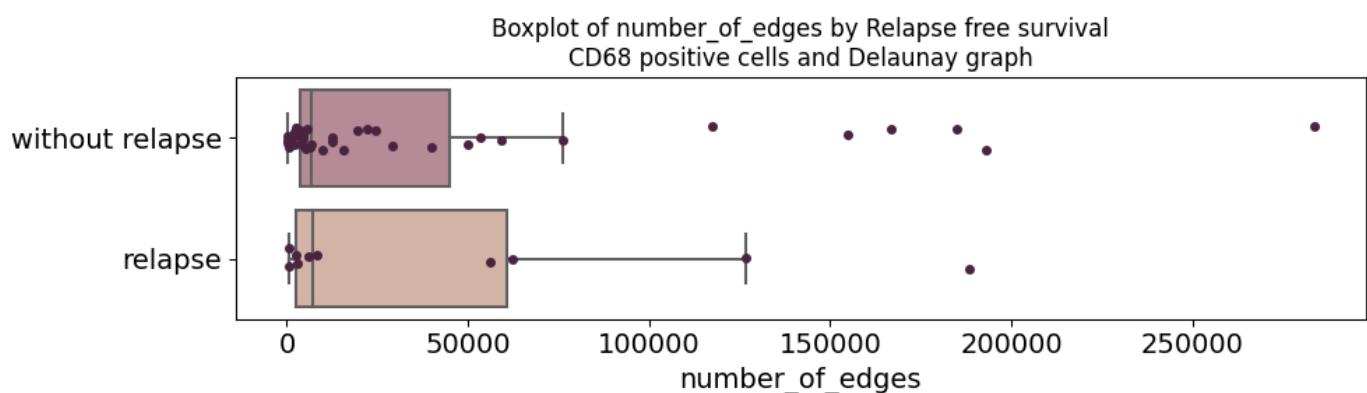
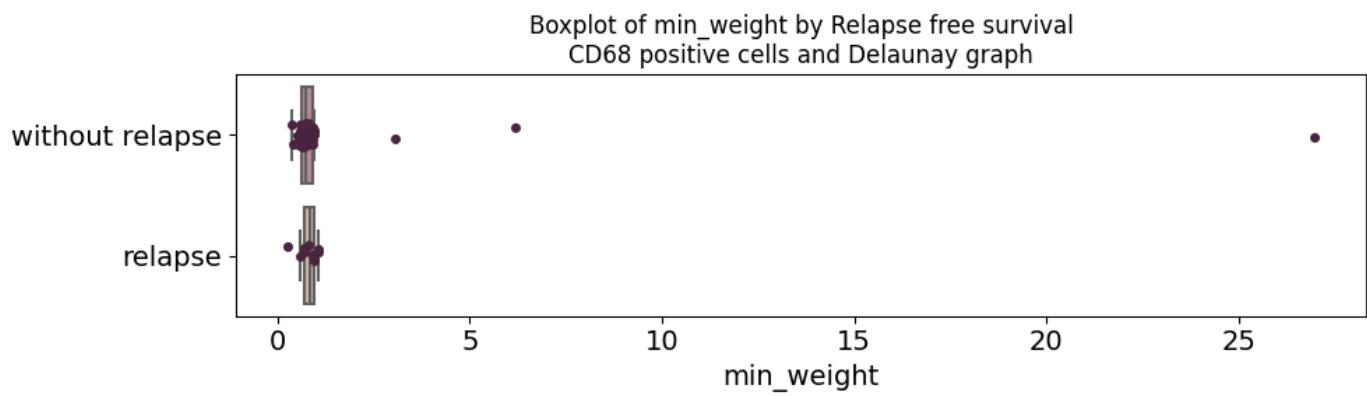


Boxplot of maximum\_degree by Relapse free survival  
CD68 positive cells and Delaunay graph

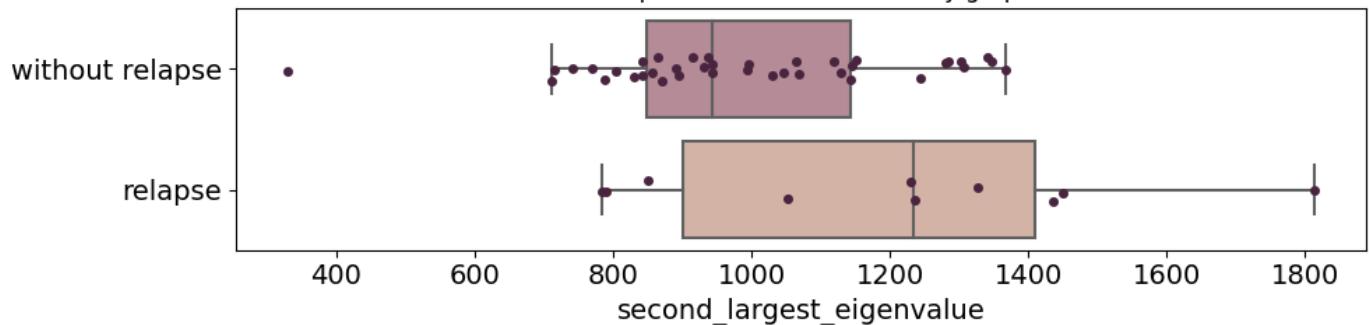


Boxplot of mean\_weight by Relapse free survival  
CD68 positive cells and Delaunay graph

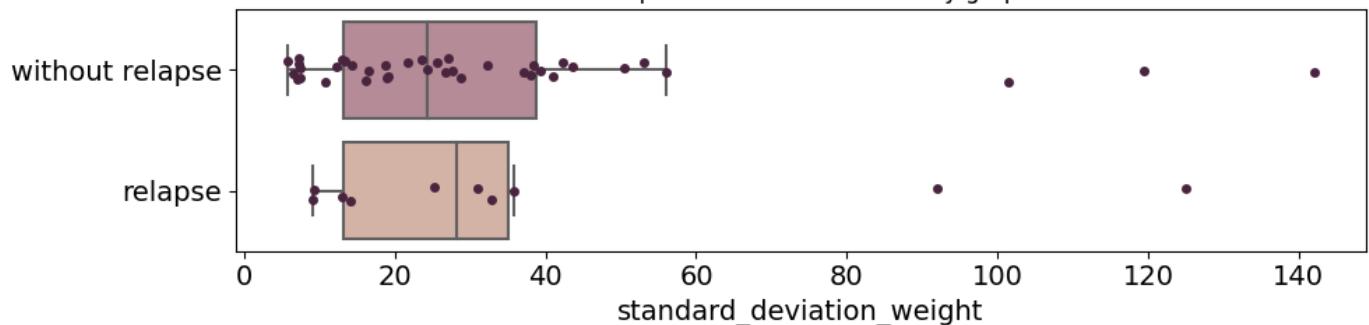




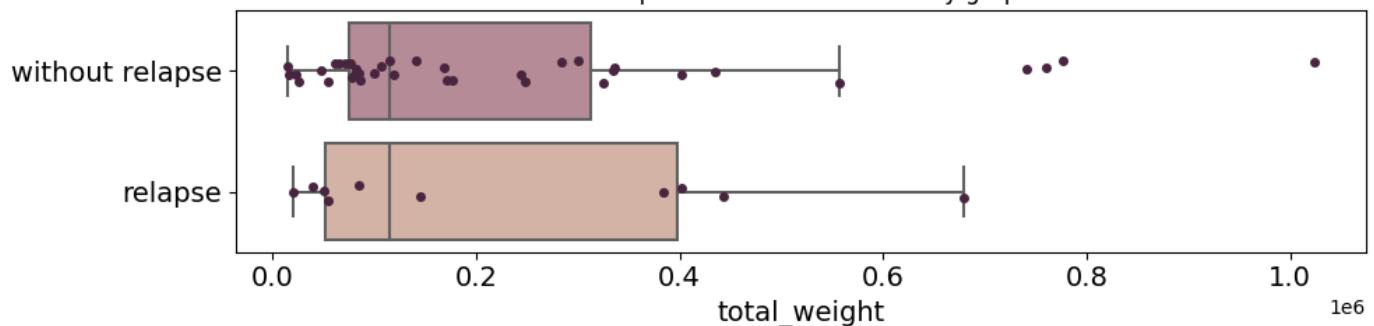
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
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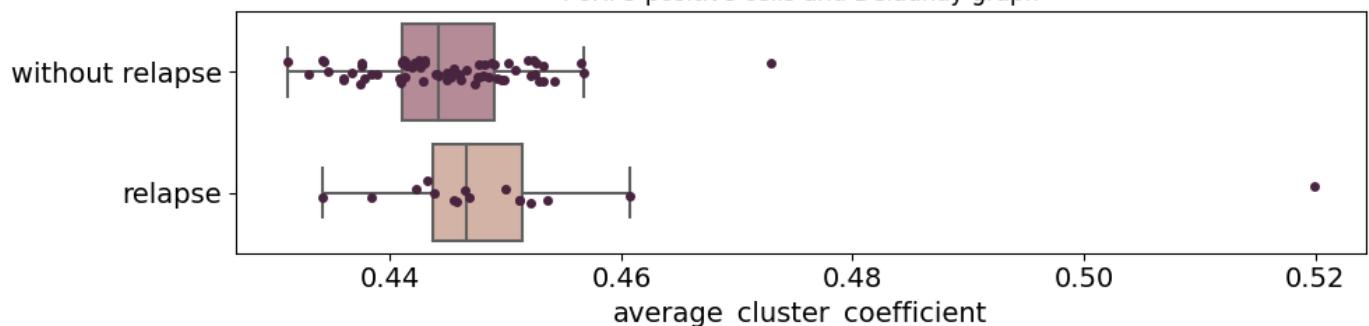
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CD68 positive cells and Delaunay graph



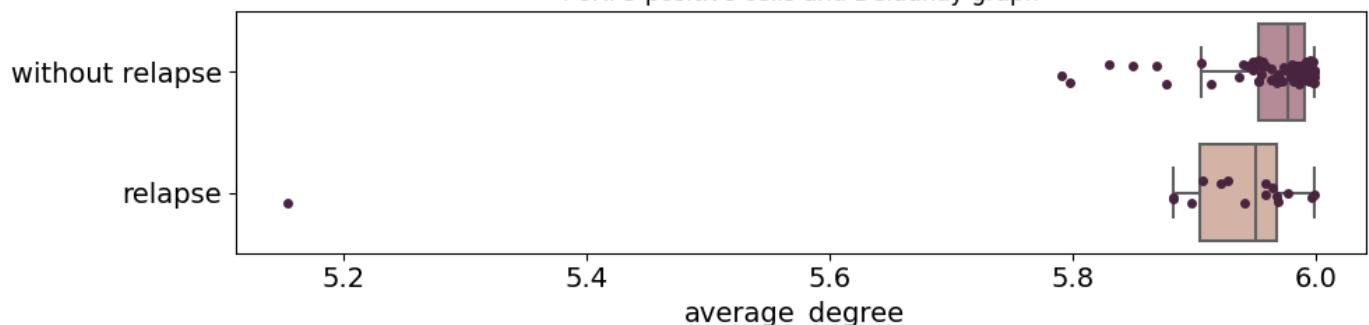
Boxplot of total\_weight by Relapse free survival  
CD68 positive cells and Delaunay graph



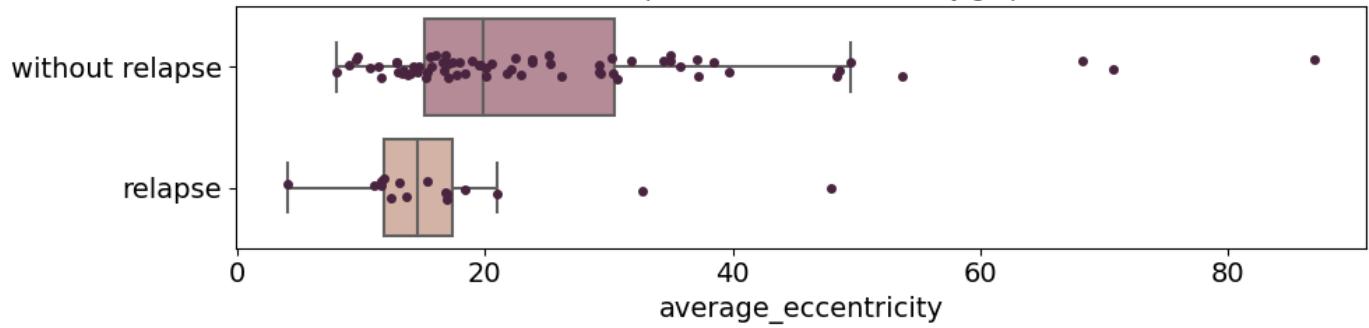
Boxplot of average\_cluster\_coefficient by Relapse free survival  
FOXP3 positive cells and Delaunay graph



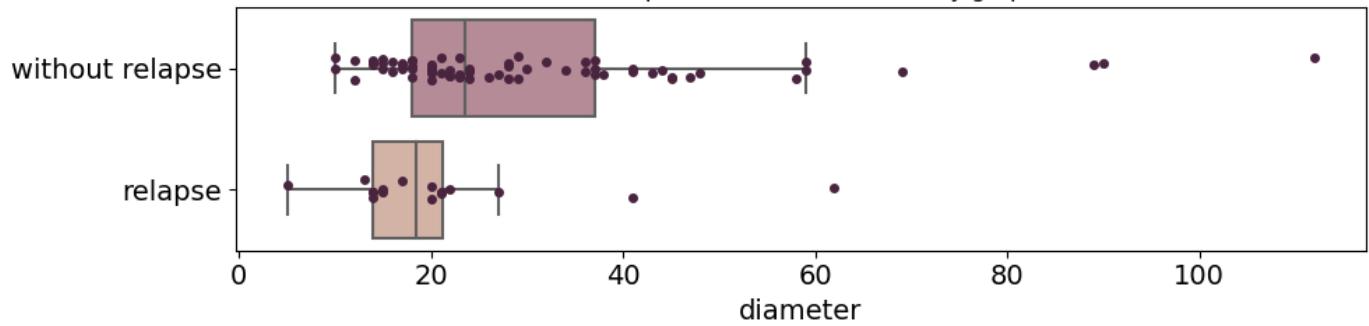
Boxplot of average\_degree\_ by Relapse free survival  
FOXP3 positive cells and Delaunay graph



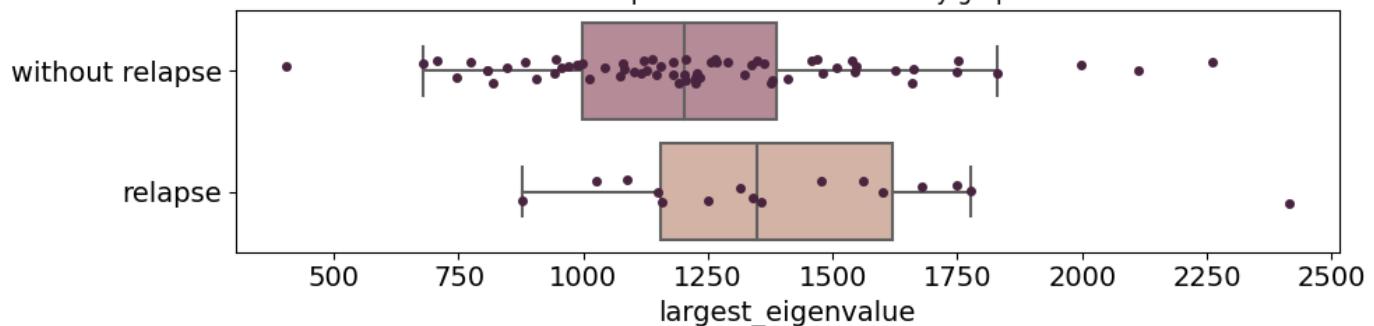
Boxplot of average\_eccentricity by Relapse free survival  
FOXP3 positive cells and Delaunay graph



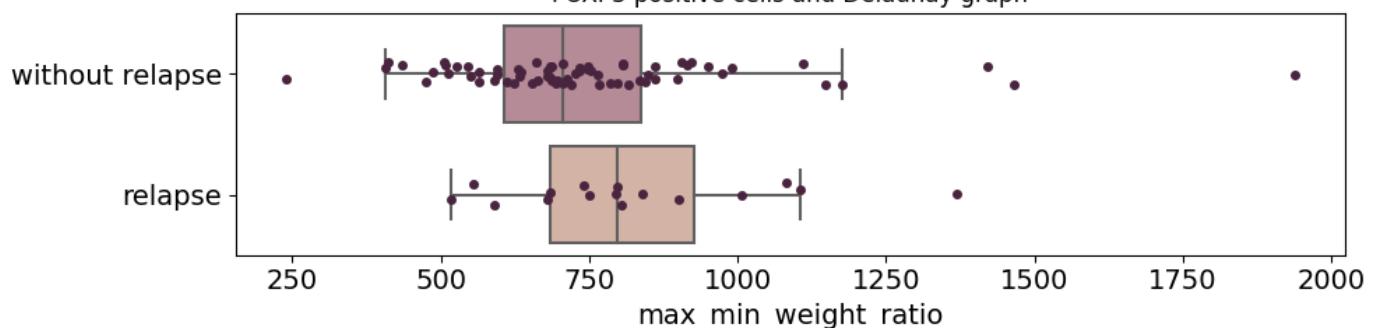
Boxplot of diameter by Relapse free survival  
FOXP3 positive cells and Delaunay graph



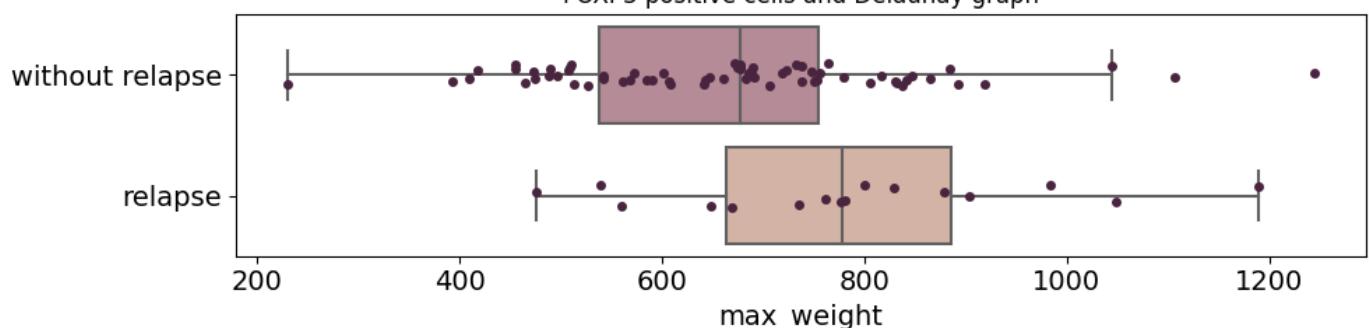
Boxplot of largest\_eigenvalue by Relapse free survival  
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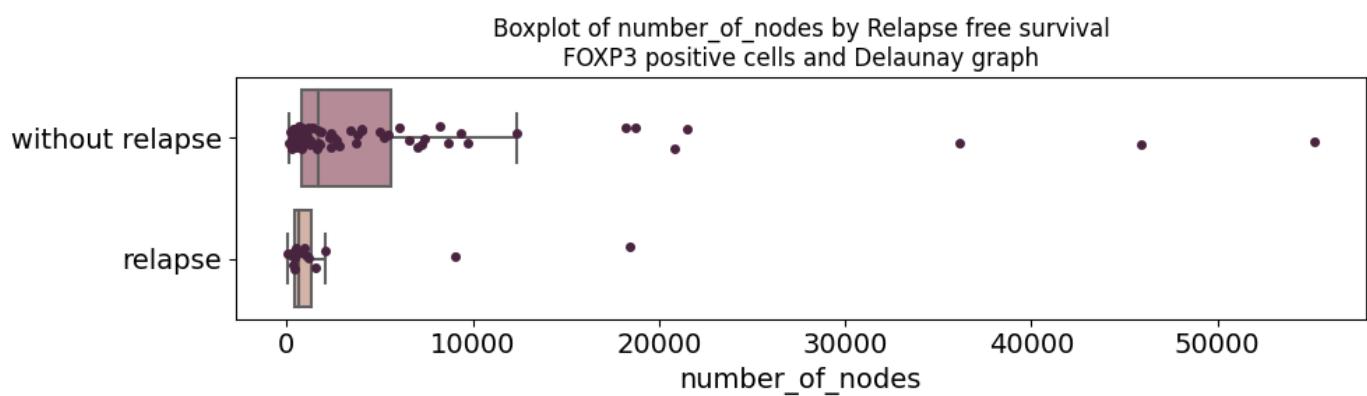
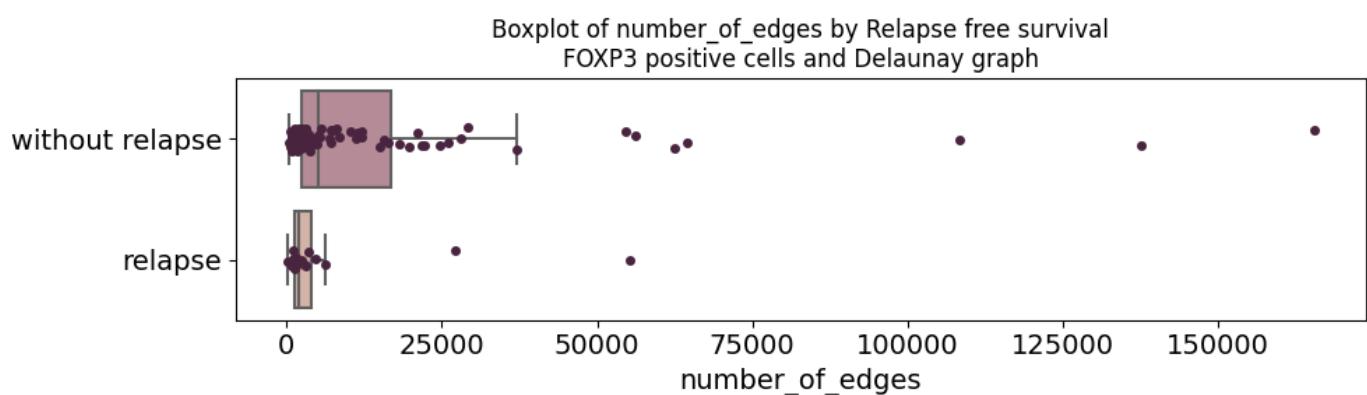
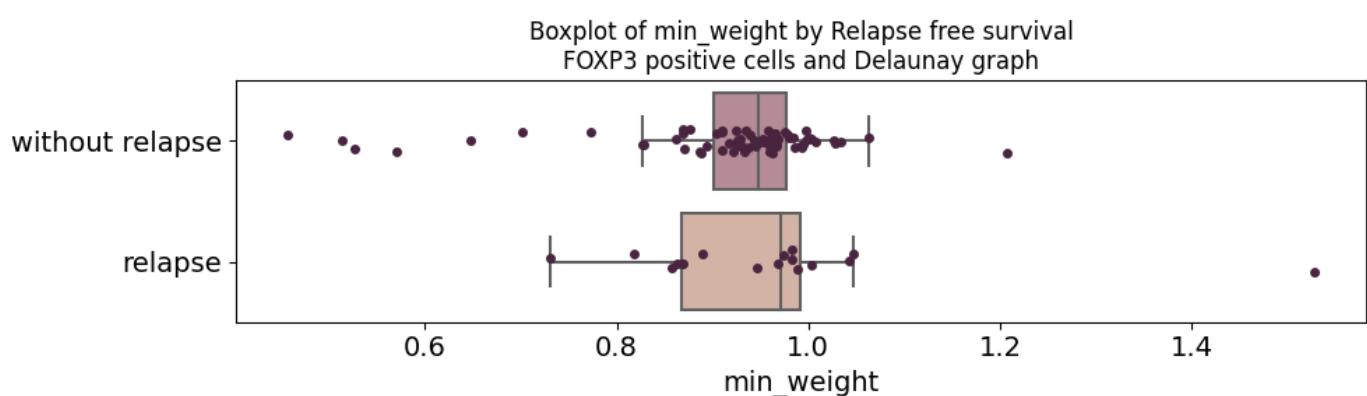
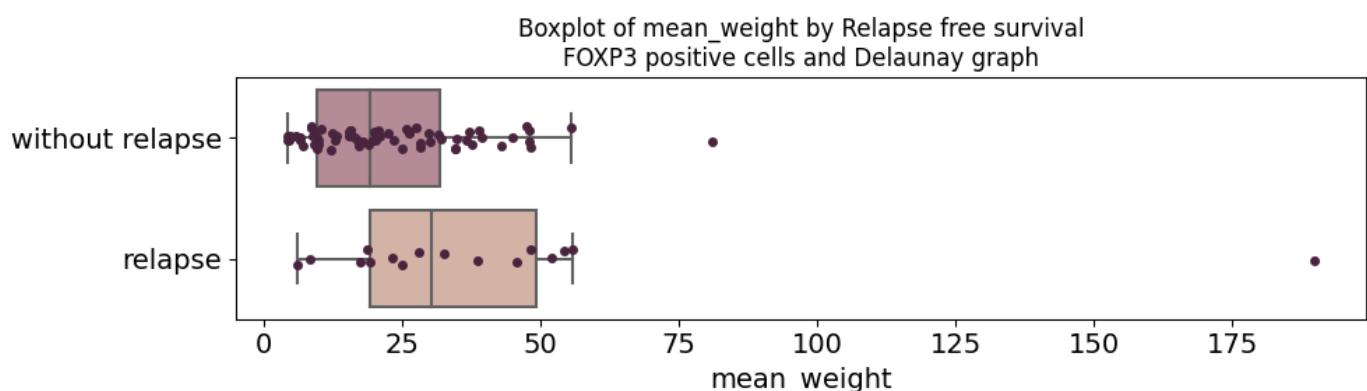
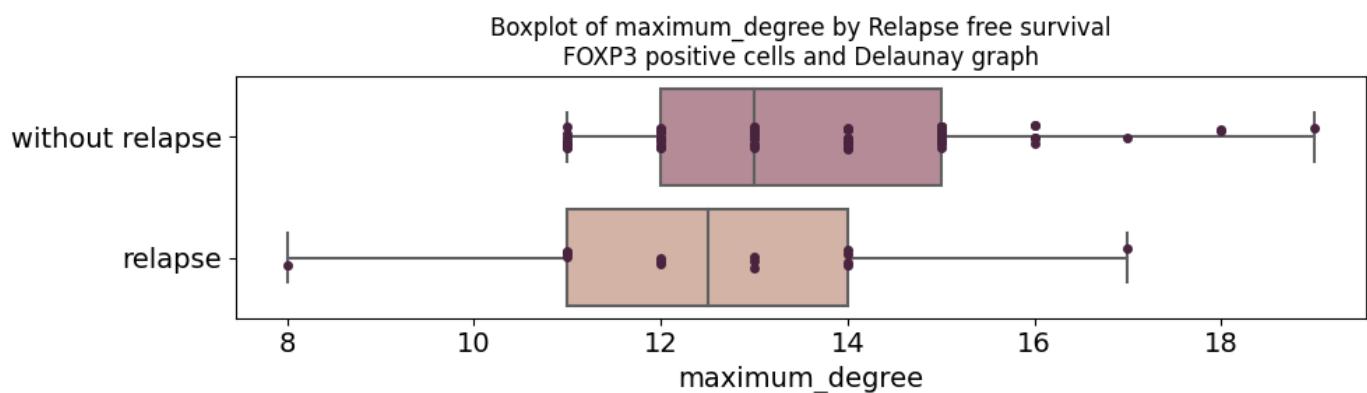


Boxplot of max\_min\_weight\_ratio by Relapse free survival  
FOXP3 positive cells and Delaunay graph

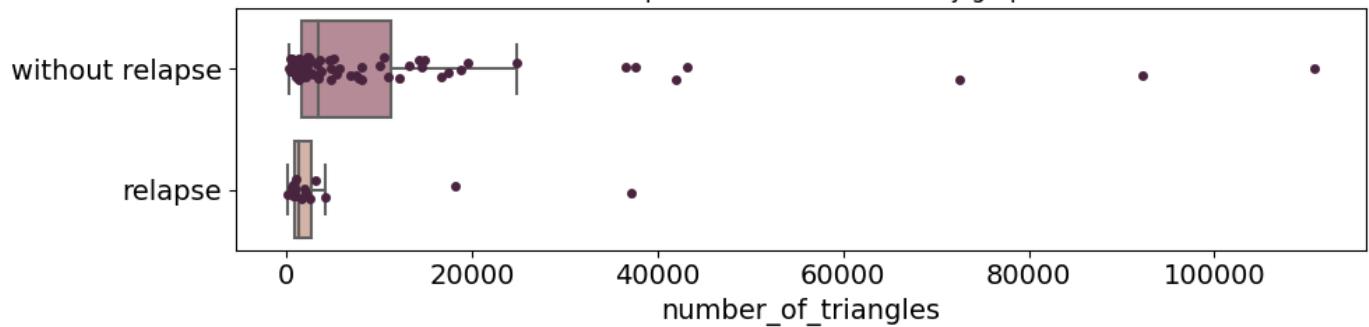


Boxplot of max\_weight by Relapse free survival  
FOXP3 positive cells and Delaunay graph

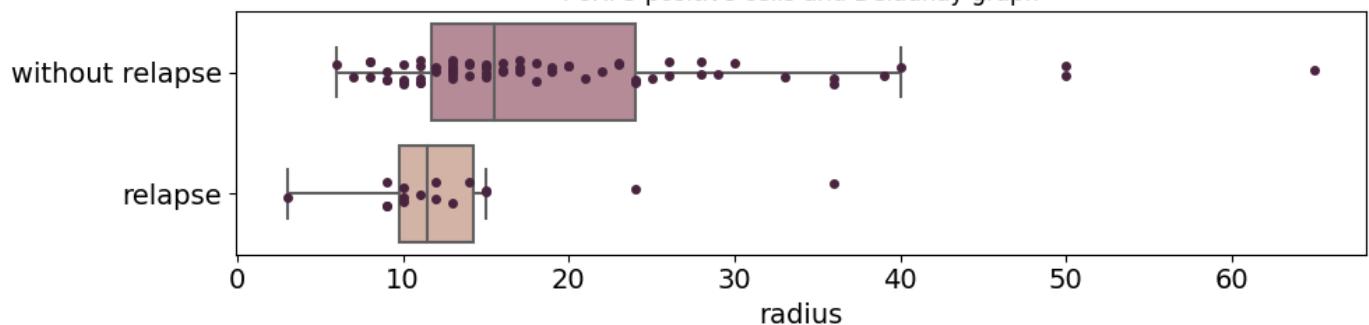




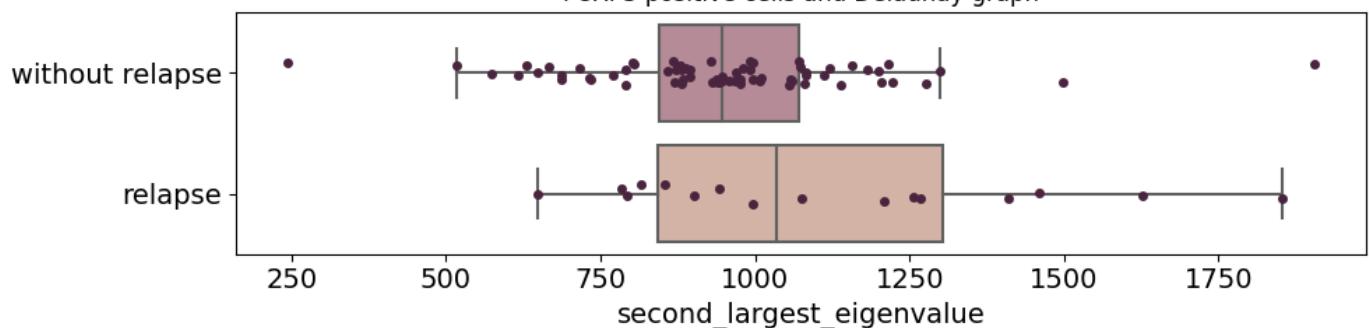
Boxplot of number\_of\_triangles by Relapse free survival  
FOXP3 positive cells and Delaunay graph



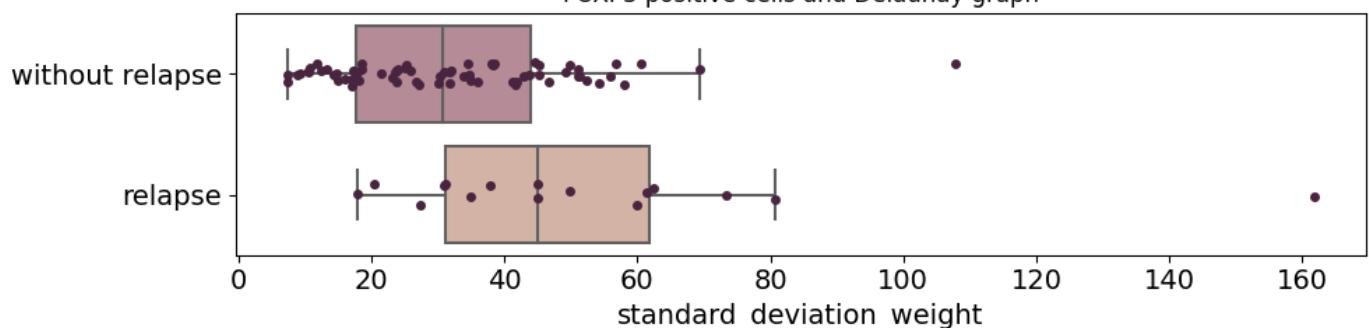
Boxplot of radius by Relapse free survival  
FOXP3 positive cells and Delaunay graph



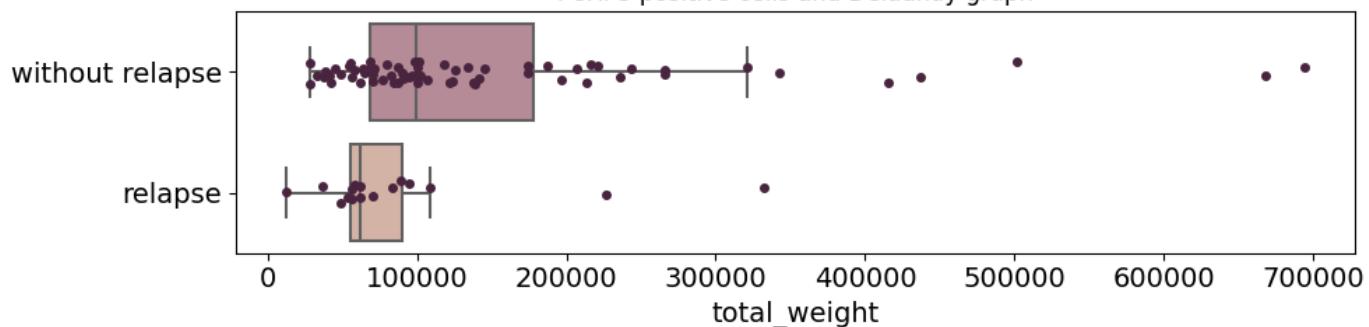
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
FOXP3 positive cells and Delaunay graph



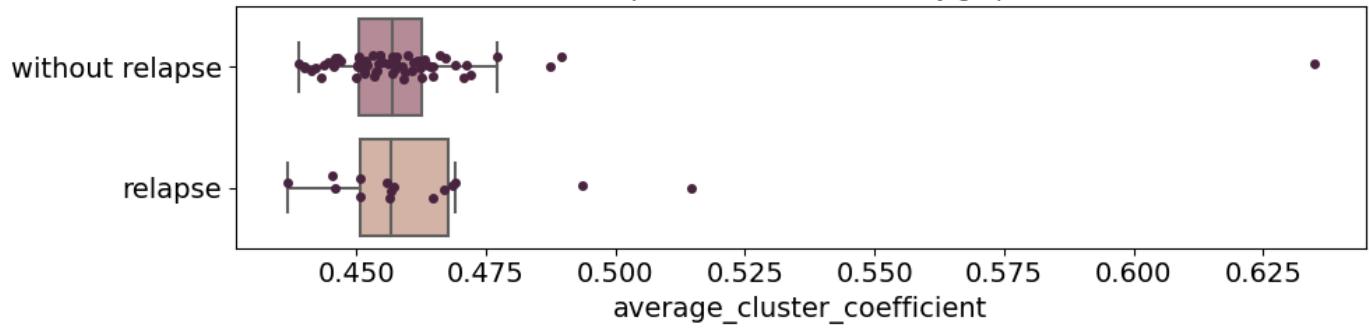
Boxplot of standard\_deviation\_weight by Relapse free survival  
FOXP3 positive cells and Delaunay graph



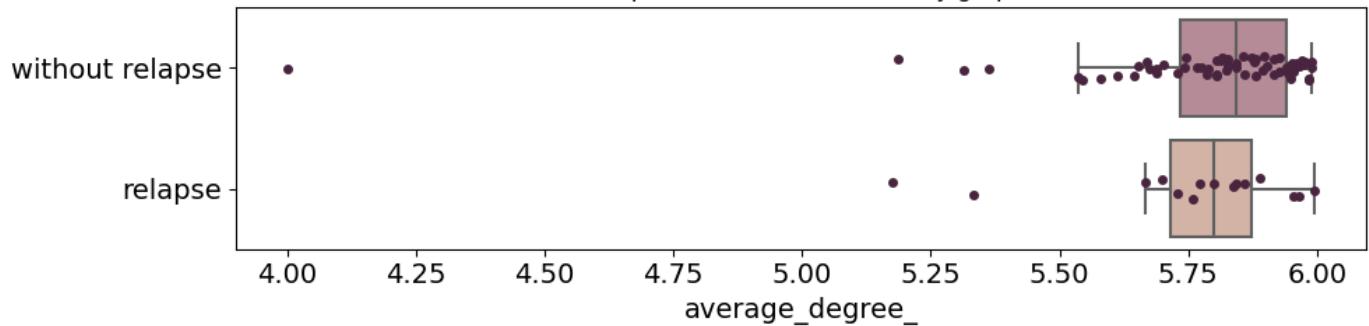
Boxplot of total\_weight by Relapse free survival  
FOXP3 positive cells and Delaunay graph



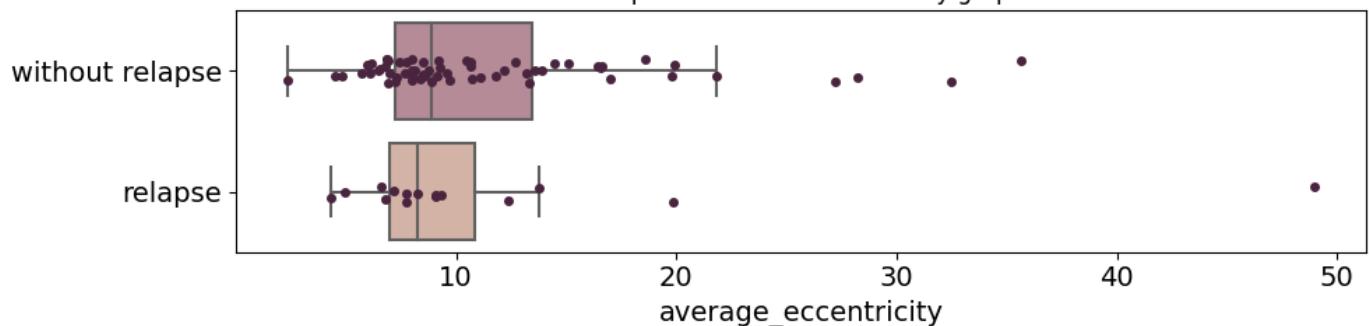
Boxplot of average\_cluster\_coefficient by Relapse free survival  
PD1 positive cells and Delaunay graph



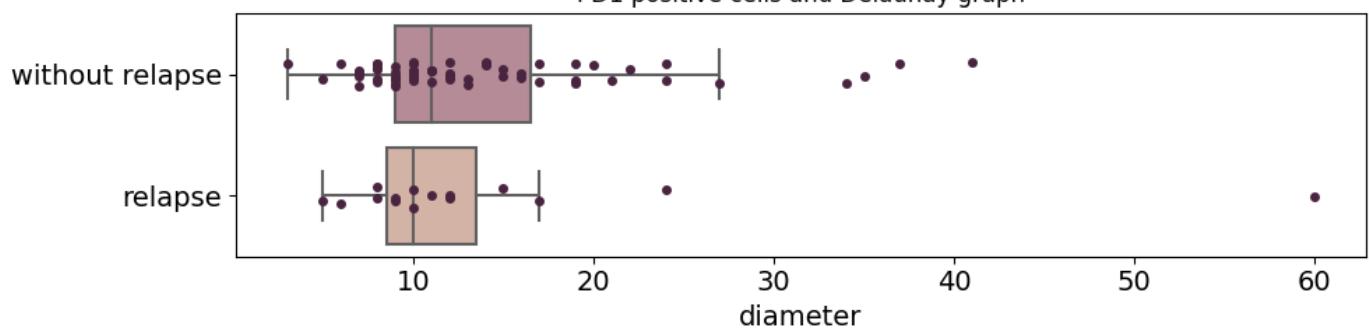
Boxplot of average\_degree\_ by Relapse free survival  
PD1 positive cells and Delaunay graph



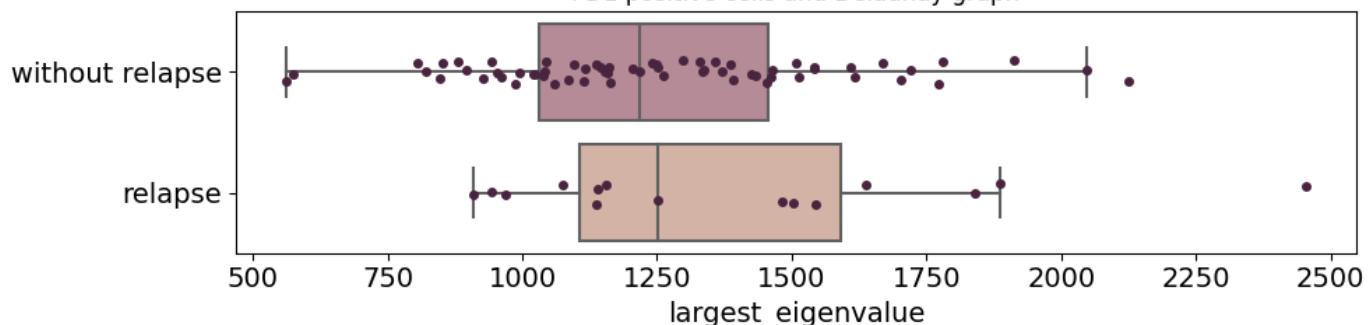
Boxplot of average\_eccentricity by Relapse free survival  
PD1 positive cells and Delaunay graph



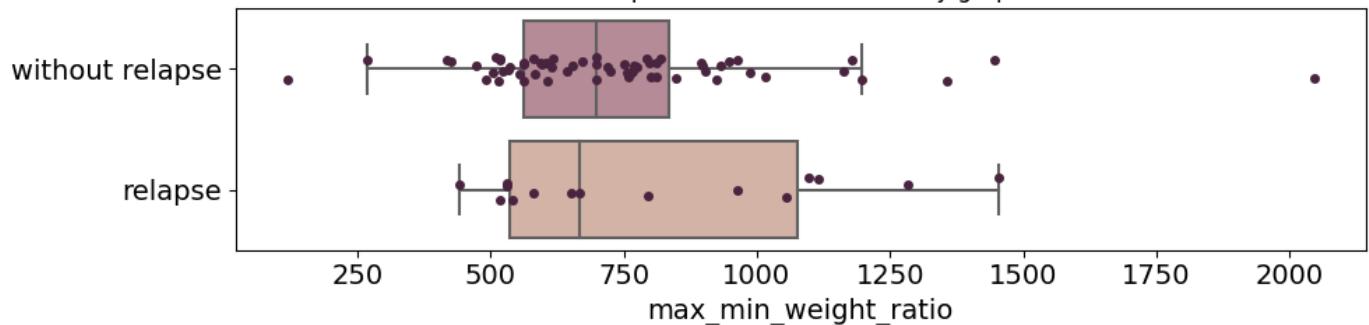
Boxplot of diameter by Relapse free survival  
PD1 positive cells and Delaunay graph



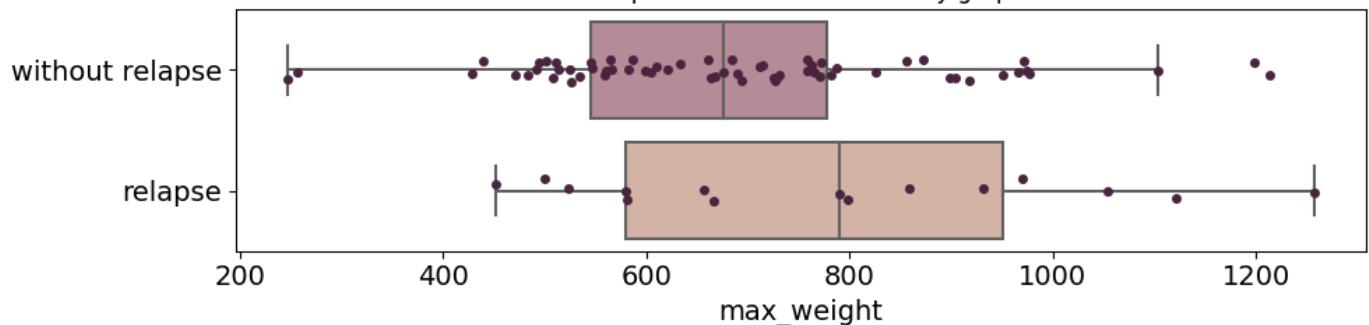
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PD1 positive cells and Delaunay graph



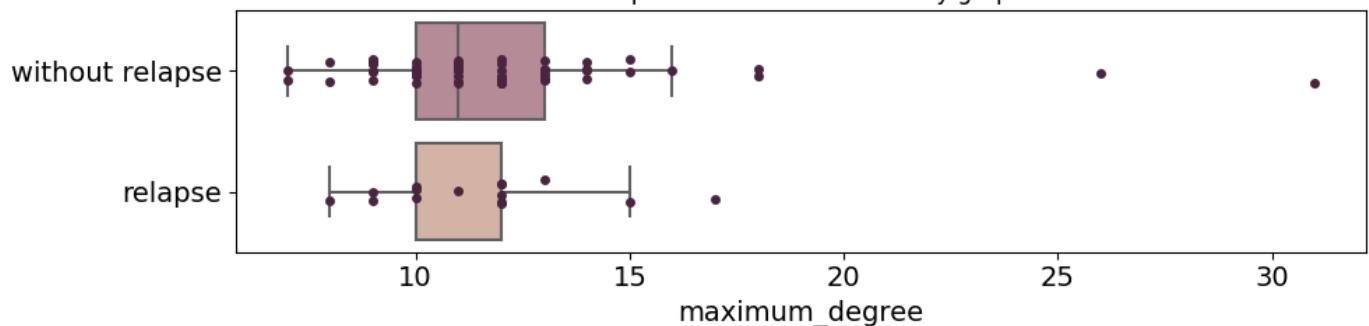
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PD1 positive cells and Delaunay graph



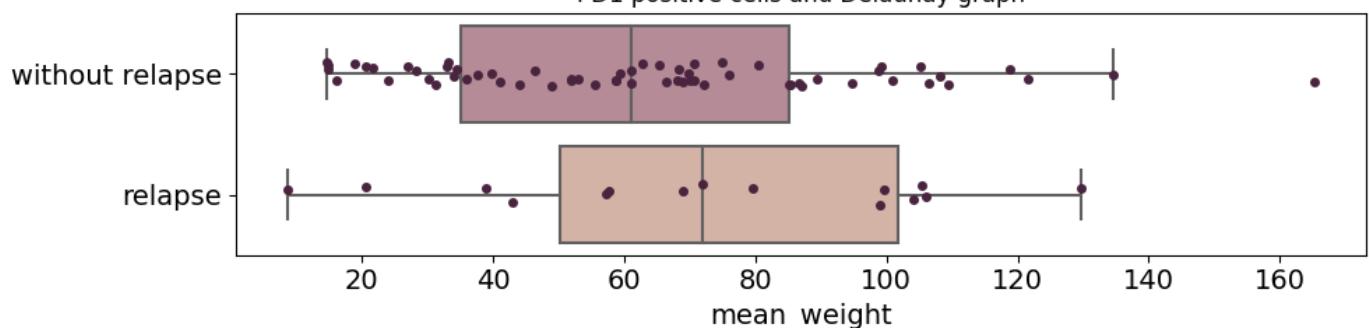
Boxplot of max\_weight by Relapse free survival  
PD1 positive cells and Delaunay graph



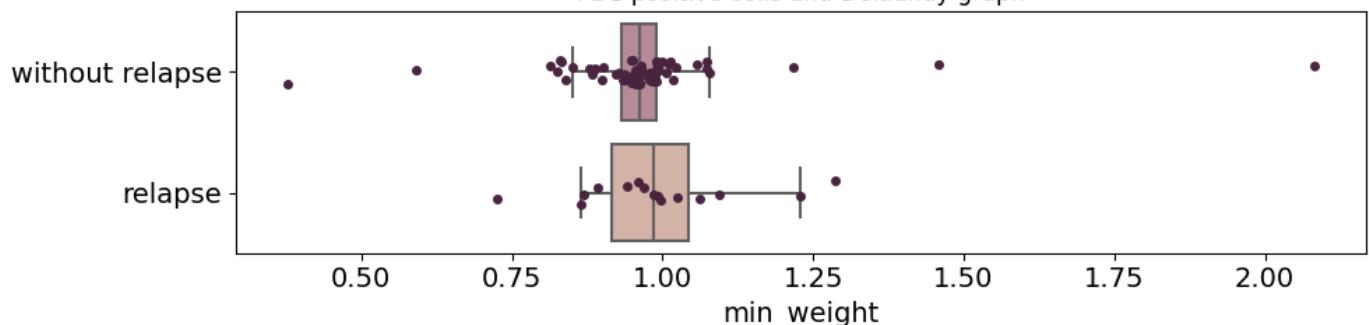
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PD1 positive cells and Delaunay graph



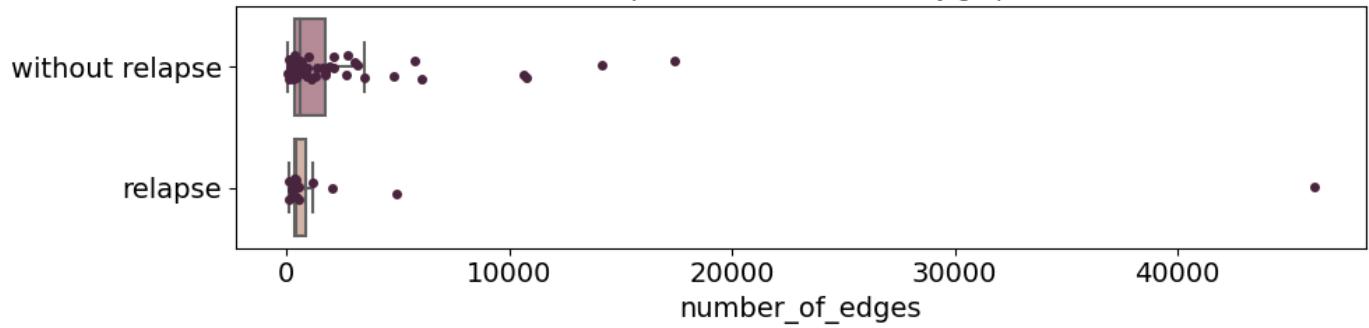
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PD1 positive cells and Delaunay graph



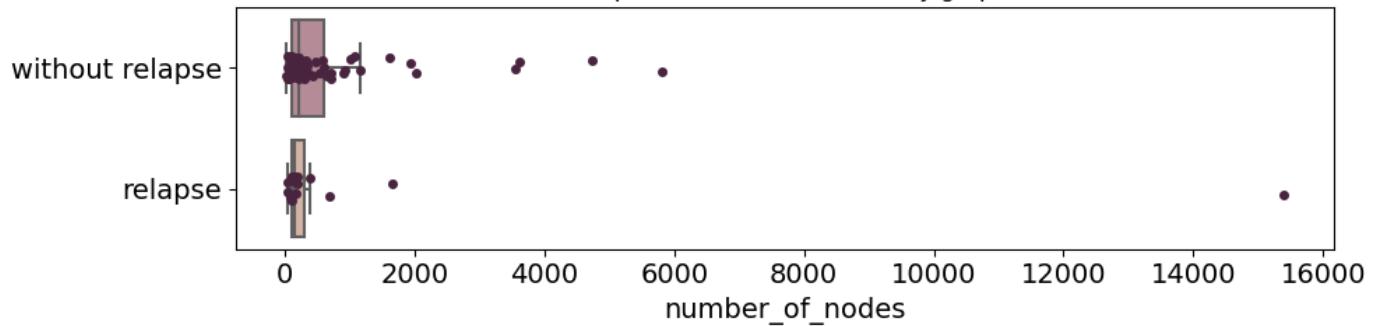
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PD1 positive cells and Delaunay graph



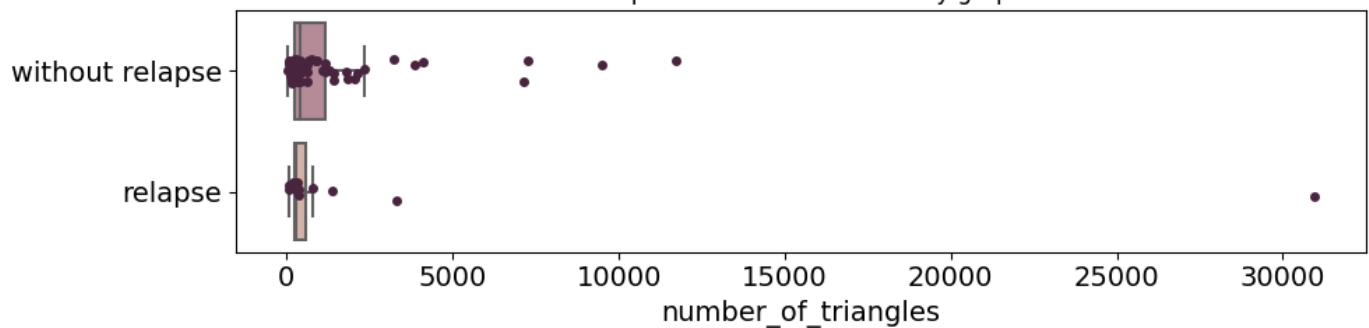
Boxplot of number\_of\_edges by Relapse free survival  
PD1 positive cells and Delaunay graph



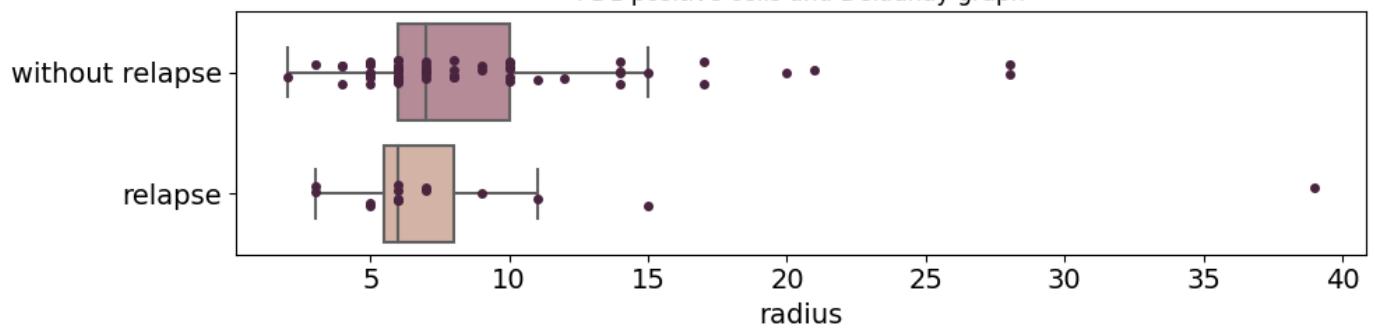
Boxplot of number\_of\_nodes by Relapse free survival  
PD1 positive cells and Delaunay graph



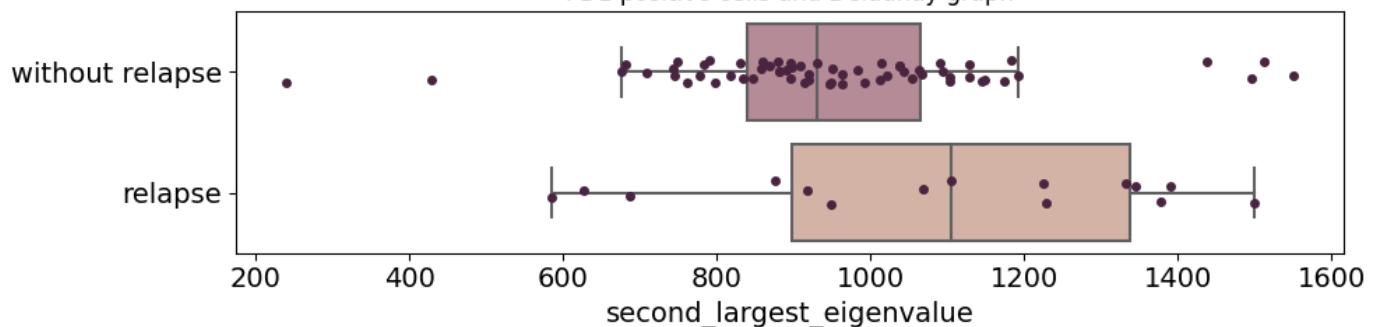
Boxplot of number\_of\_triangles by Relapse free survival  
PD1 positive cells and Delaunay graph

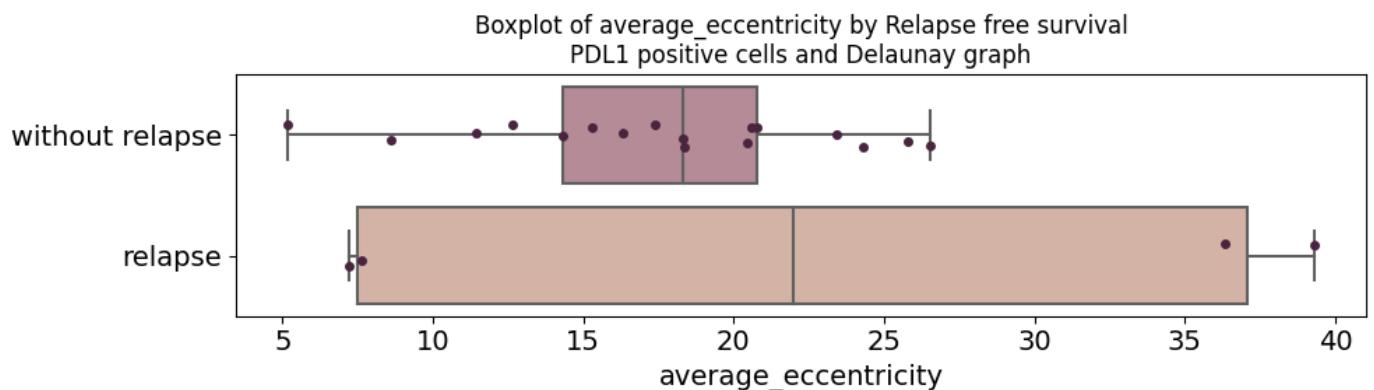
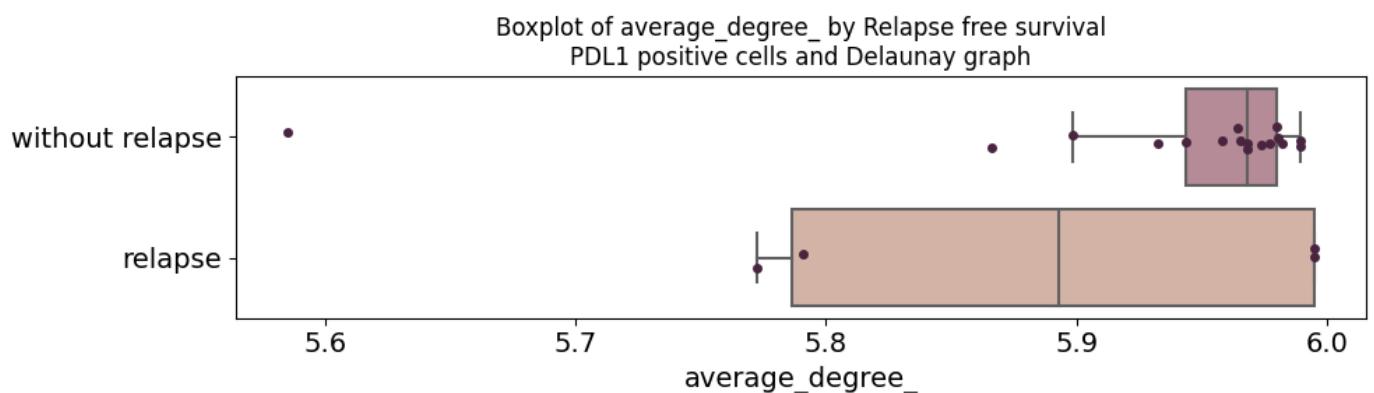
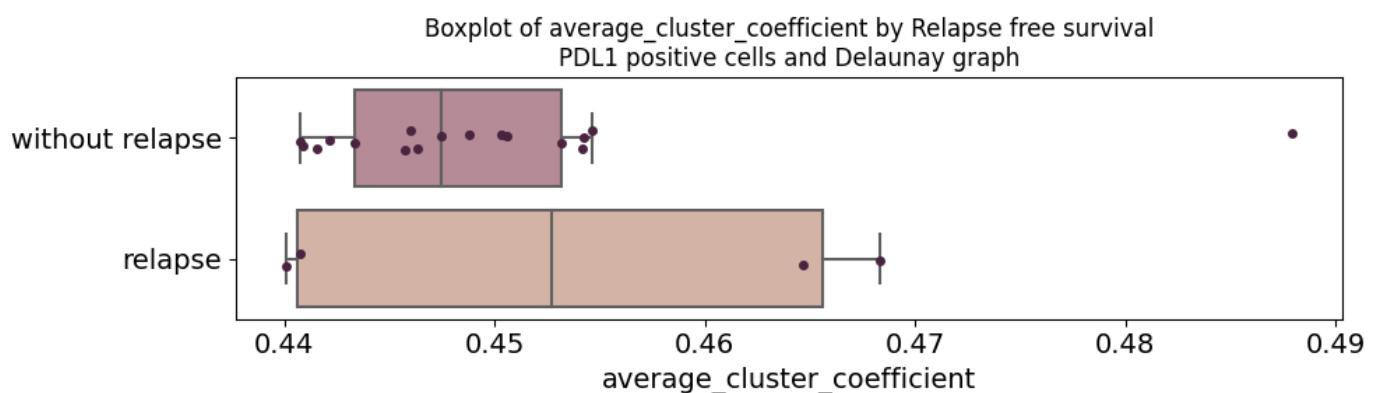
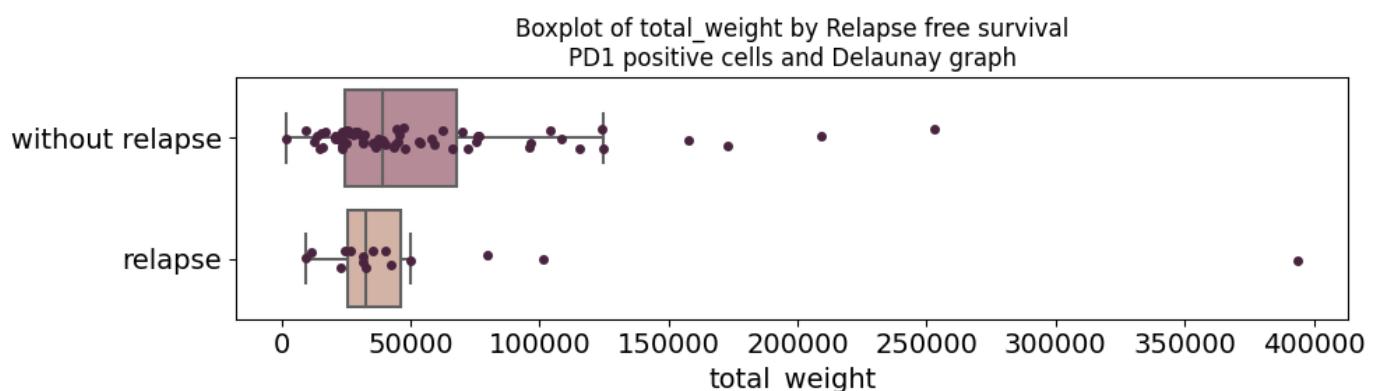
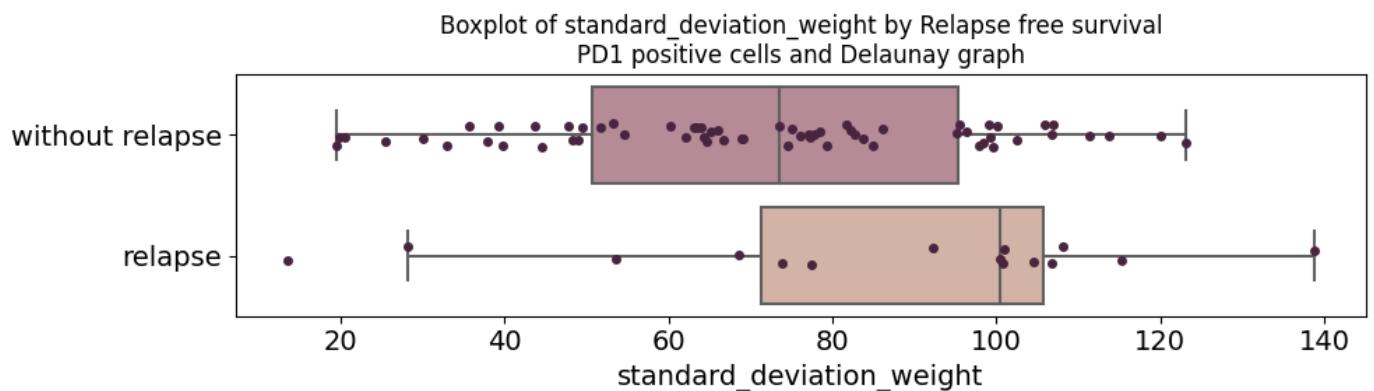


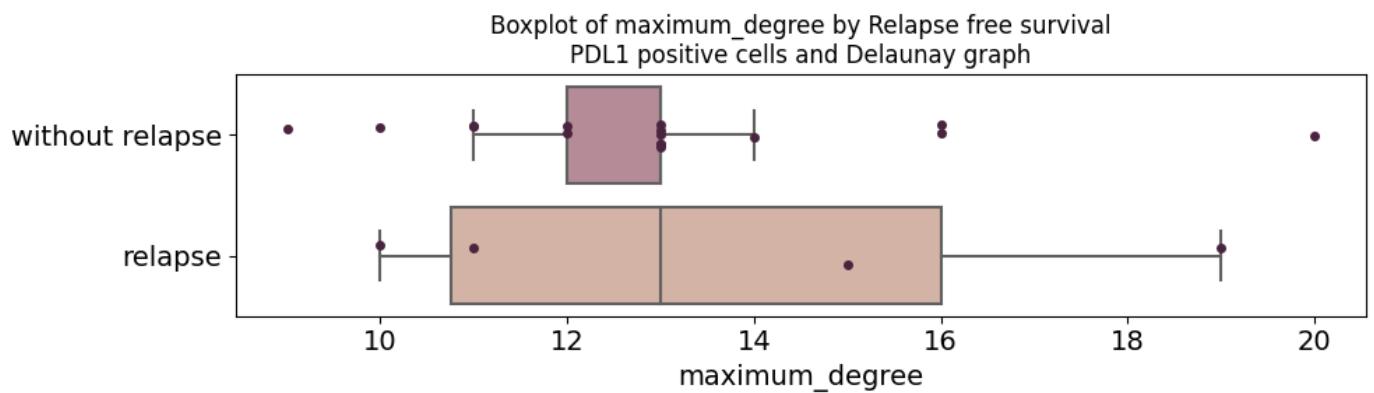
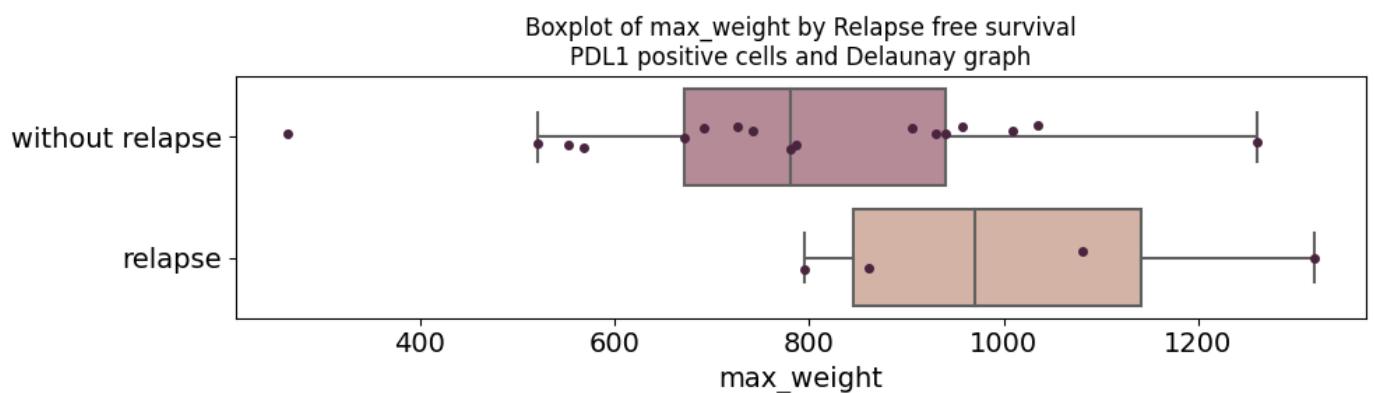
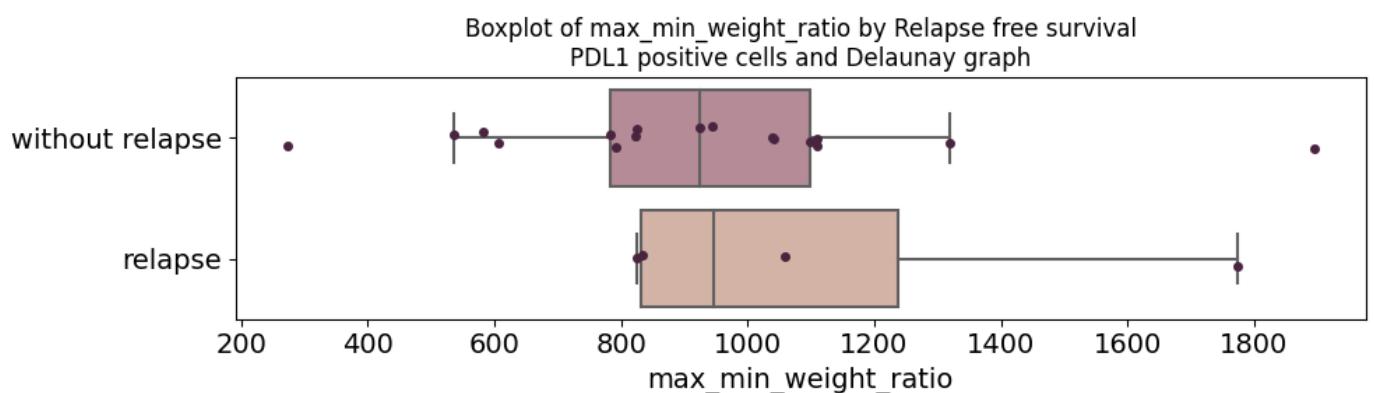
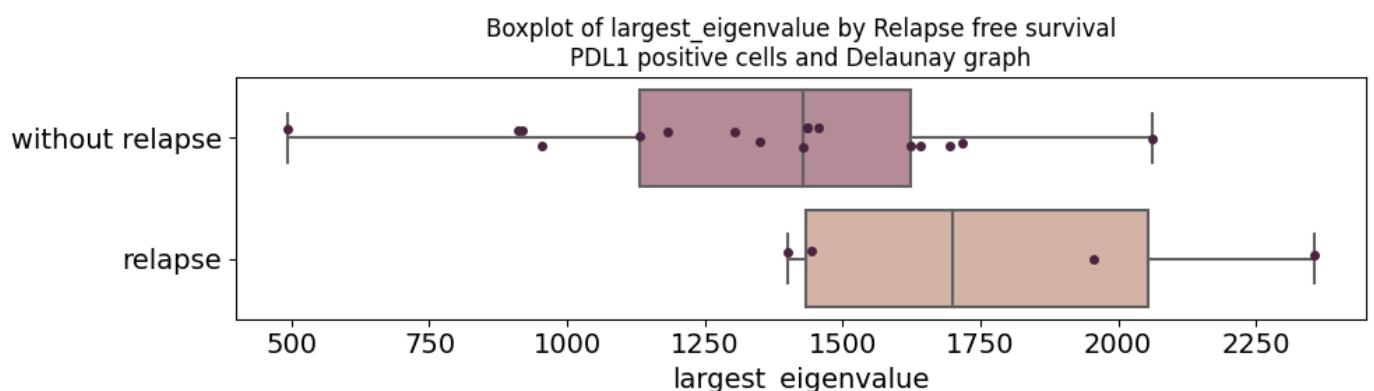
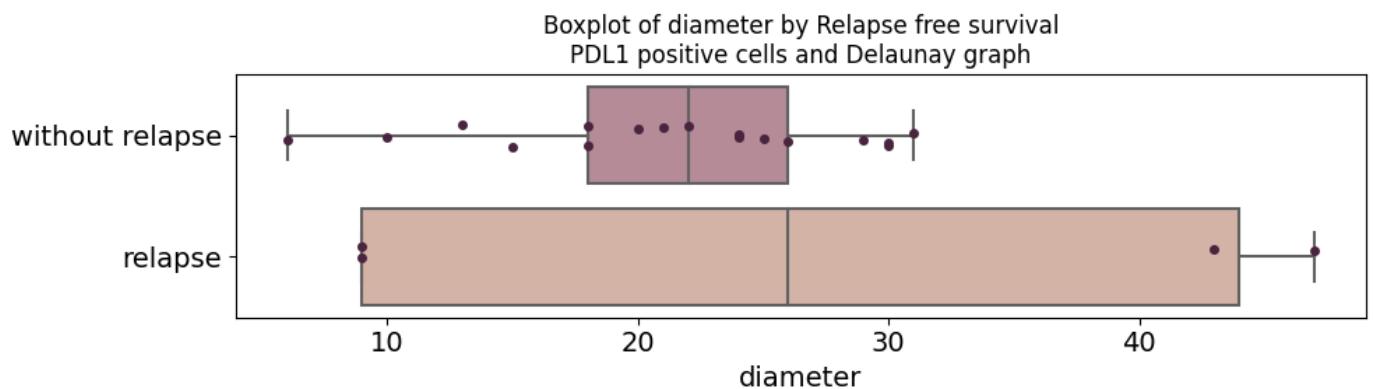
Boxplot of radius by Relapse free survival  
PD1 positive cells and Delaunay graph

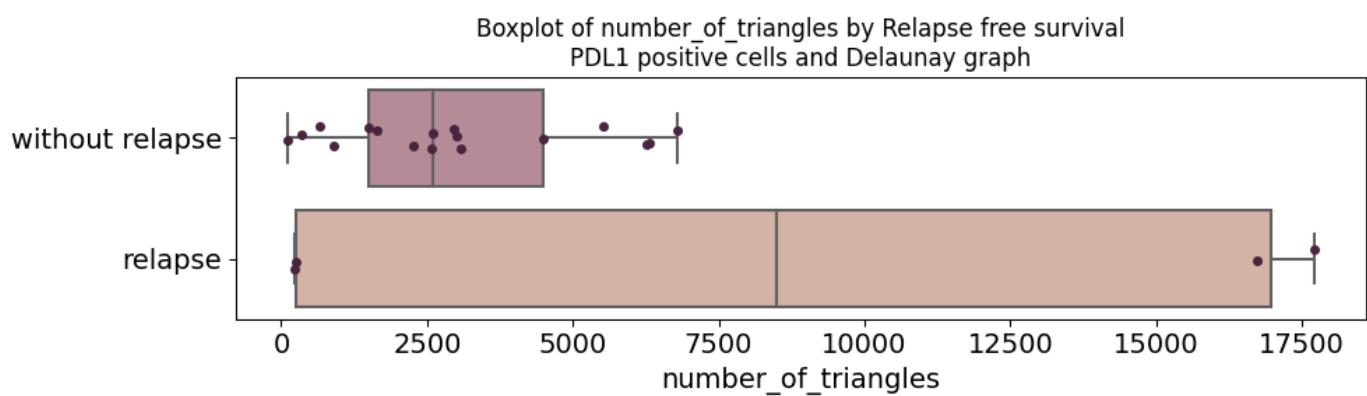
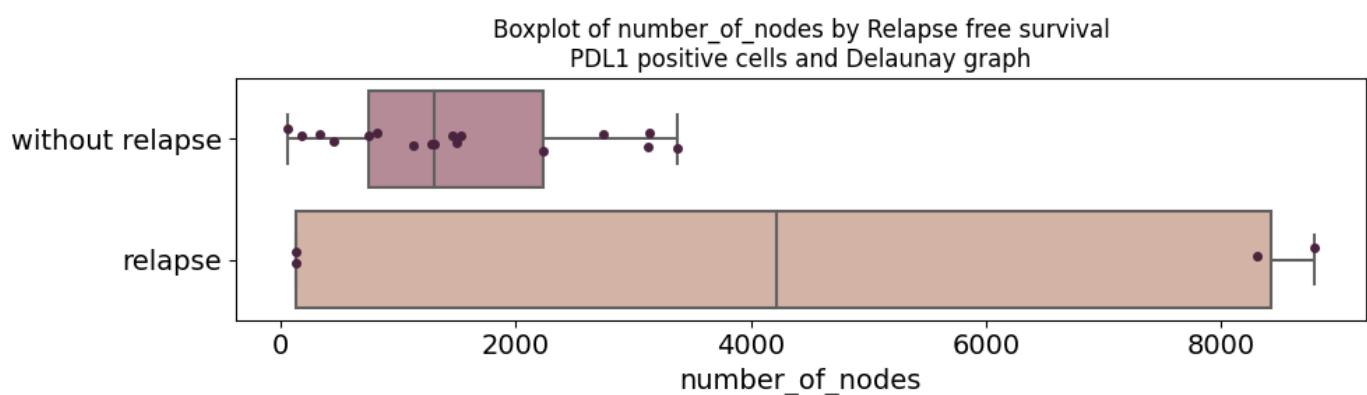
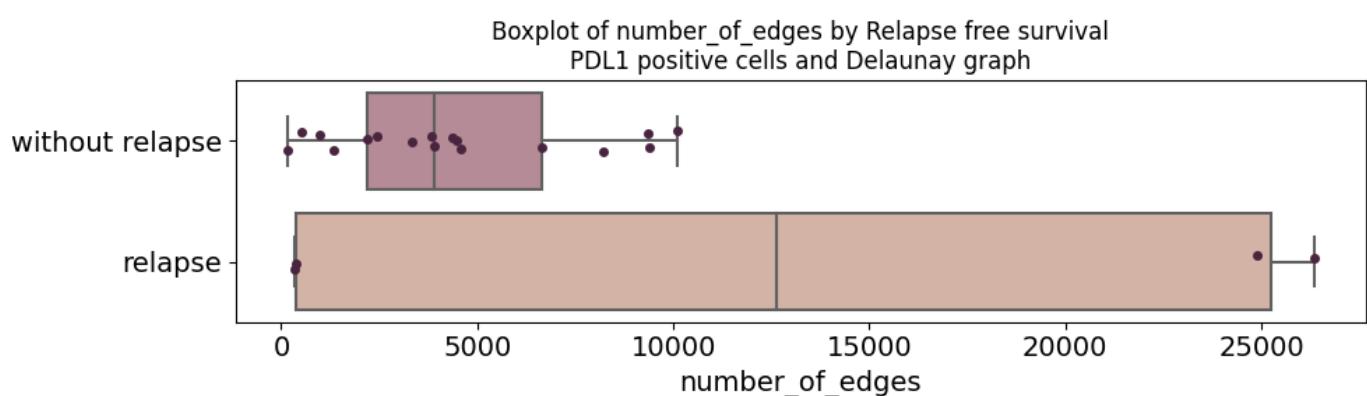
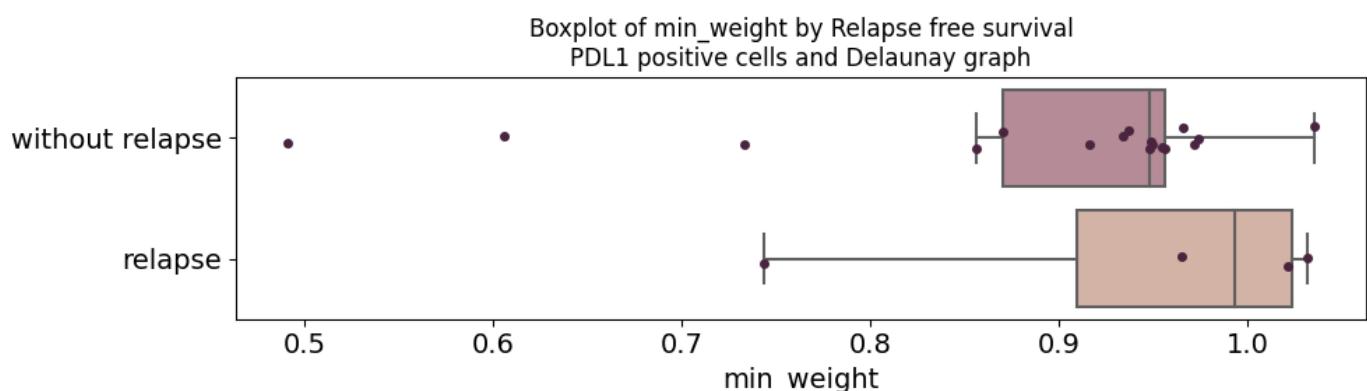
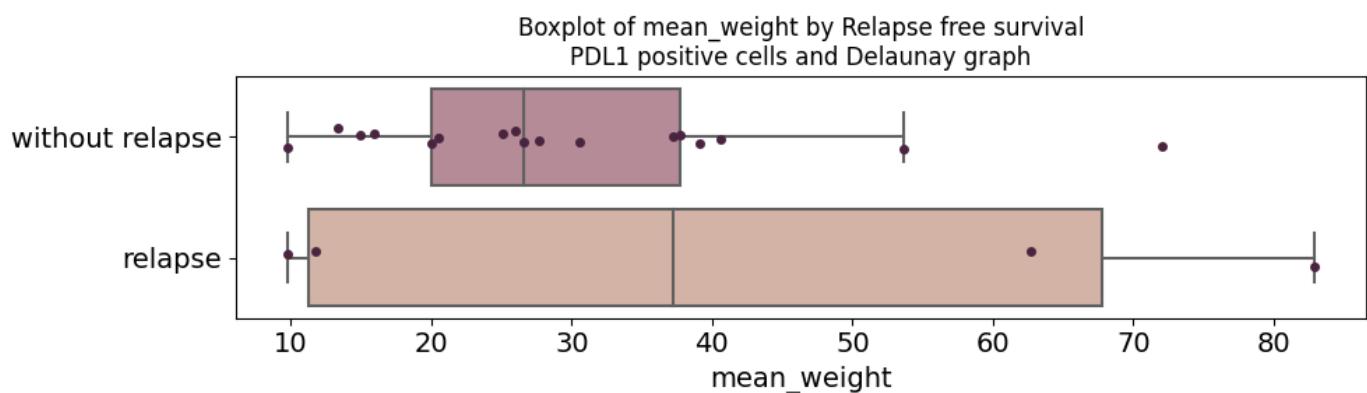


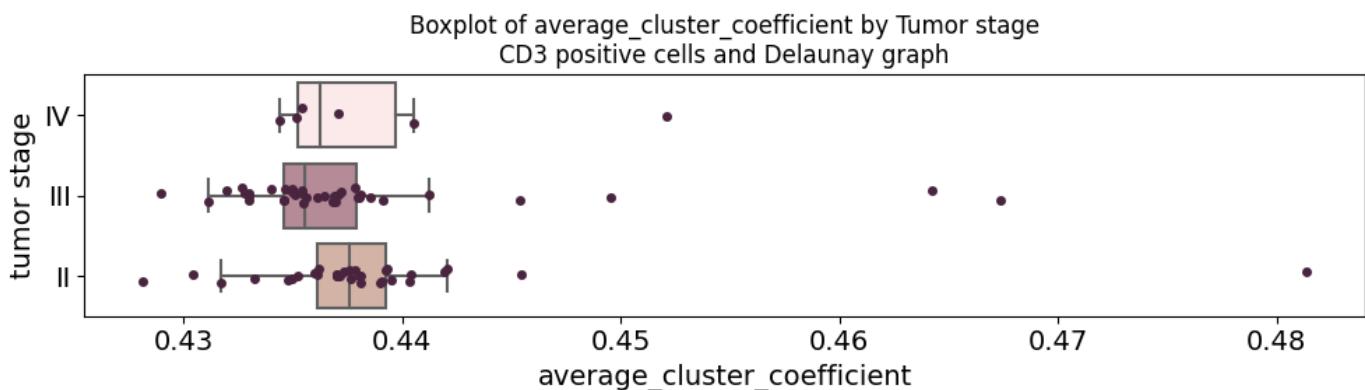
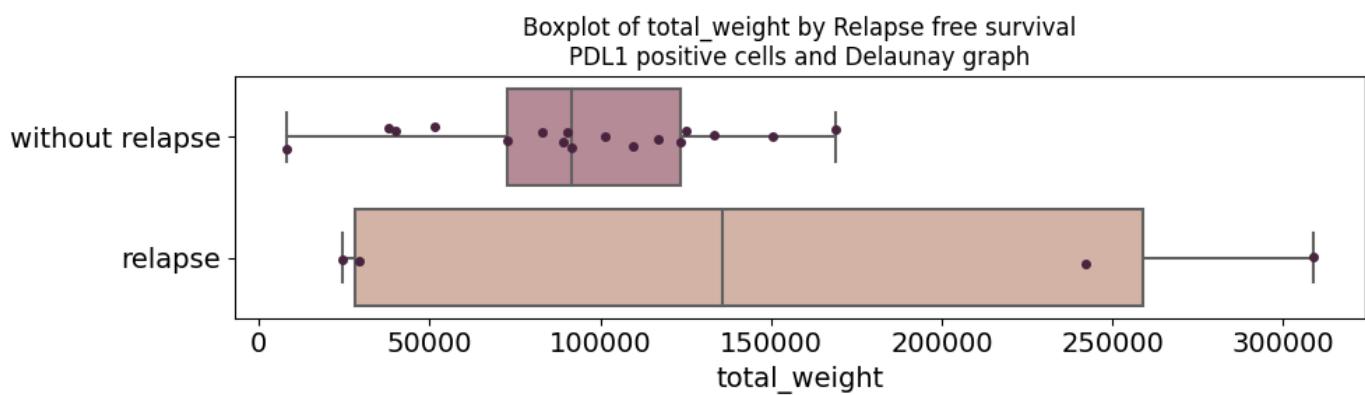
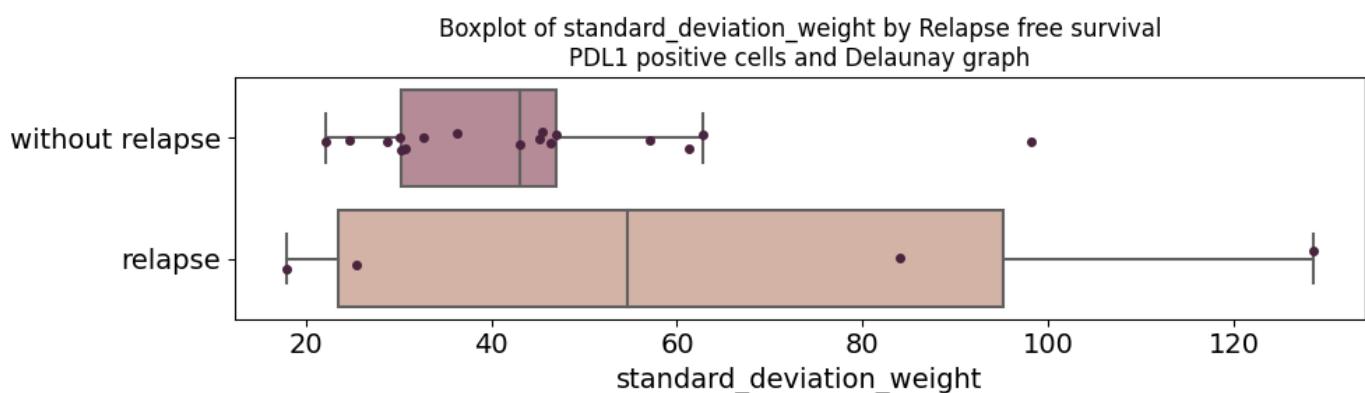
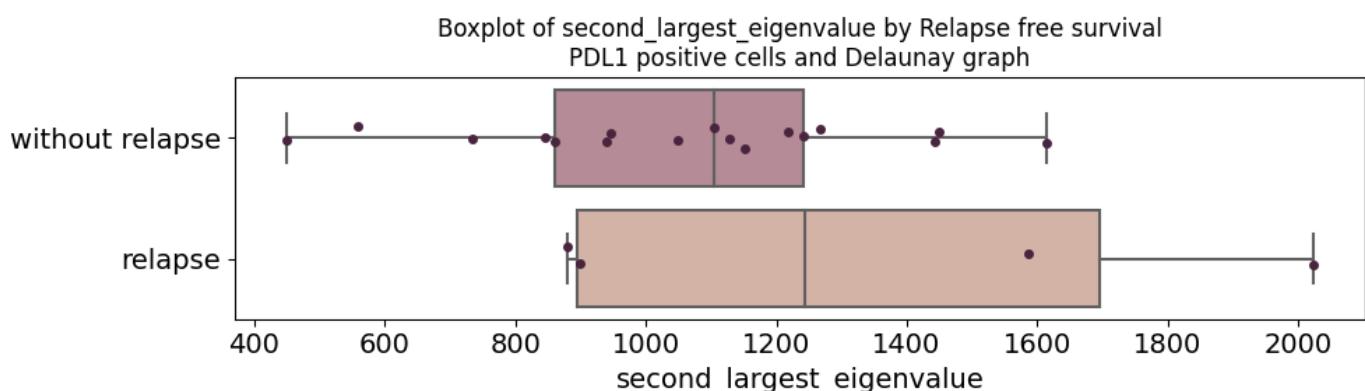
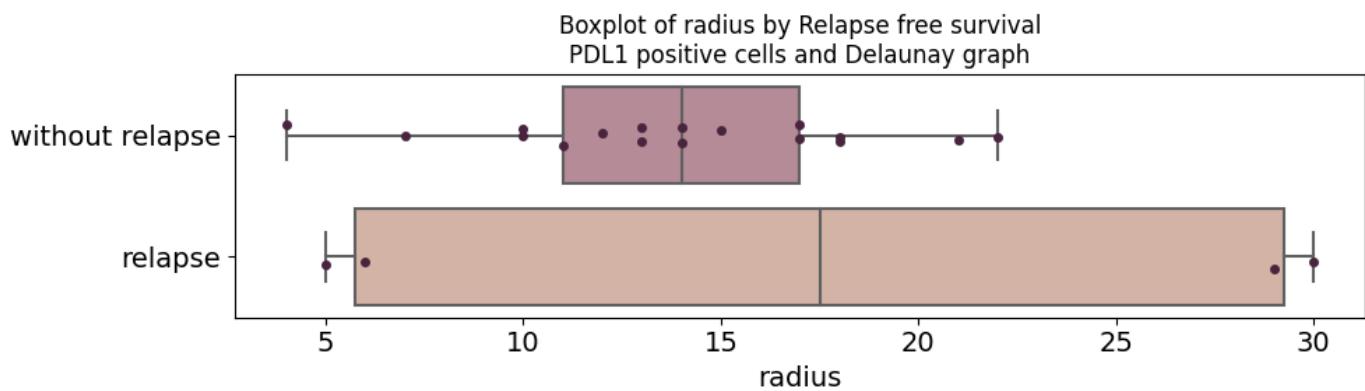
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
PD1 positive cells and Delaunay graph



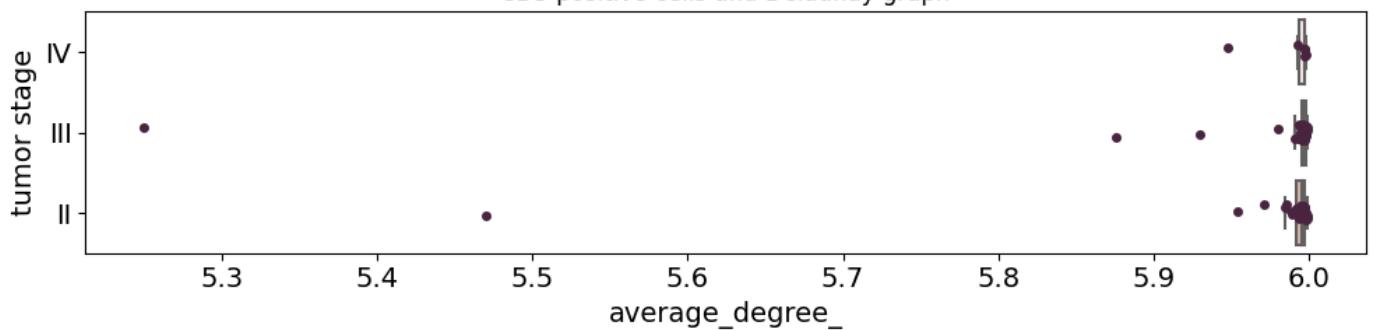




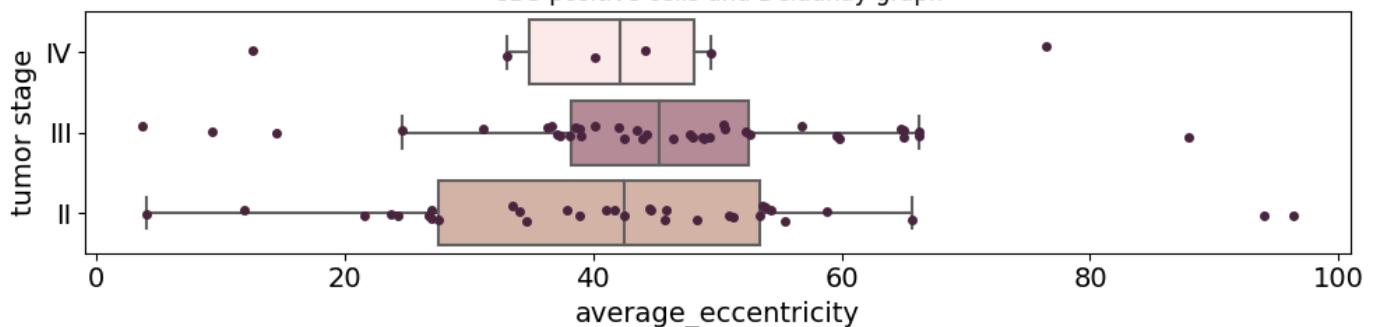




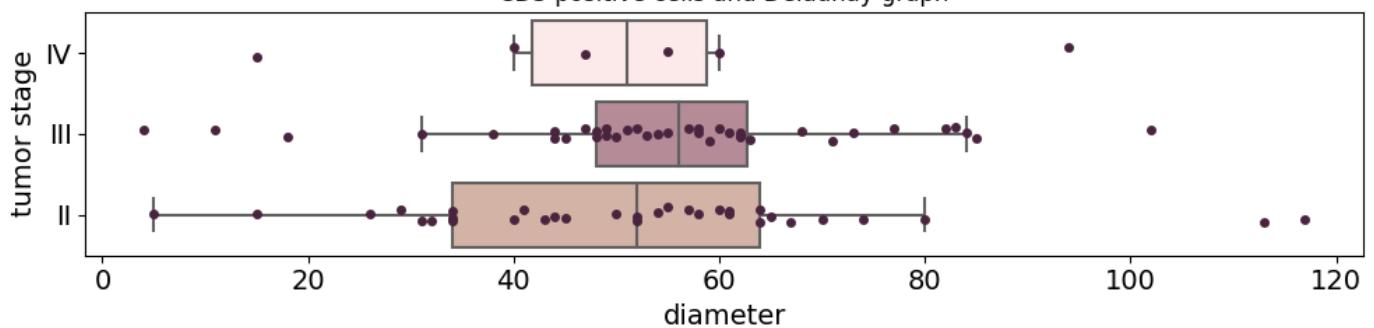
Boxplot of average\_degree\_ by Tumor stage  
CD3 positive cells and Delaunay graph



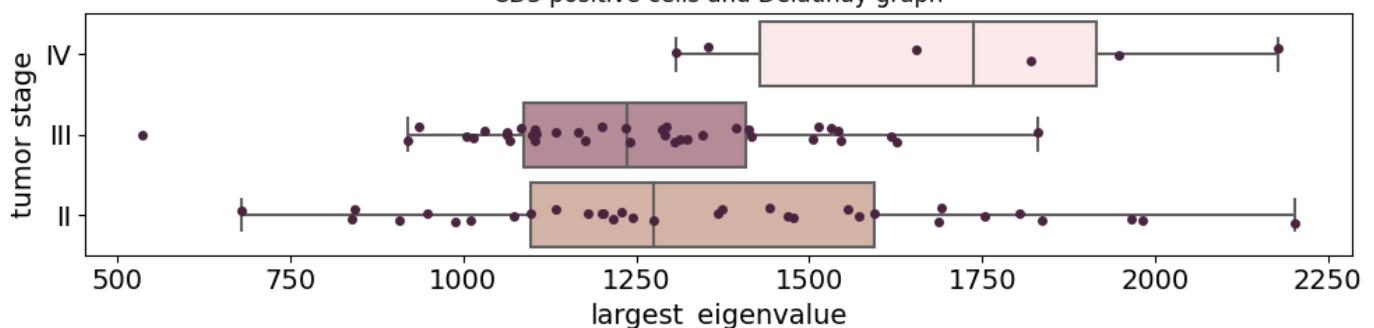
Boxplot of average\_eccentricity by Tumor stage  
CD3 positive cells and Delaunay graph



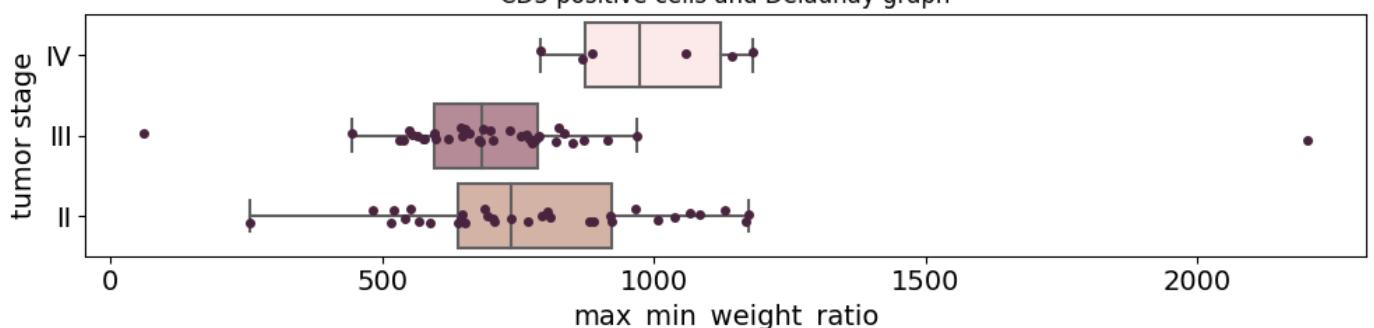
Boxplot of diameter by Tumor stage  
CD3 positive cells and Delaunay graph

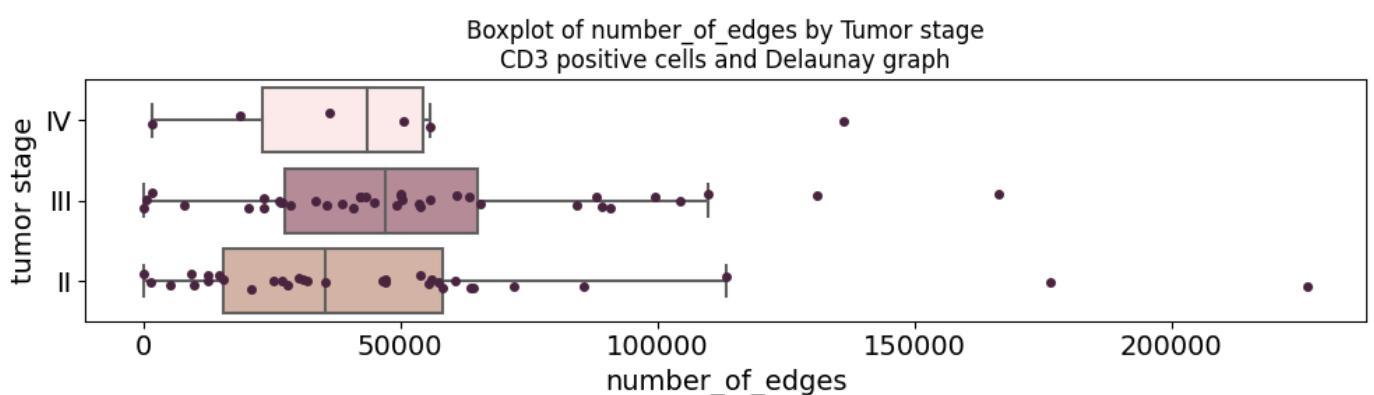
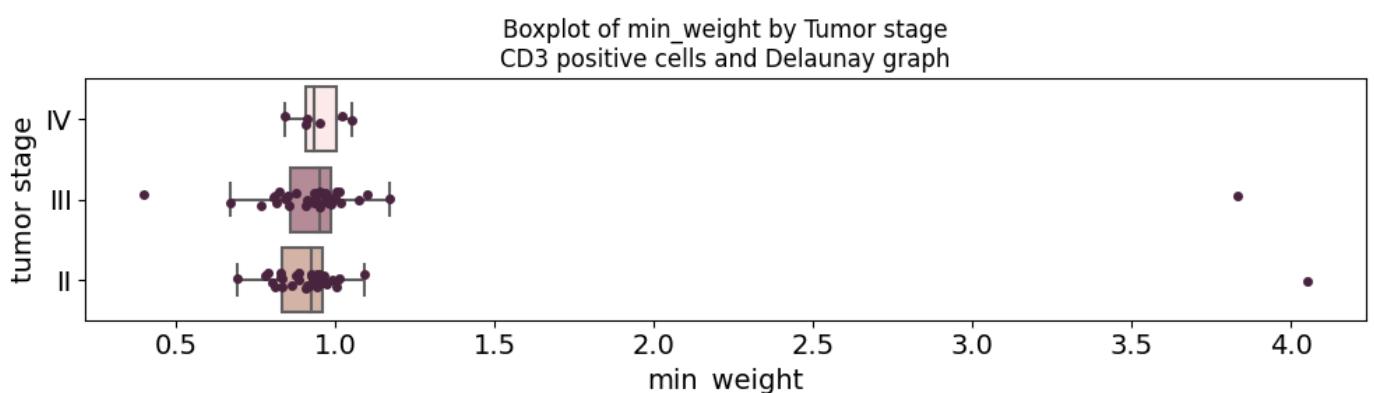
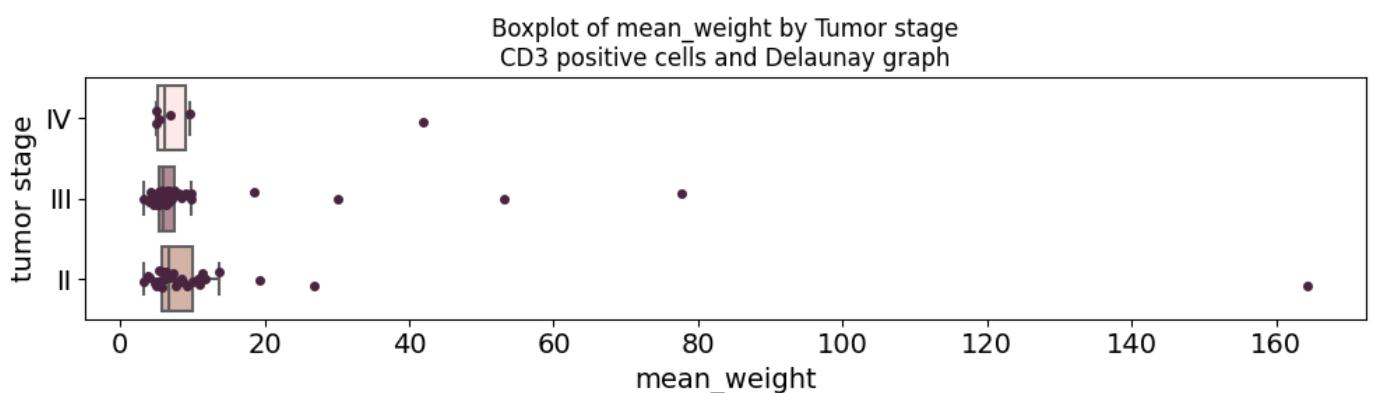
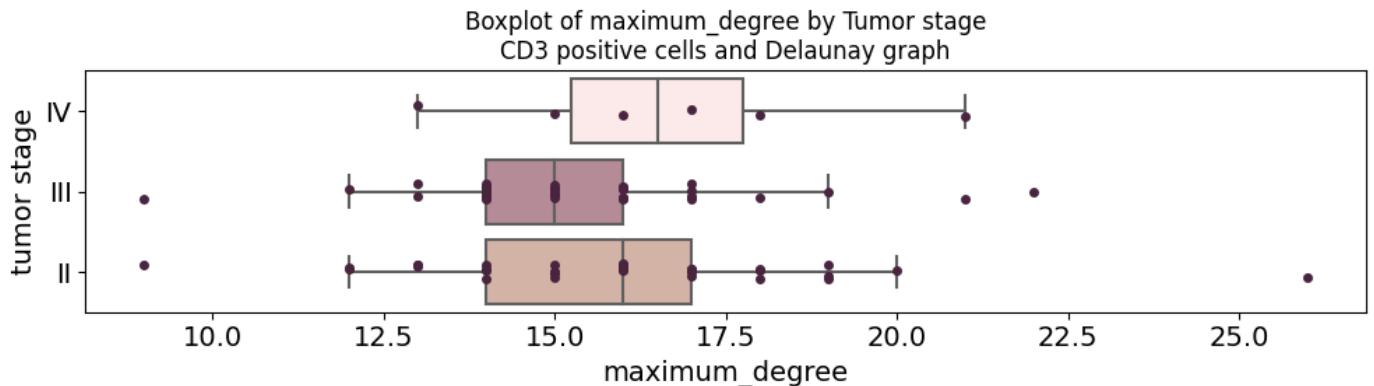
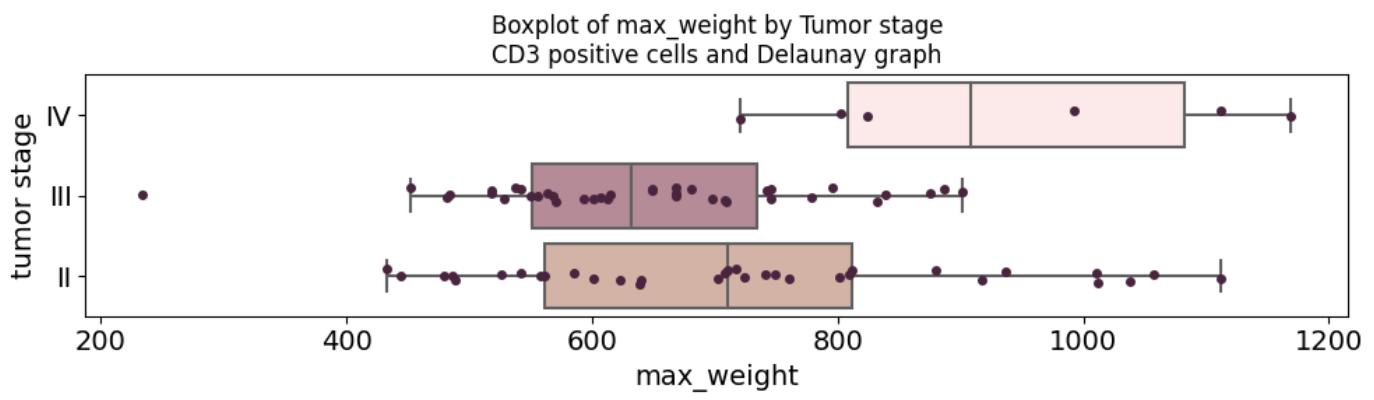


Boxplot of largest\_eigenvalue by Tumor stage  
CD3 positive cells and Delaunay graph

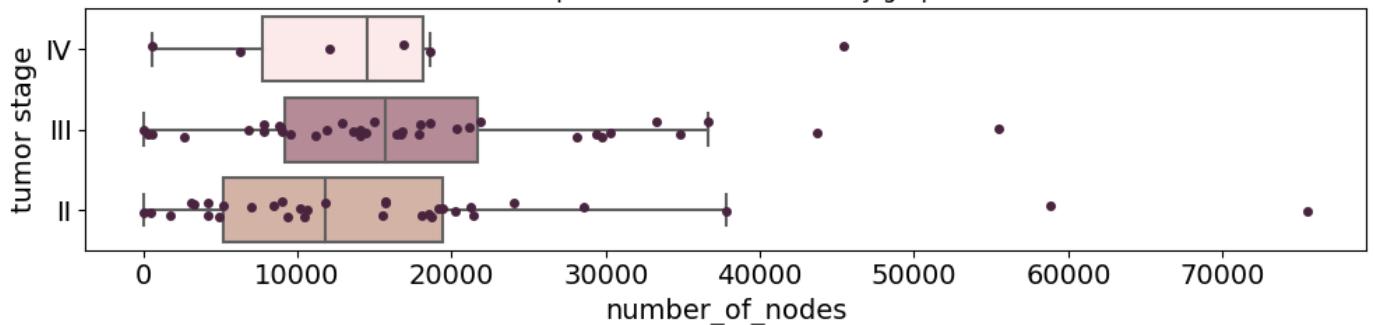


Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD3 positive cells and Delaunay graph

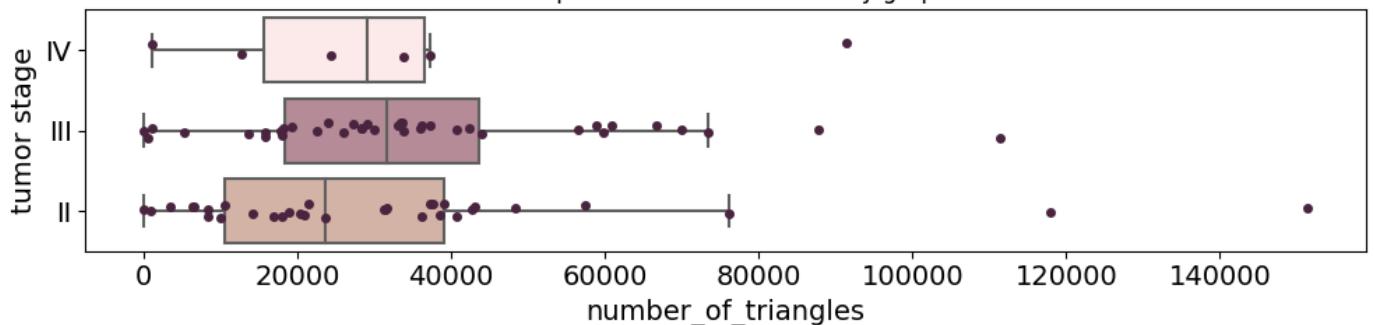




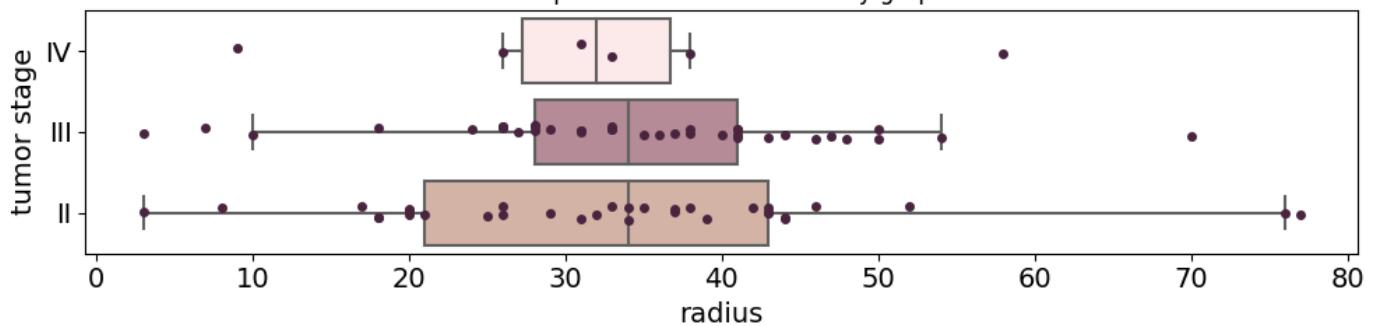
Boxplot of number\_of\_nodes by Tumor stage  
CD3 positive cells and Delaunay graph



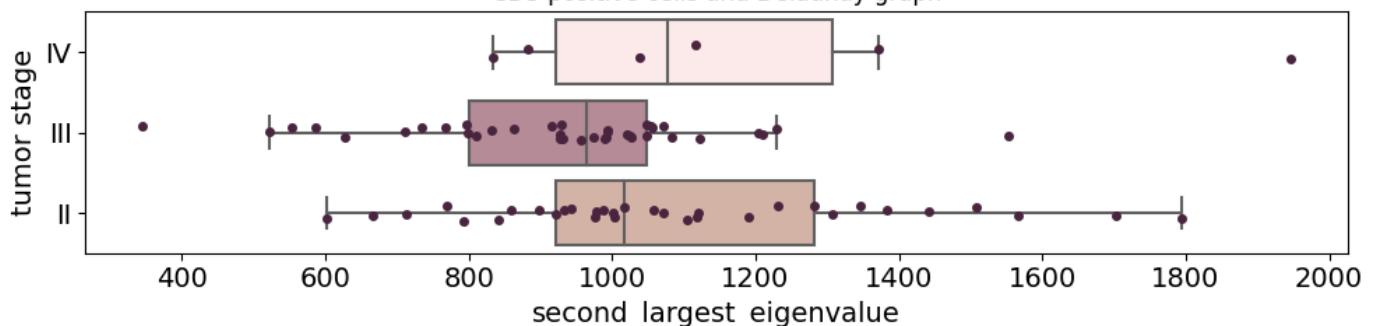
Boxplot of number\_of\_triangles by Tumor stage  
CD3 positive cells and Delaunay graph



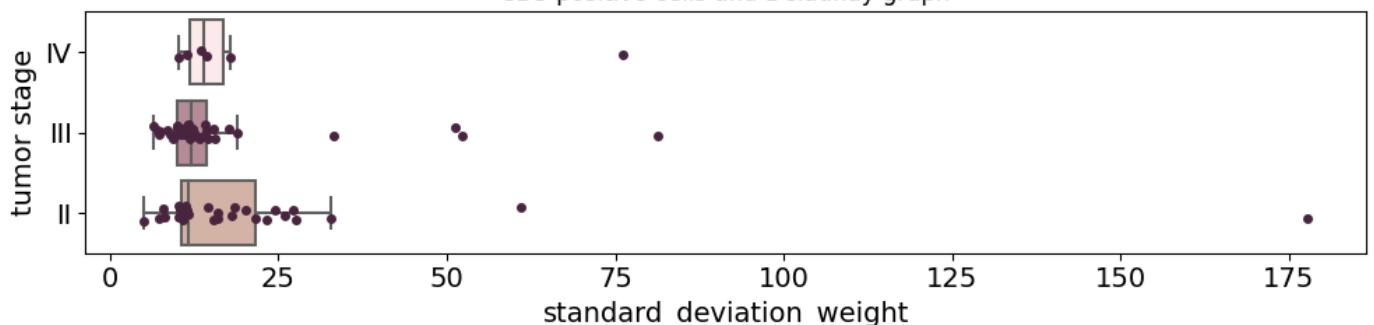
Boxplot of radius by Tumor stage  
CD3 positive cells and Delaunay graph



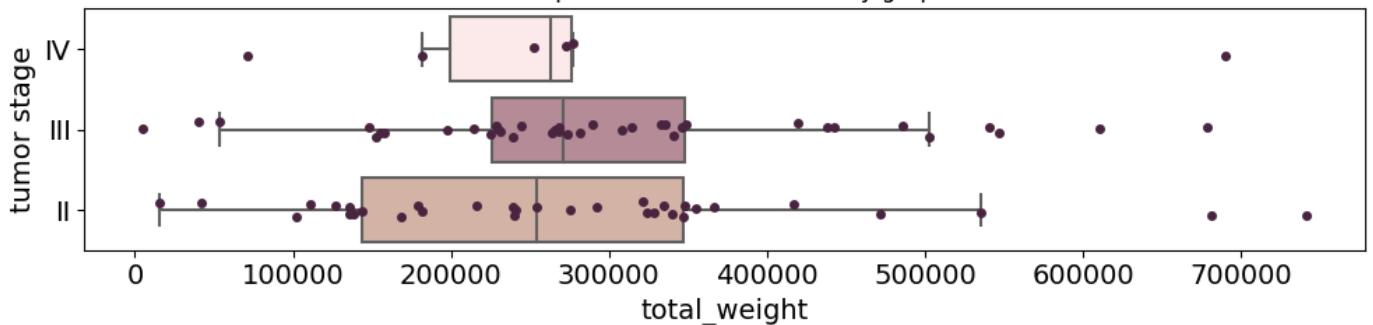
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD3 positive cells and Delaunay graph



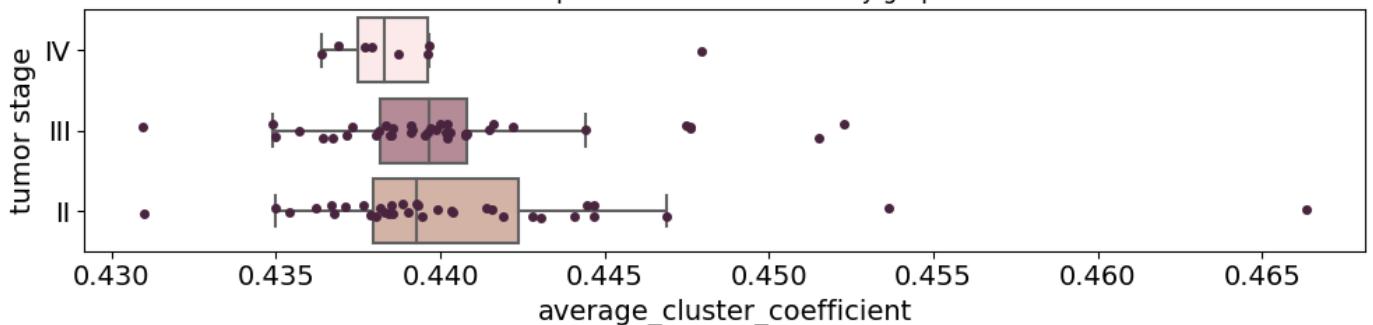
Boxplot of standard\_deviation\_weight by Tumor stage  
CD3 positive cells and Delaunay graph



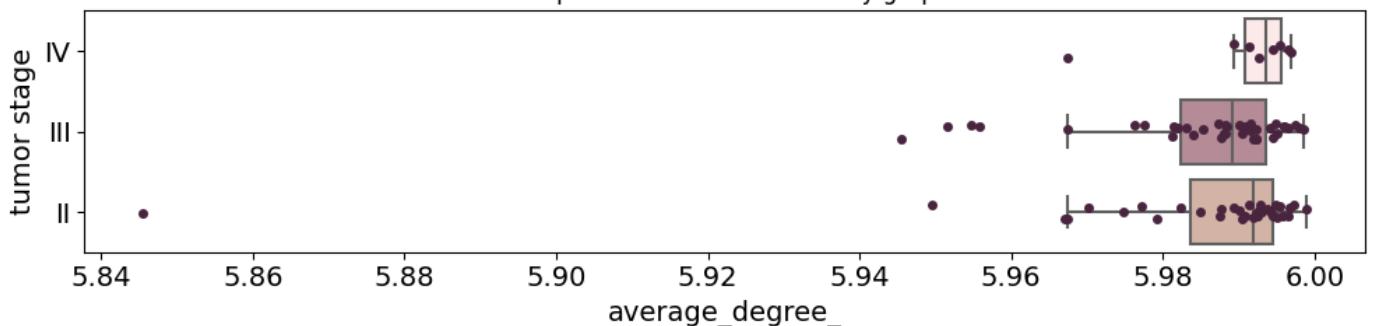
Boxplot of total\_weight by Tumor stage  
CD3 positive cells and Delaunay graph



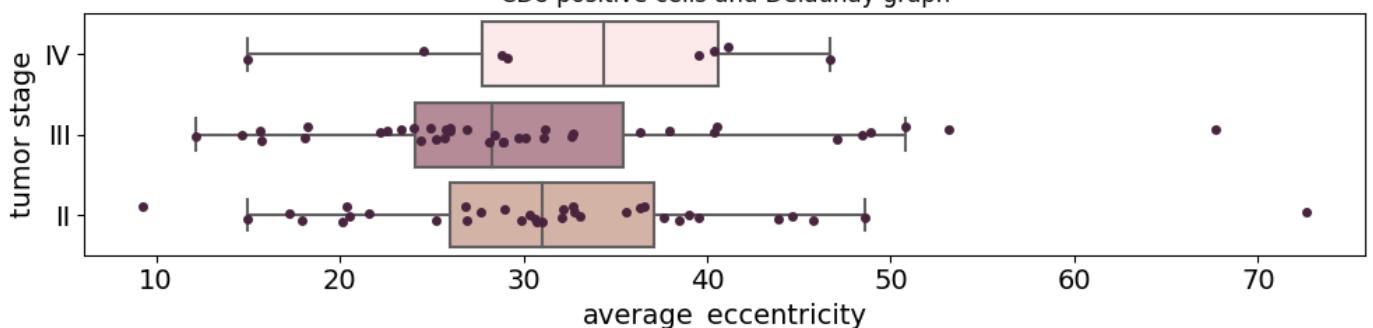
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD8 positive cells and Delaunay graph



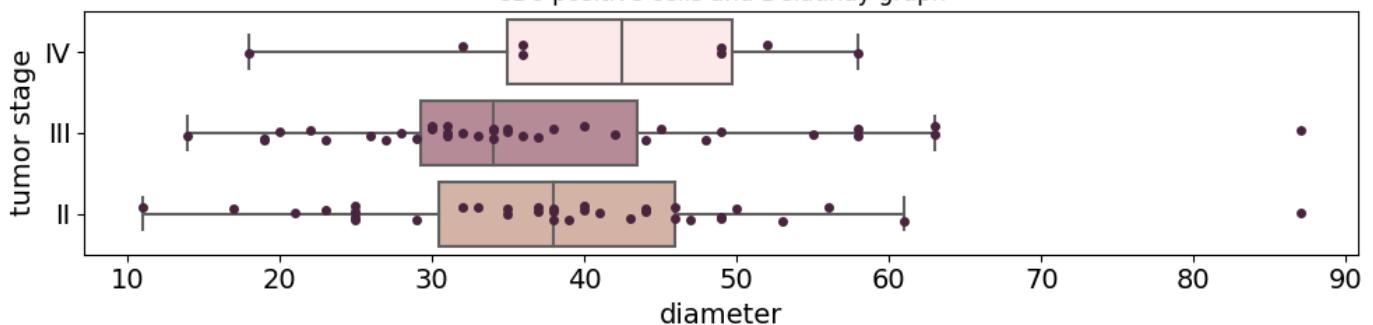
Boxplot of average\_degree\_ by Tumor stage  
CD8 positive cells and Delaunay graph



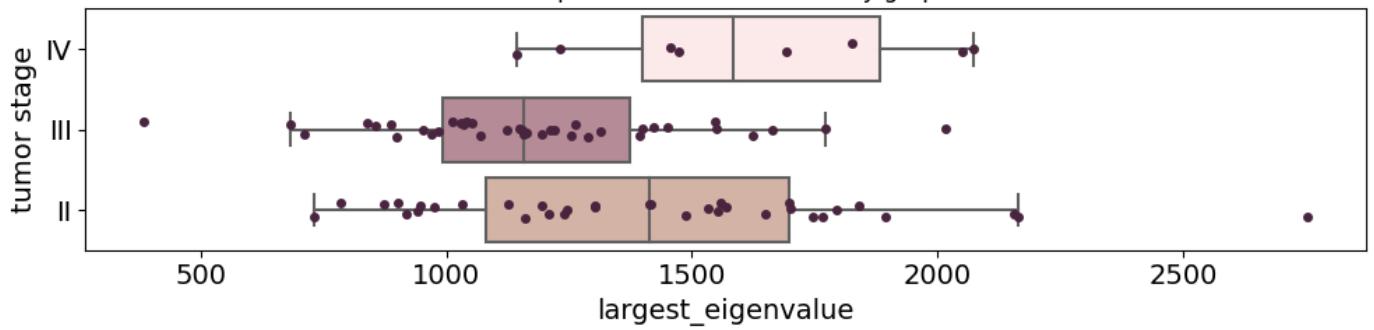
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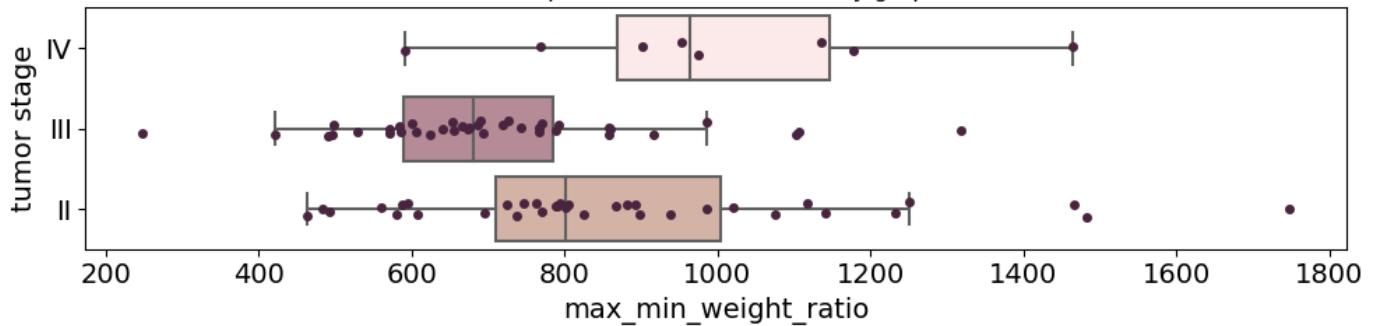
Boxplot of diameter by Tumor stage  
CD8 positive cells and Delaunay graph



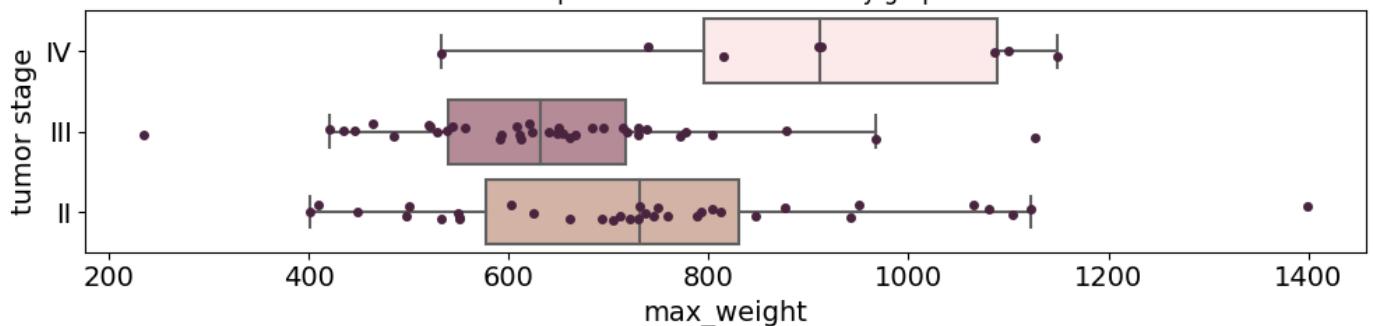
Boxplot of largest\_eigenvalue by Tumor stage  
CD8 positive cells and Delaunay graph



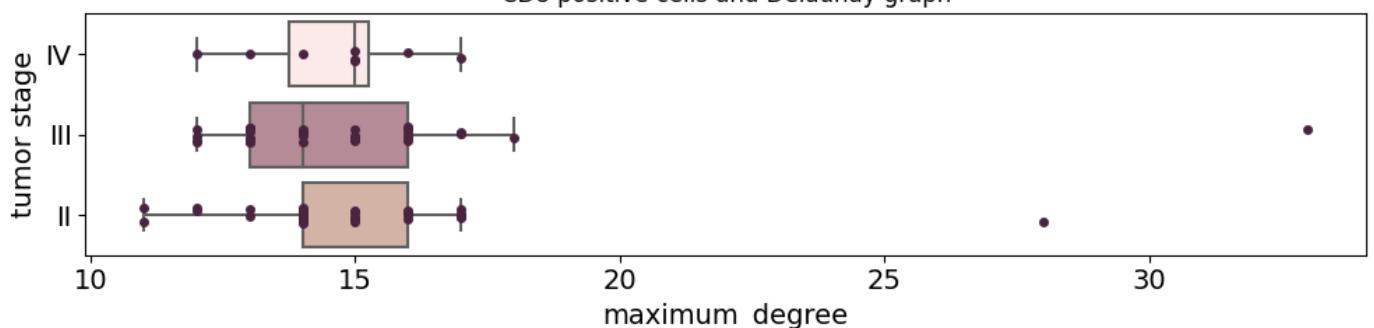
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD8 positive cells and Delaunay graph



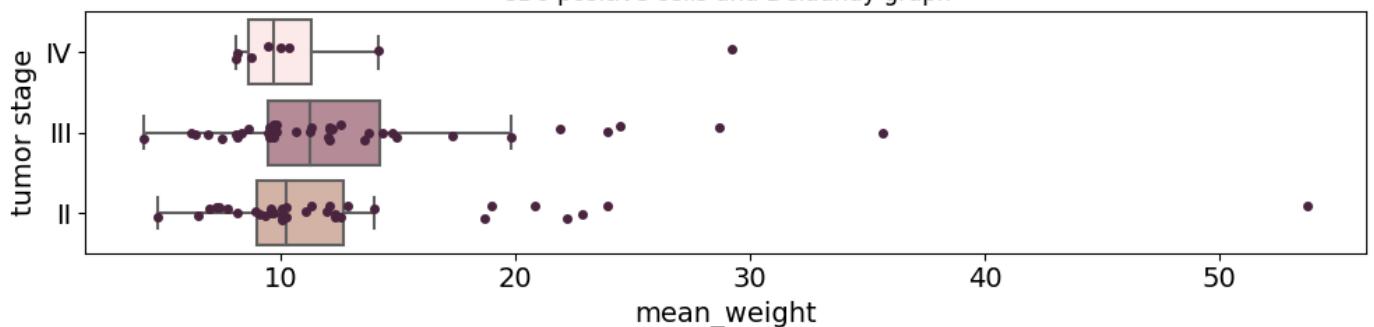
Boxplot of max\_weight by Tumor stage  
CD8 positive cells and Delaunay graph

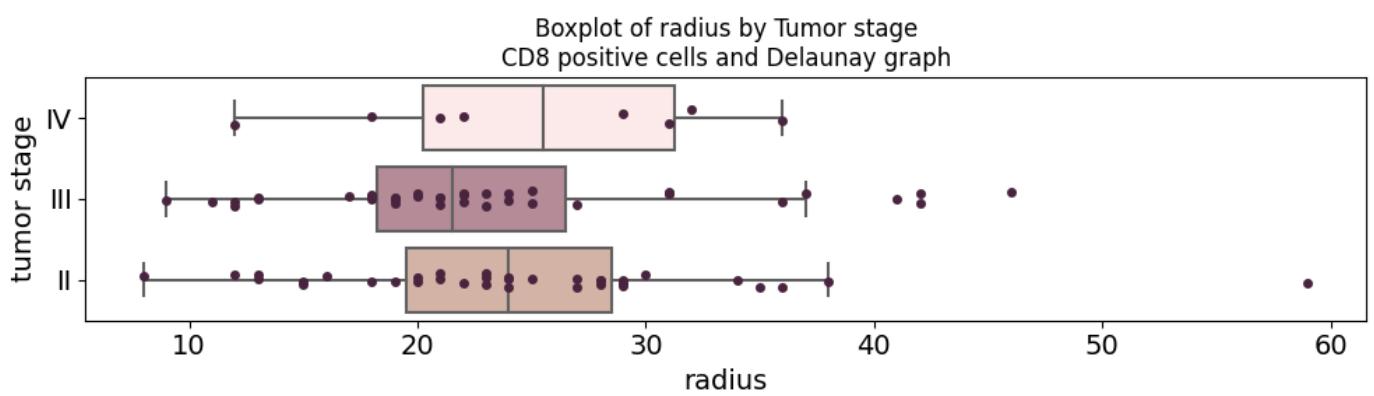
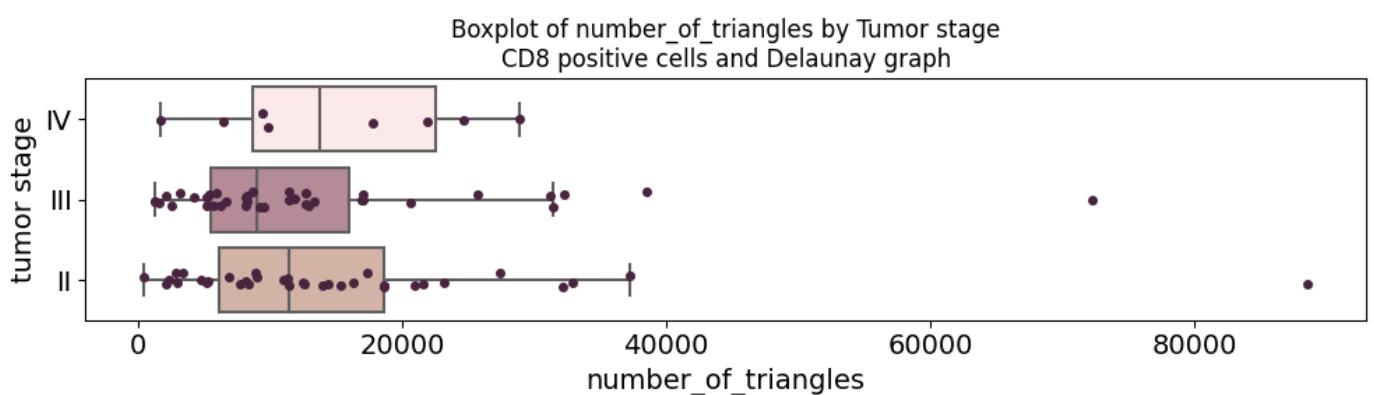
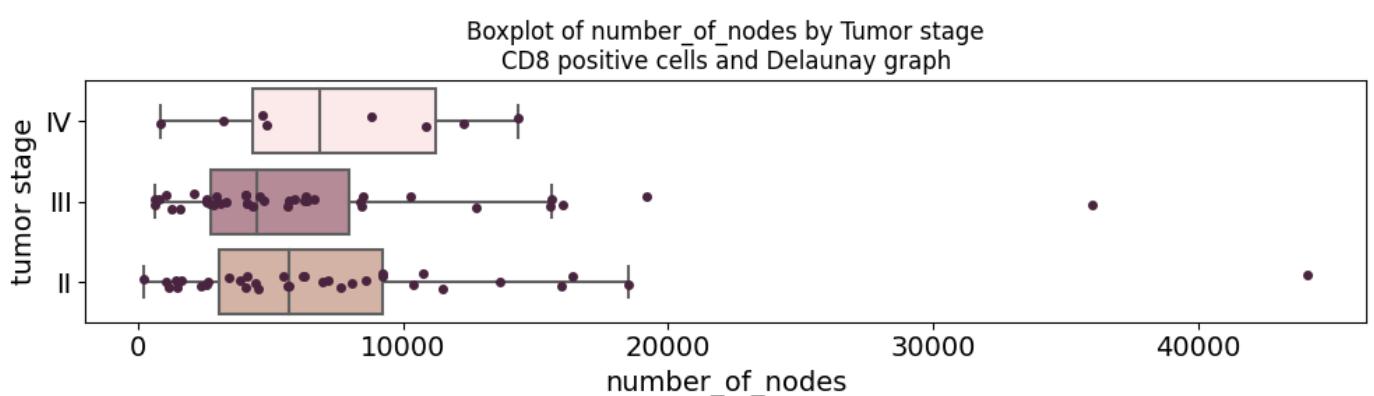
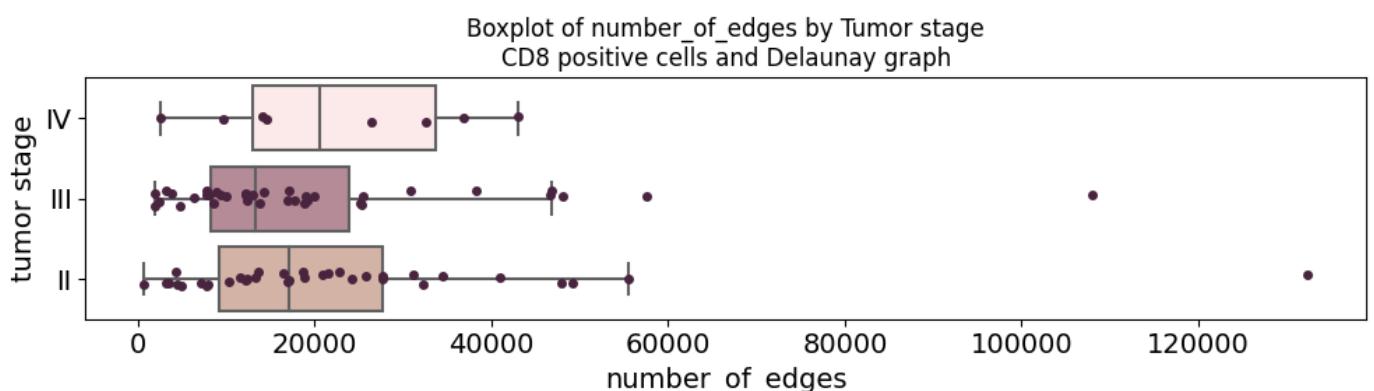
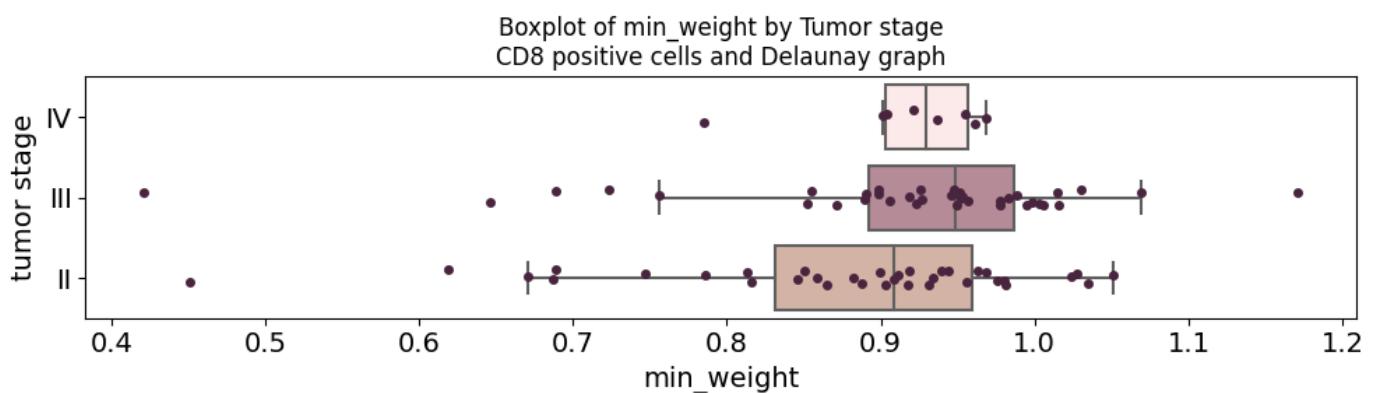


Boxplot of maximum\_degree by Tumor stage  
CD8 positive cells and Delaunay graph

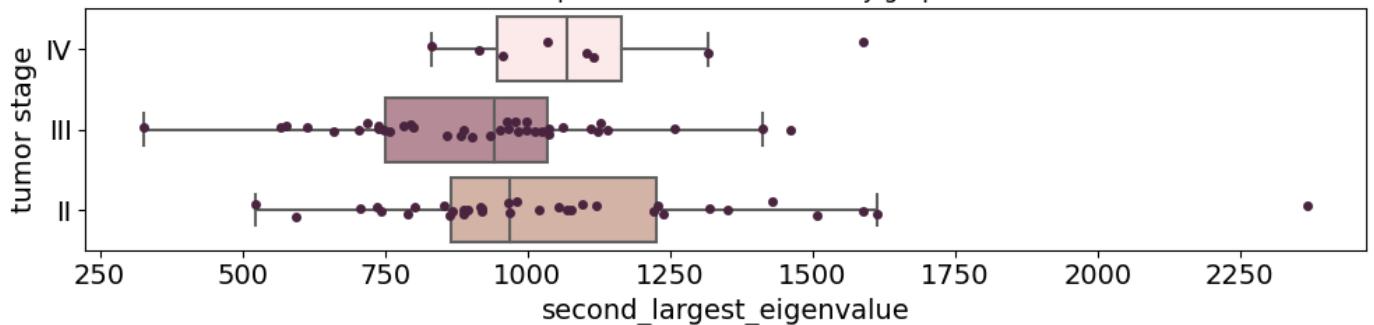


Boxplot of mean\_weight by Tumor stage  
CD8 positive cells and Delaunay graph

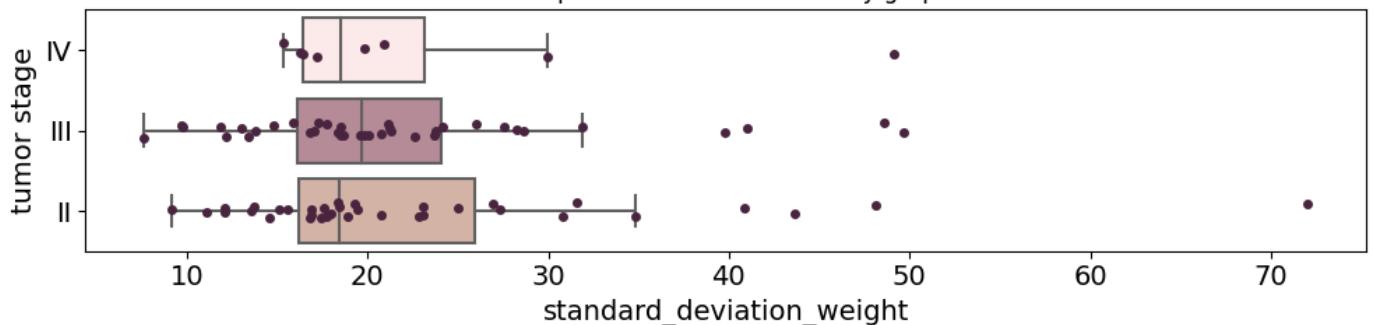




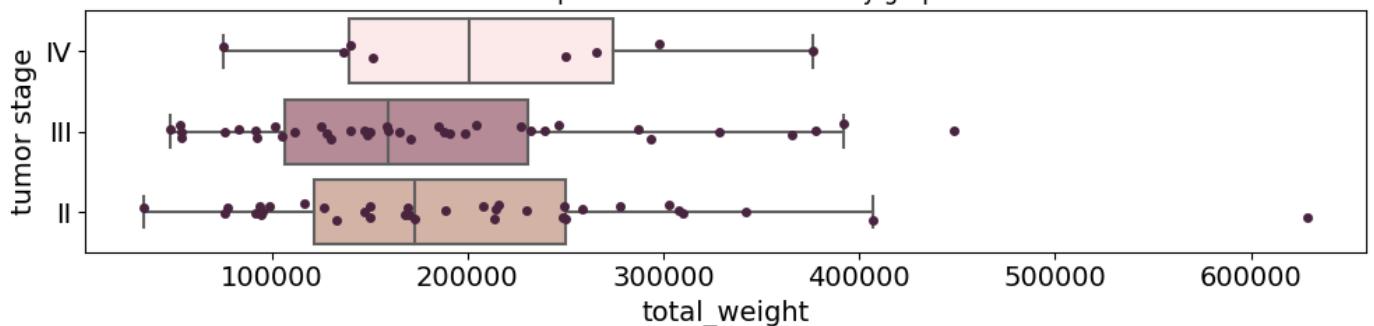
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD8 positive cells and Delaunay graph



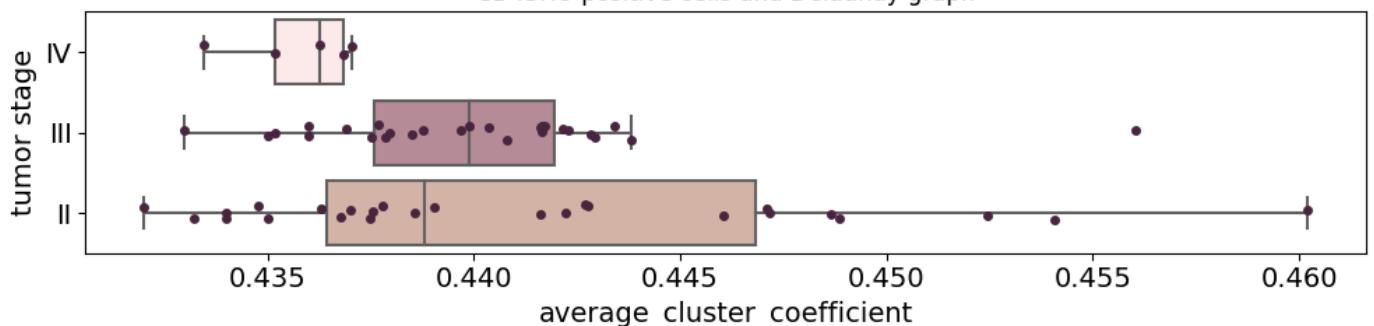
Boxplot of standard\_deviation\_weight by Tumor stage  
CD8 positive cells and Delaunay graph



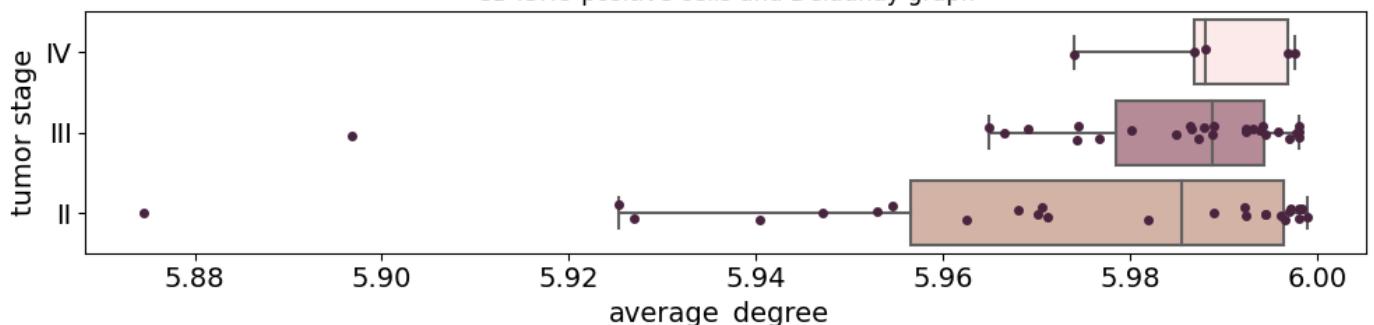
Boxplot of total\_weight by Tumor stage  
CD8 positive cells and Delaunay graph



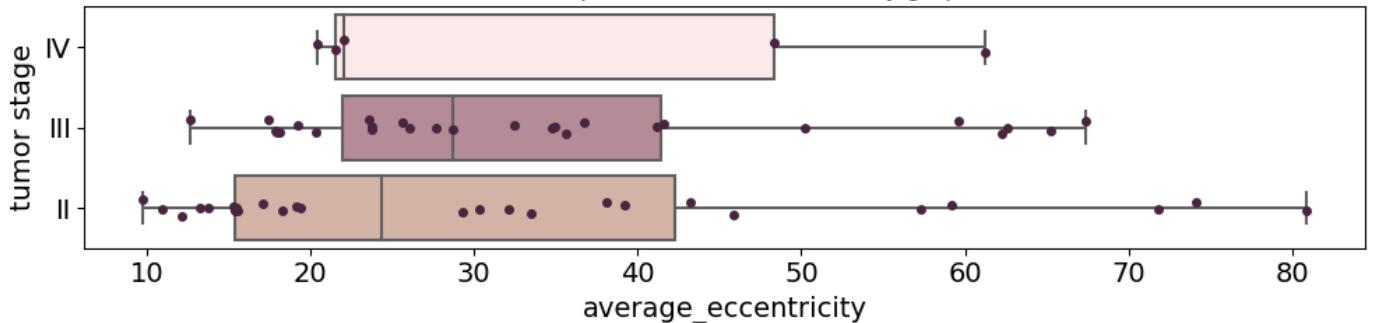
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD45RO positive cells and Delaunay graph



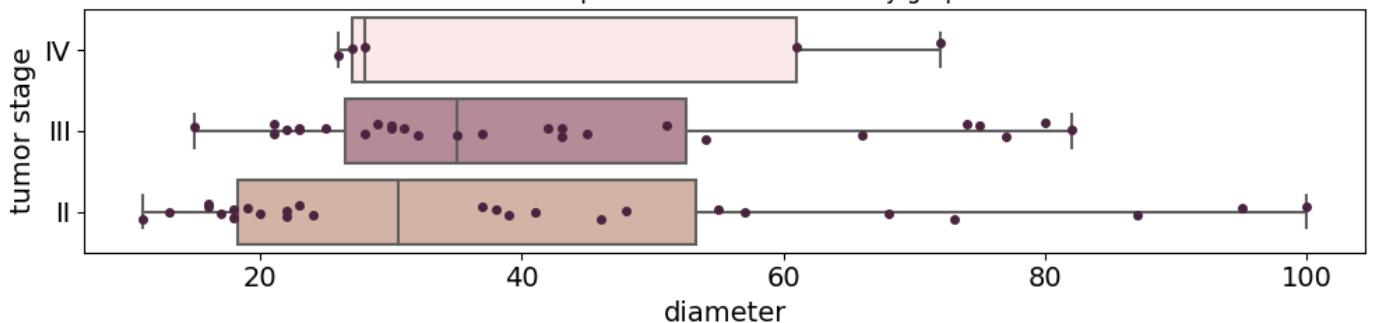
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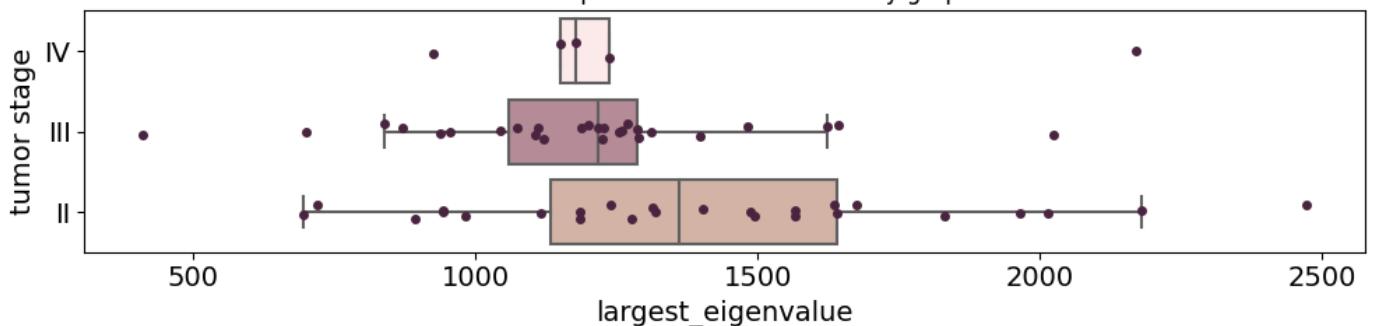
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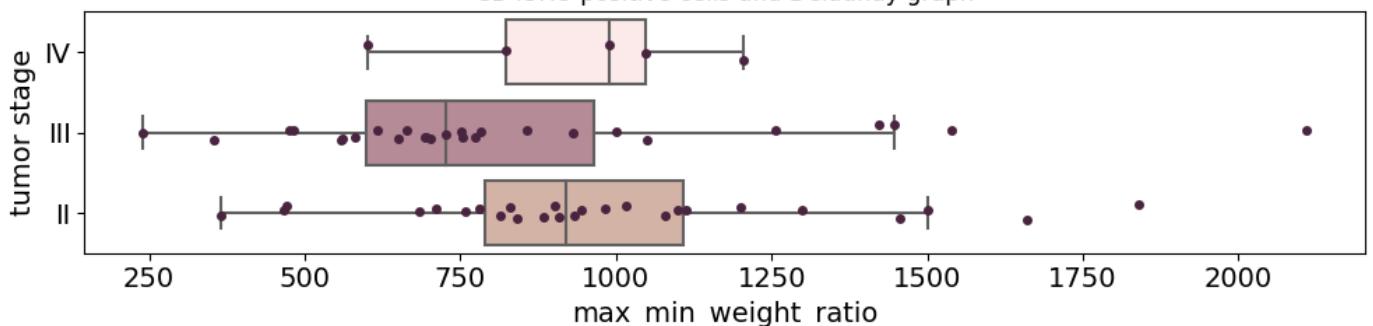
Boxplot of diameter by Tumor stage  
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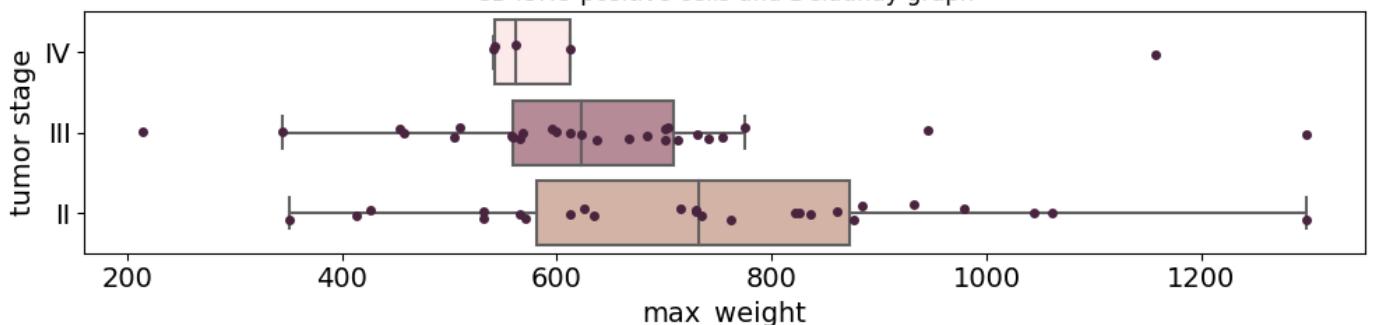
Boxplot of largest\_eigenvalue by Tumor stage  
CD45RO positive cells and Delaunay graph



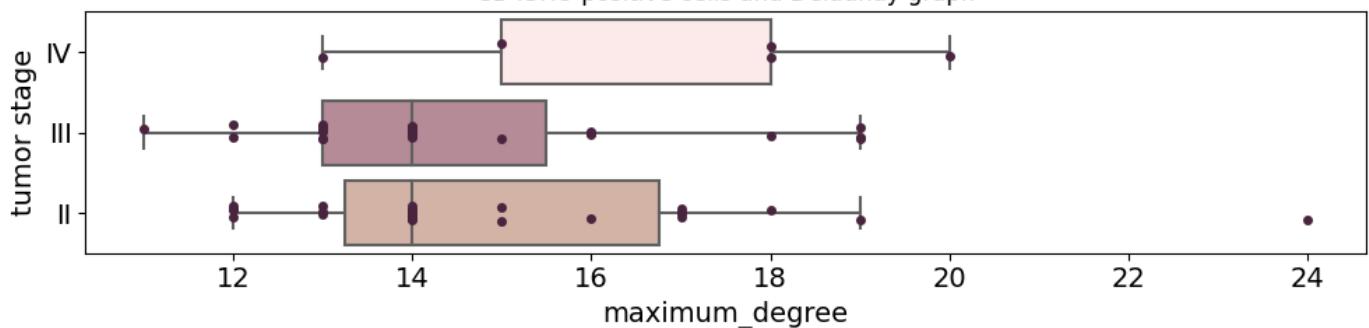
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD45RO positive cells and Delaunay graph



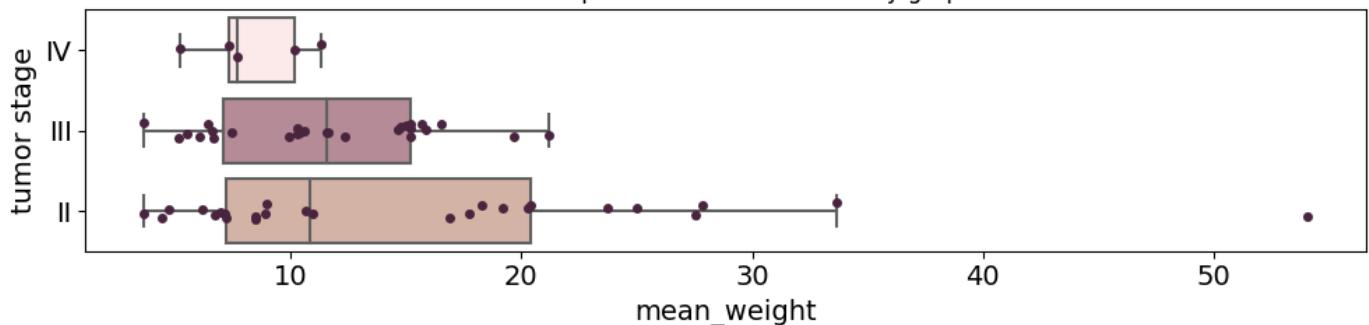
Boxplot of max\_weight by Tumor stage  
CD45RO positive cells and Delaunay graph



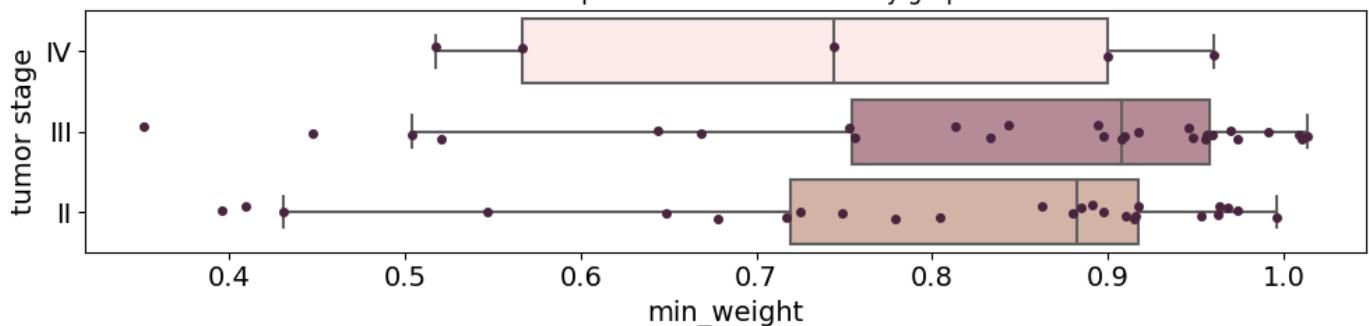
Boxplot of maximum\_degree by Tumor stage  
CD45RO positive cells and Delaunay graph



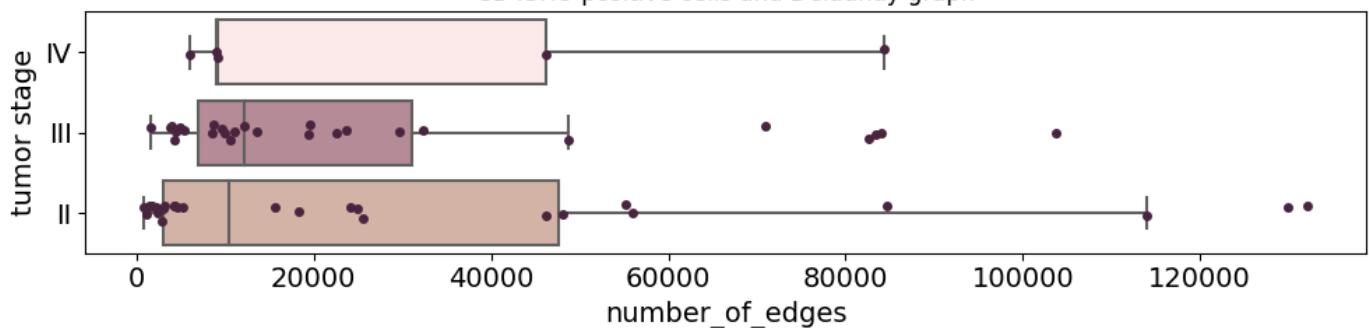
Boxplot of mean\_weight by Tumor stage  
CD45RO positive cells and Delaunay graph



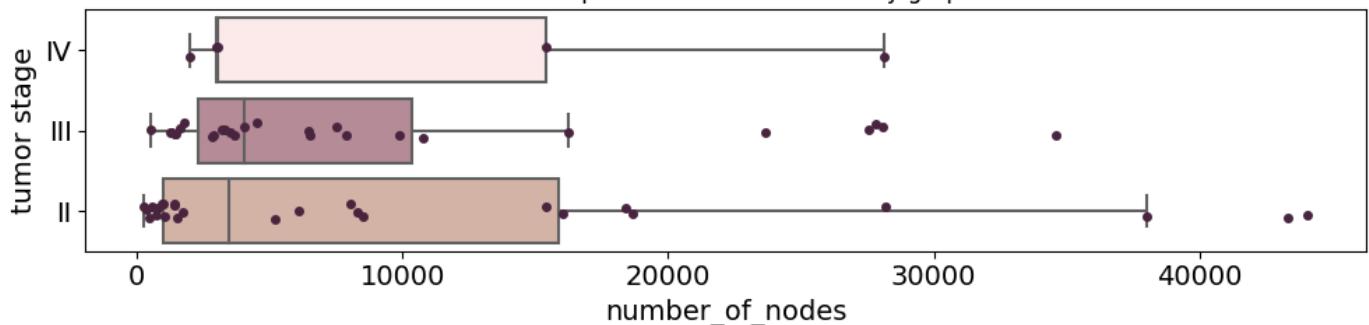
Boxplot of min\_weight by Tumor stage  
CD45RO positive cells and Delaunay graph



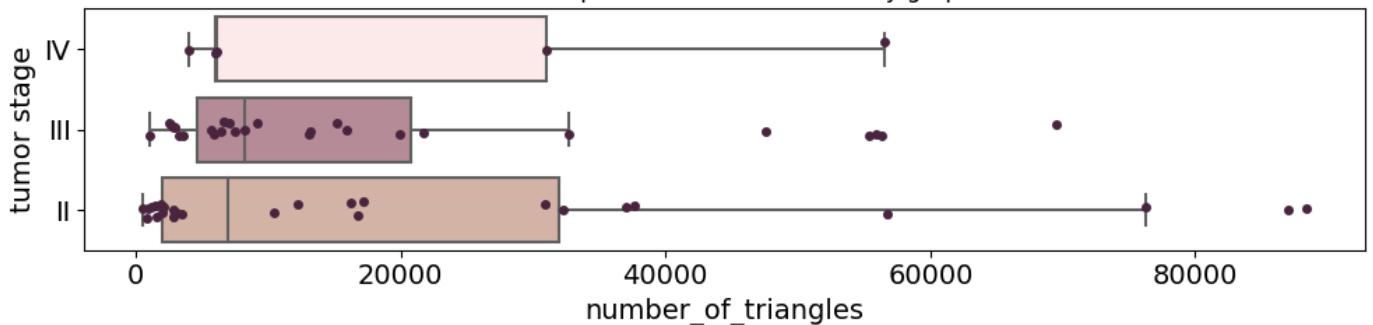
Boxplot of number\_of\_edges by Tumor stage  
CD45RO positive cells and Delaunay graph



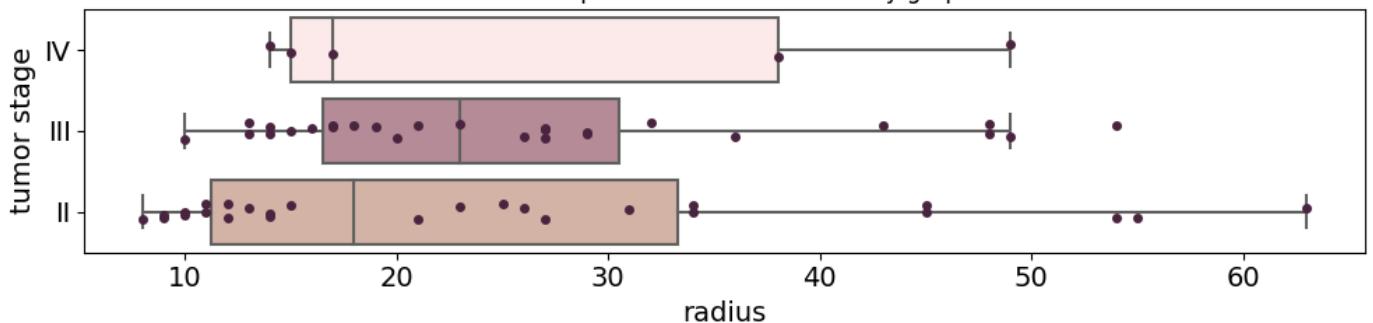
Boxplot of number\_of\_nodes by Tumor stage  
CD45RO positive cells and Delaunay graph



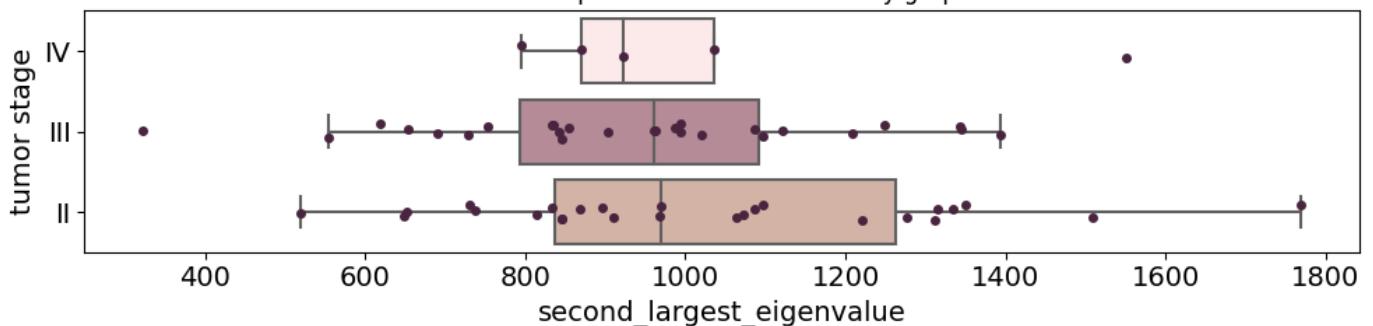
Boxplot of number\_of\_triangles by Tumor stage  
CD45RO positive cells and Delaunay graph



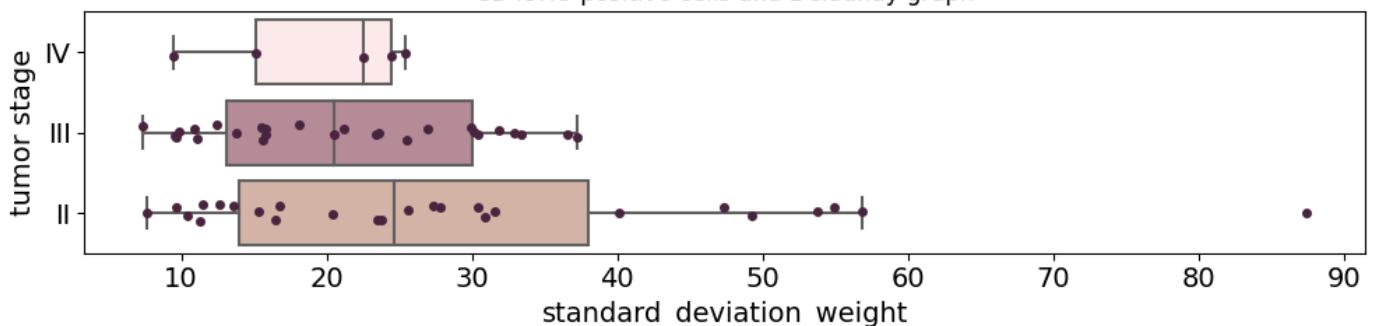
Boxplot of radius by Tumor stage  
CD45RO positive cells and Delaunay graph



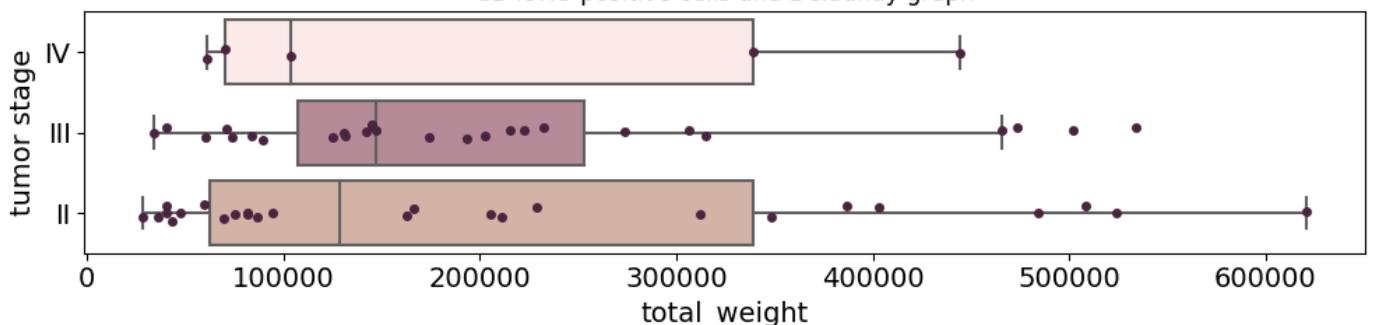
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD45RO positive cells and Delaunay graph



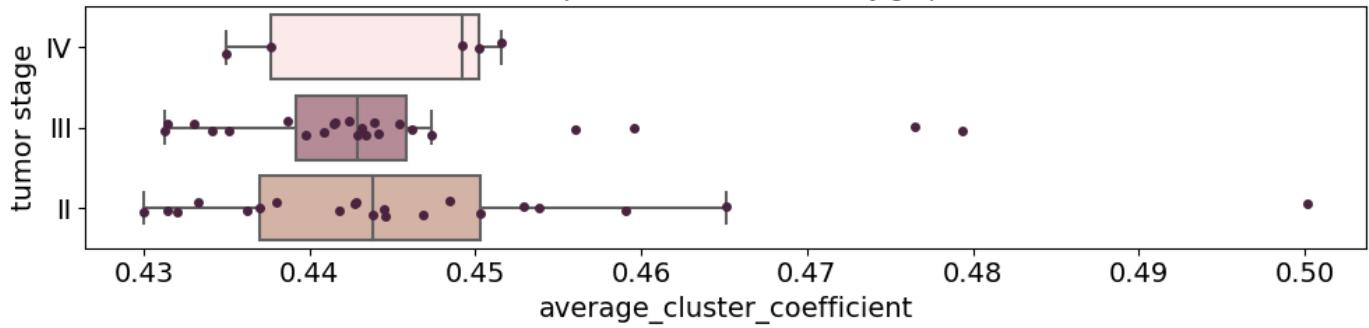
Boxplot of standard\_deviation\_weight by Tumor stage  
CD45RO positive cells and Delaunay graph



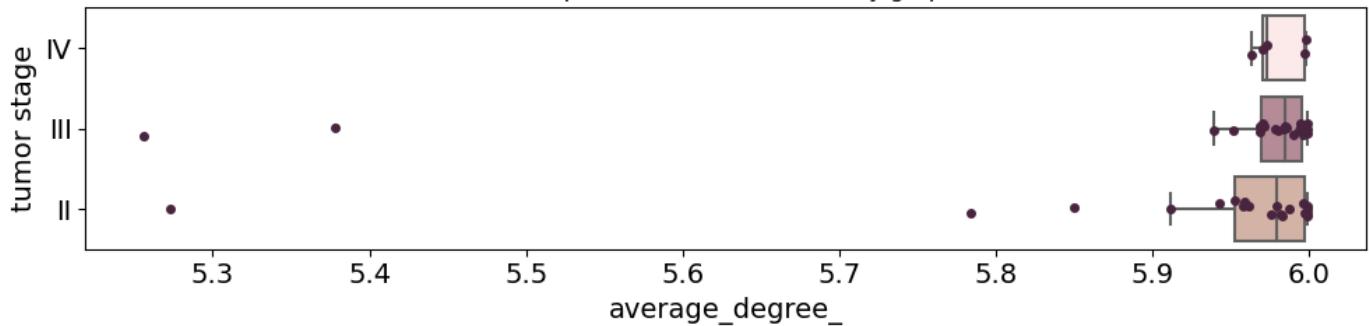
Boxplot of total\_weight by Tumor stage  
CD45RO positive cells and Delaunay graph



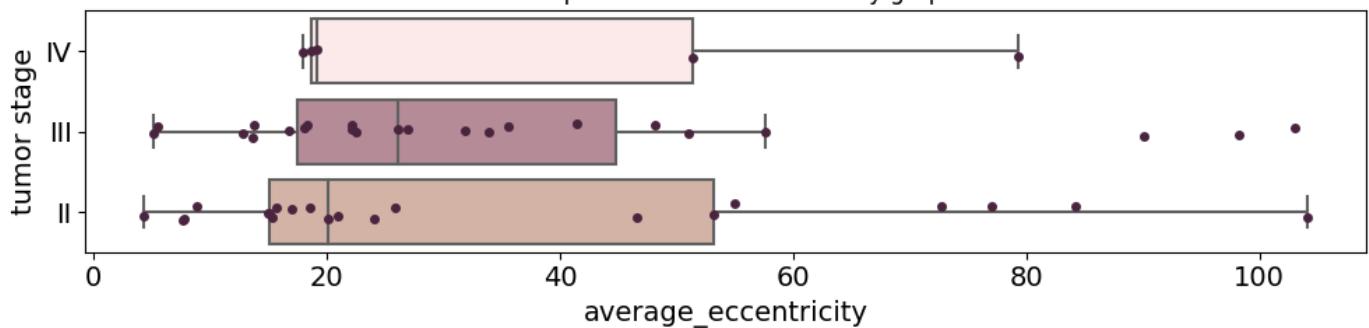
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD68 positive cells and Delaunay graph



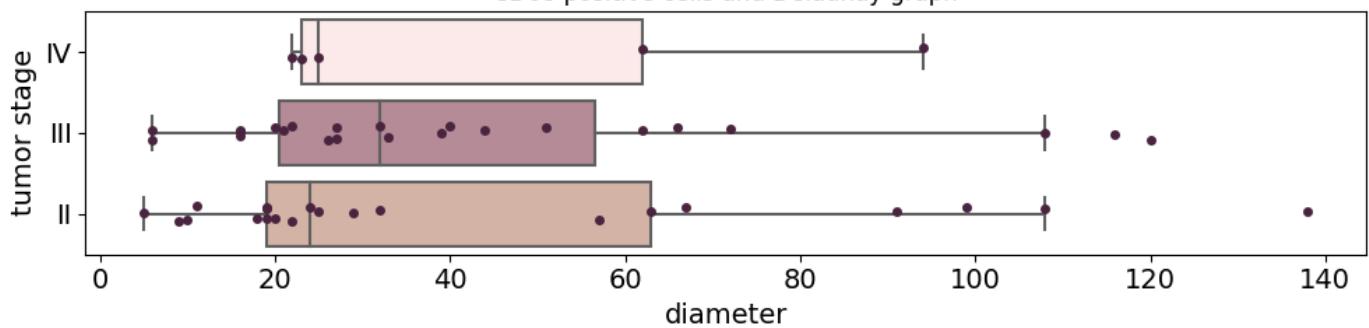
Boxplot of average\_degree\_ by Tumor stage  
CD68 positive cells and Delaunay graph



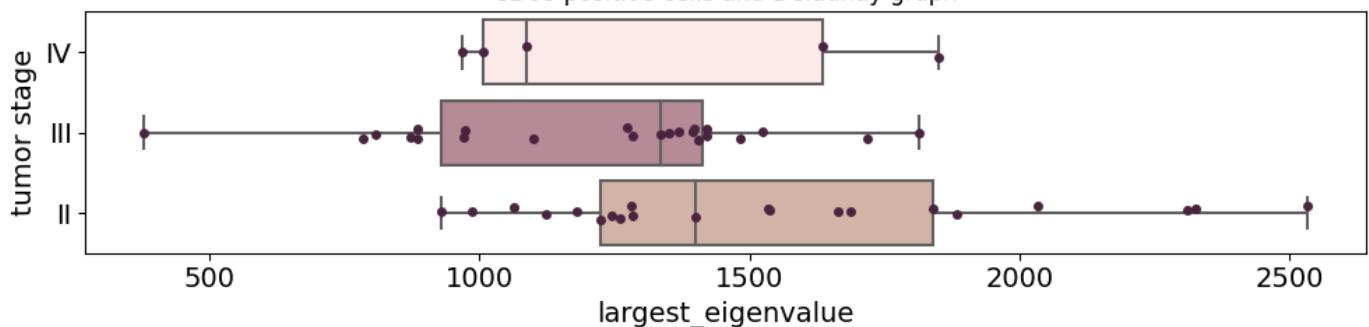
Boxplot of average\_eccentricity by Tumor stage  
CD68 positive cells and Delaunay graph



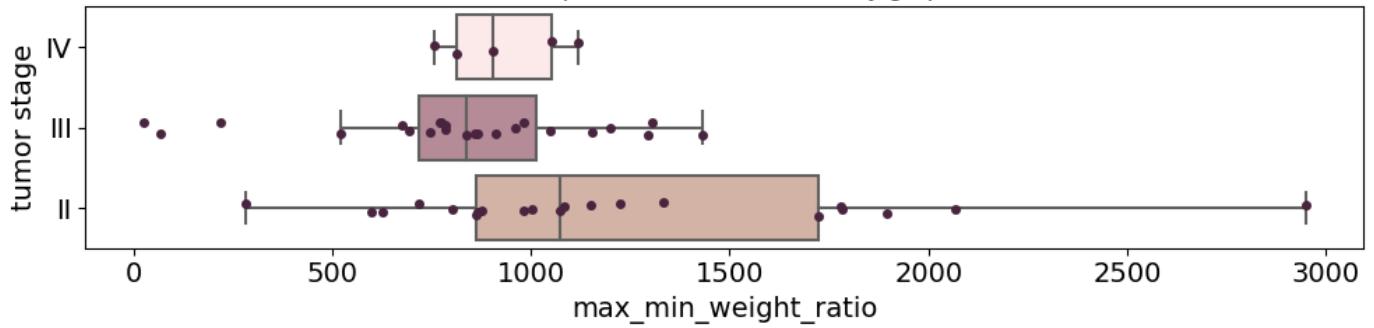
Boxplot of diameter by Tumor stage  
CD68 positive cells and Delaunay graph



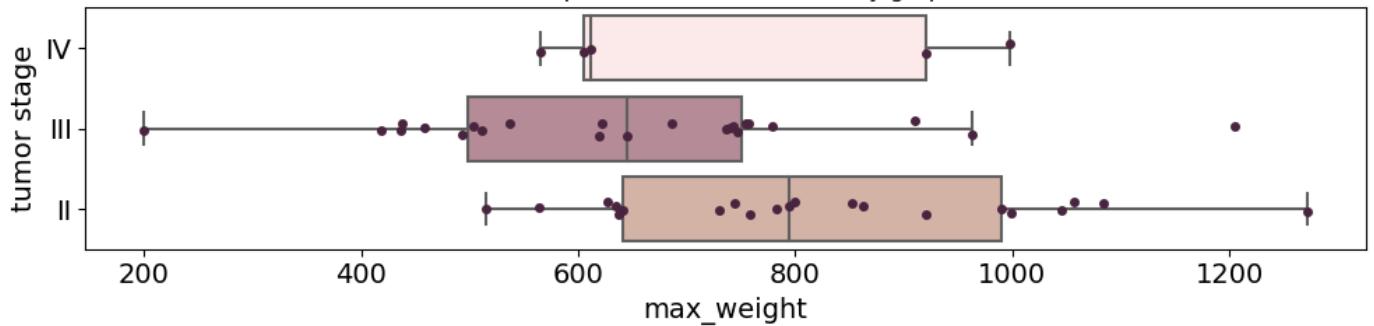
Boxplot of largest\_eigenvalue by Tumor stage  
CD68 positive cells and Delaunay graph



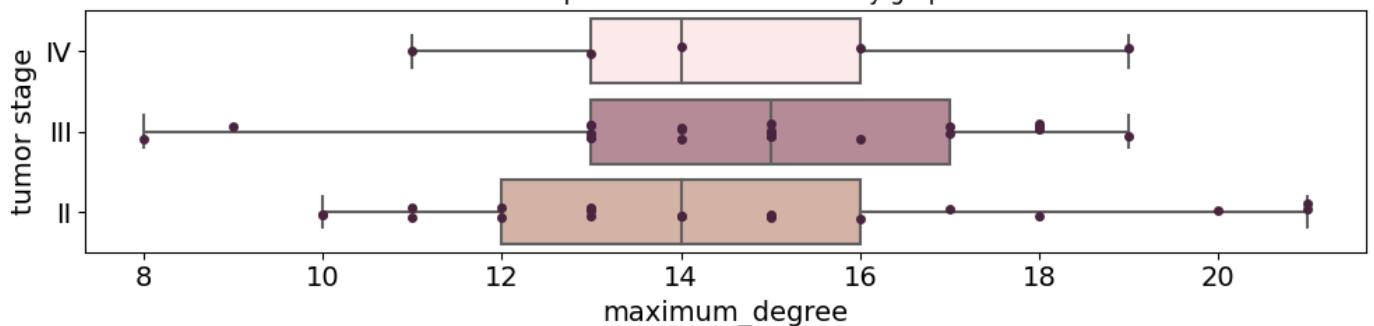
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD68 positive cells and Delaunay graph



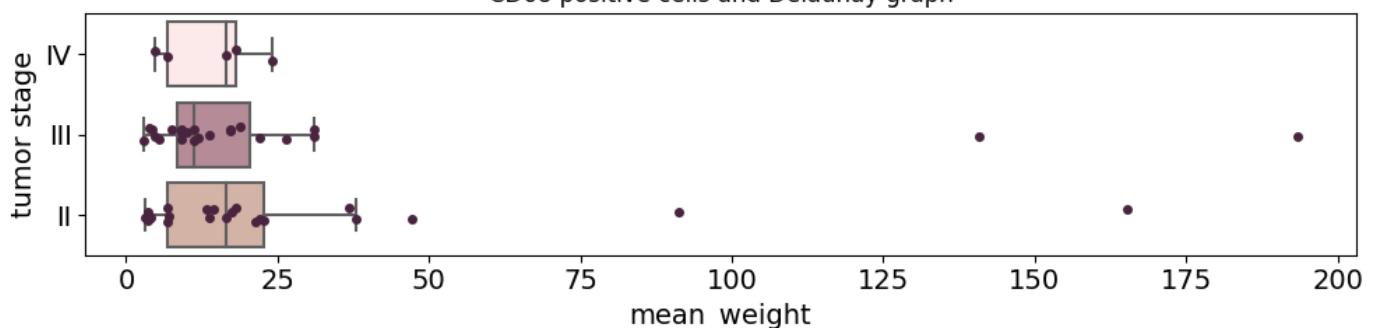
Boxplot of max\_weight by Tumor stage  
CD68 positive cells and Delaunay graph



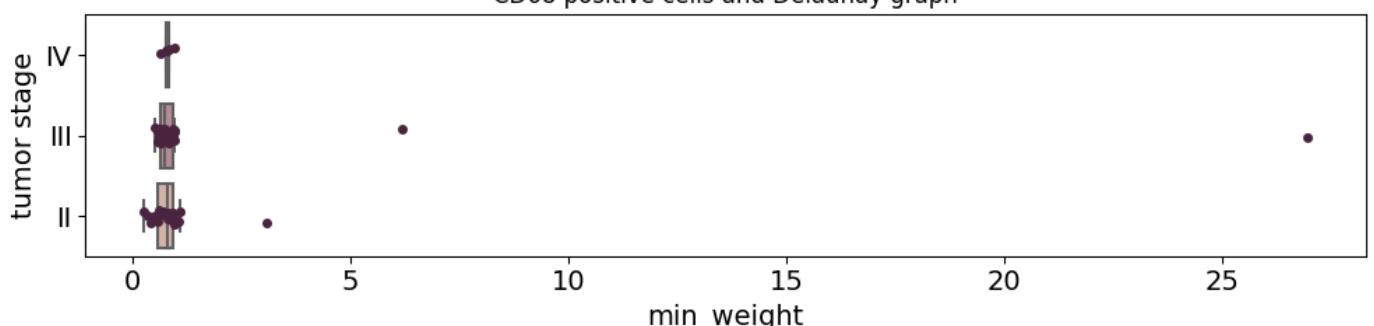
Boxplot of maximum\_degree by Tumor stage  
CD68 positive cells and Delaunay graph



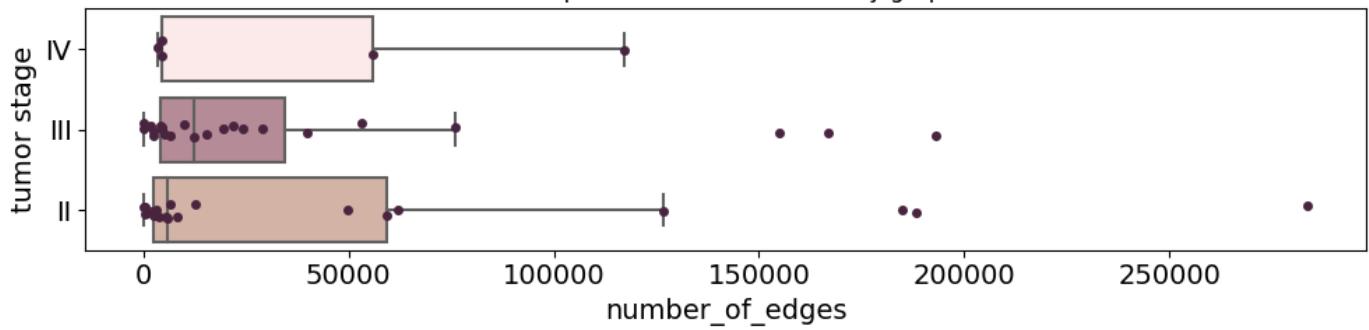
Boxplot of mean\_weight by Tumor stage  
CD68 positive cells and Delaunay graph



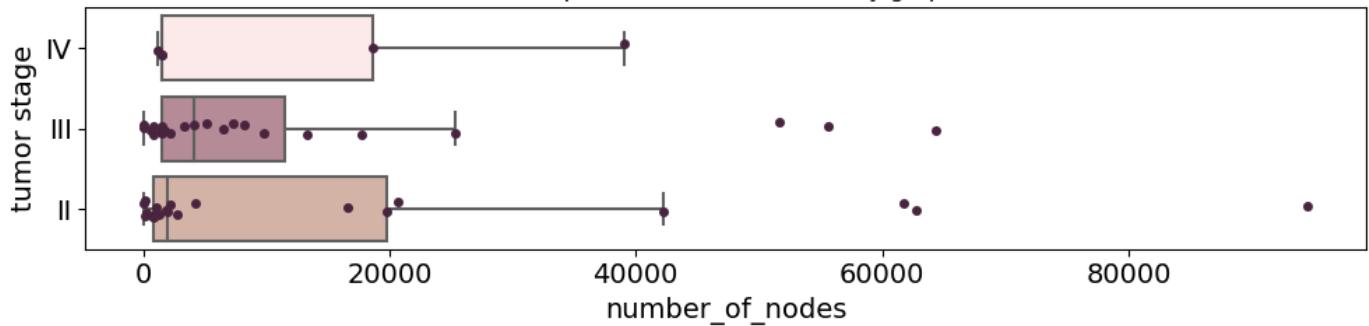
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CD68 positive cells and Delaunay graph



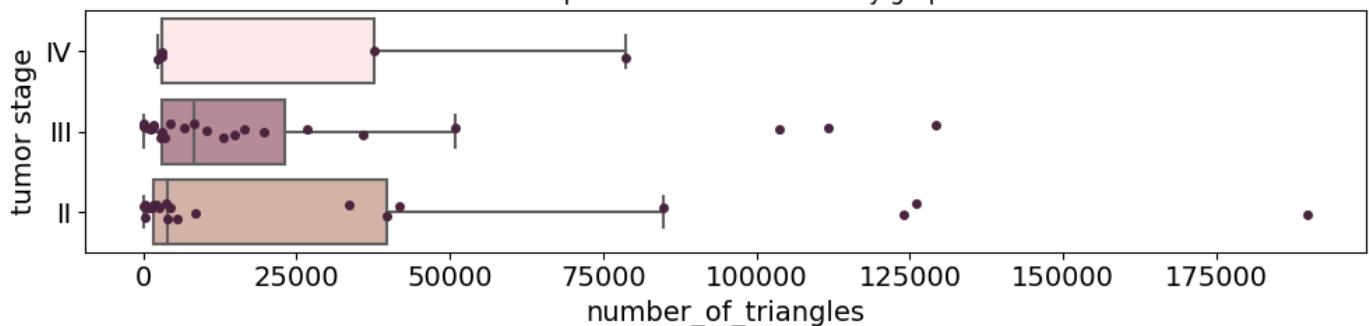
Boxplot of number\_of\_edges by Tumor stage  
CD68 positive cells and Delaunay graph



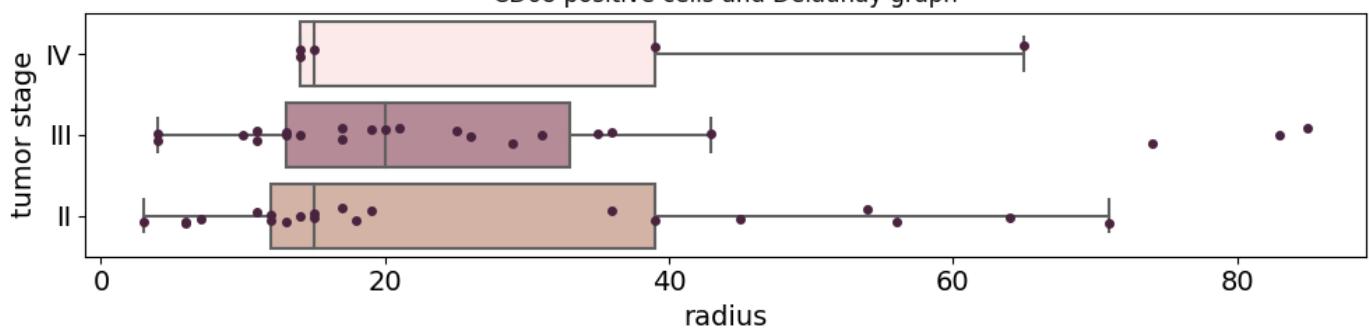
Boxplot of number\_of\_nodes by Tumor stage  
CD68 positive cells and Delaunay graph



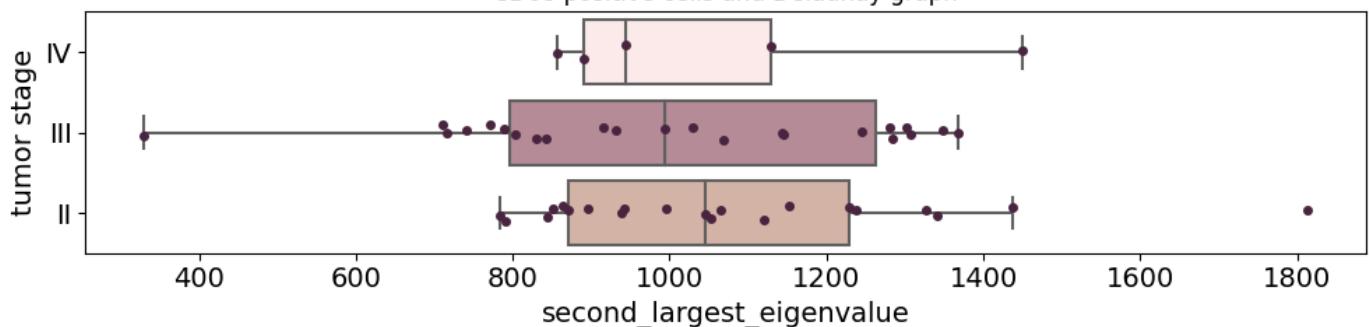
Boxplot of number\_of\_triangles by Tumor stage  
CD68 positive cells and Delaunay graph



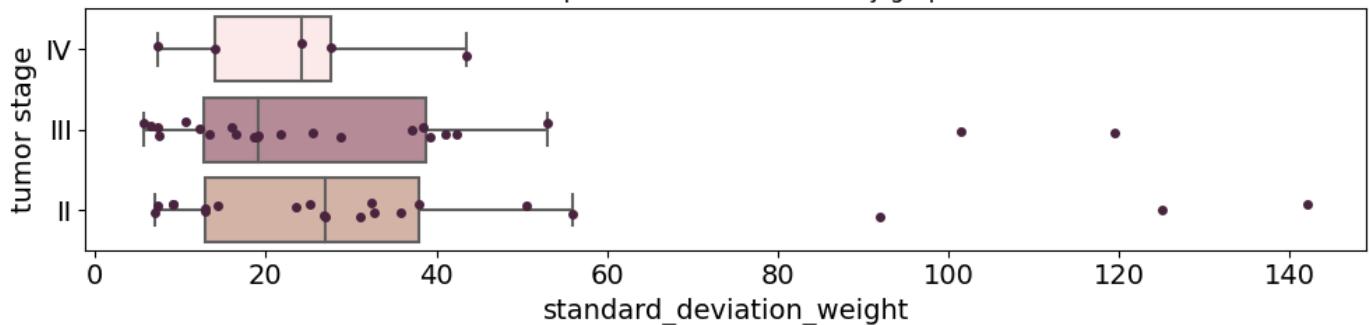
Boxplot of radius by Tumor stage  
CD68 positive cells and Delaunay graph



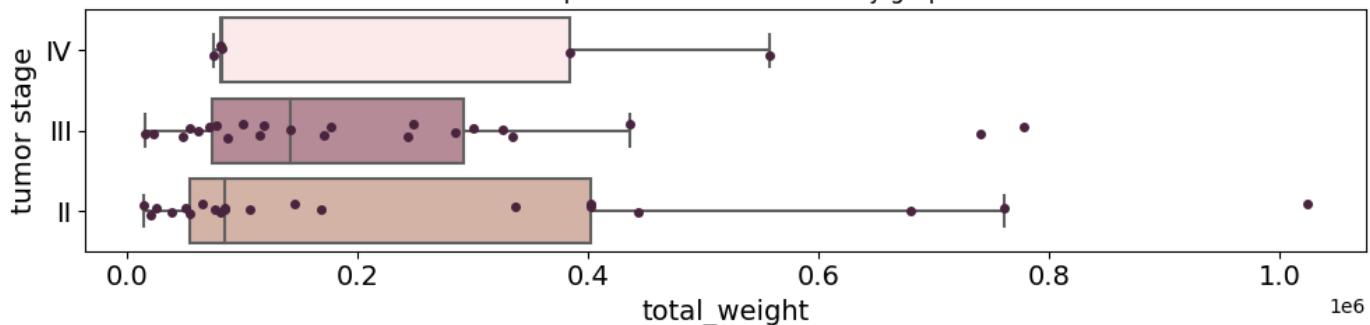
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD68 positive cells and Delaunay graph



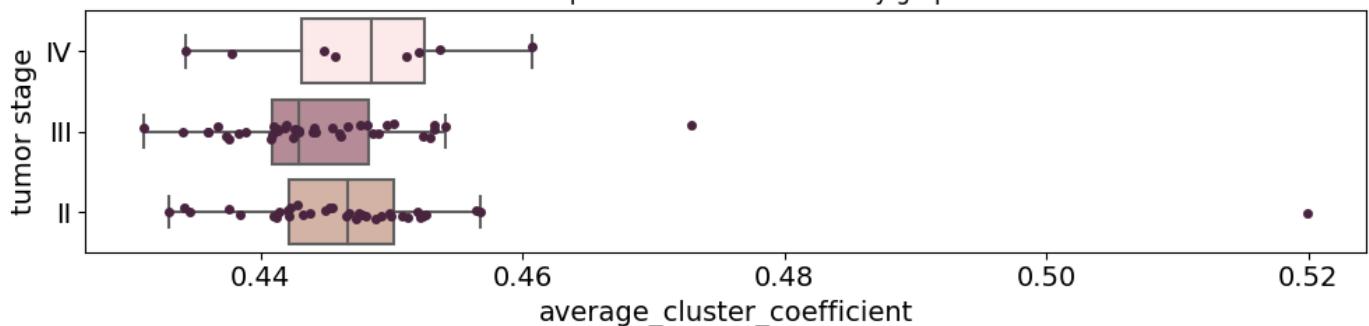
Boxplot of standard\_deviations\_weight by Tumor stage  
CD68 positive cells and Delaunay graph



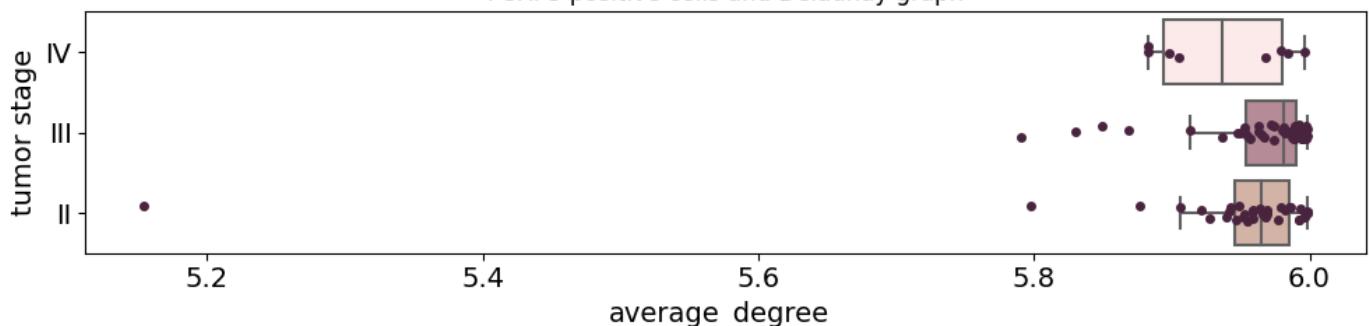
Boxplot of total\_weight by Tumor stage  
CD68 positive cells and Delaunay graph



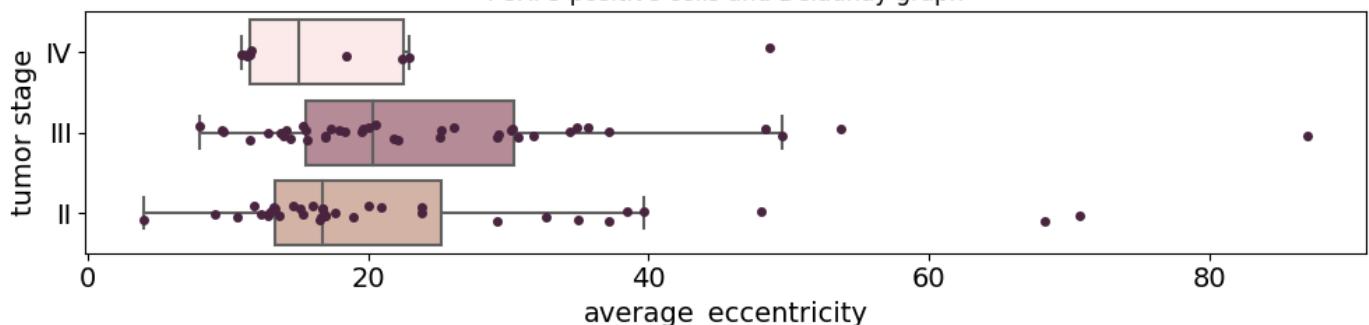
Boxplot of average\_cluster\_coefficient by Tumor stage  
FOXP3 positive cells and Delaunay graph



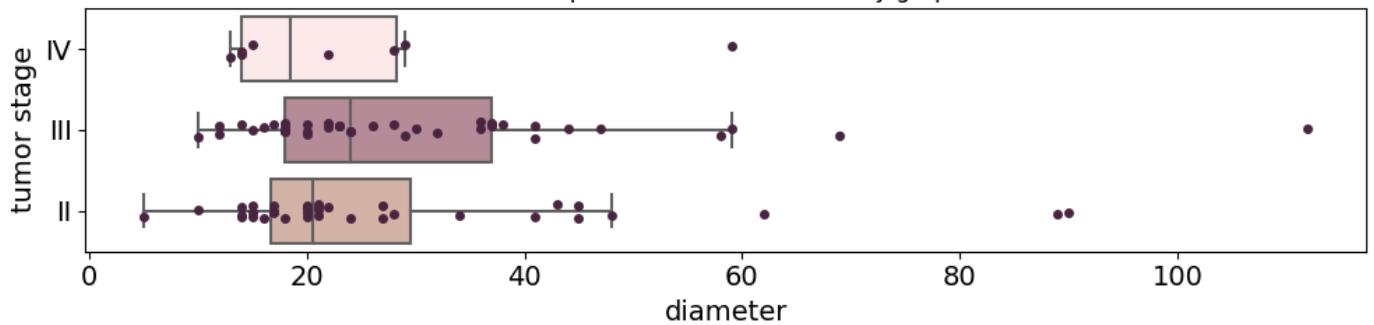
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FOXP3 positive cells and Delaunay graph



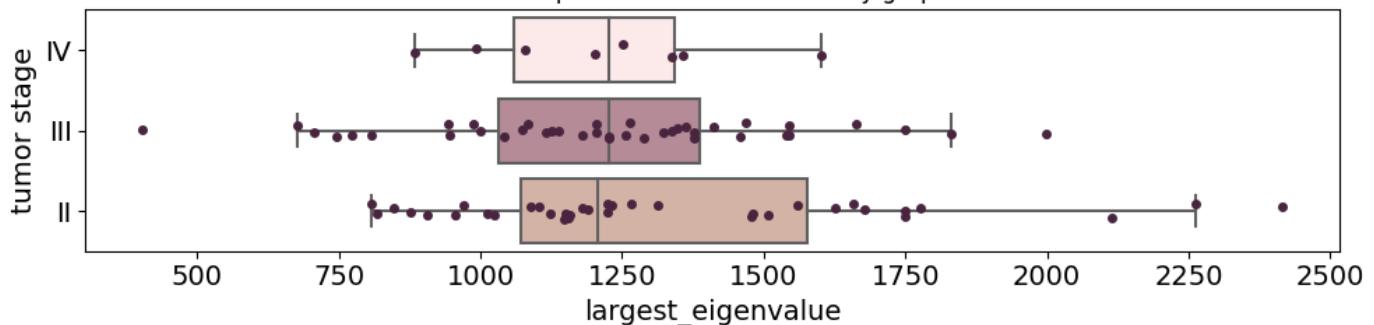
Boxplot of average\_eccentricity by Tumor stage  
FOXP3 positive cells and Delaunay graph



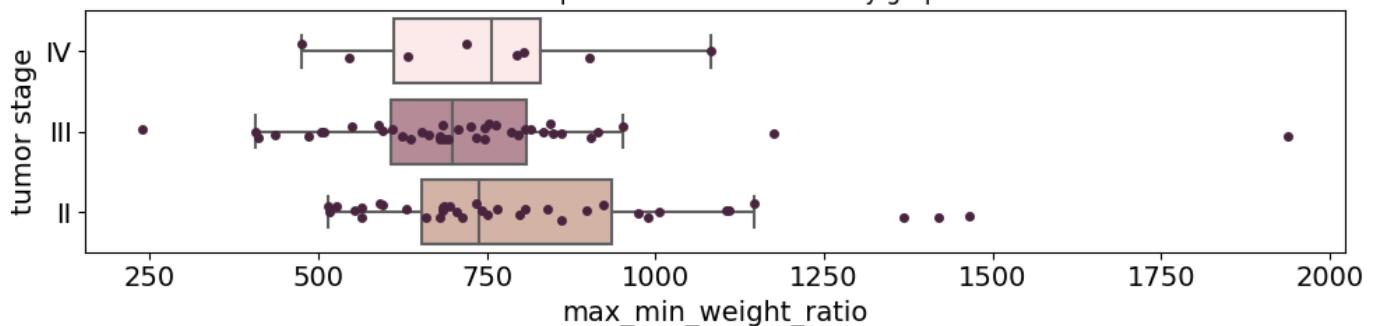
Boxplot of diameter by Tumor stage  
FOXP3 positive cells and Delaunay graph



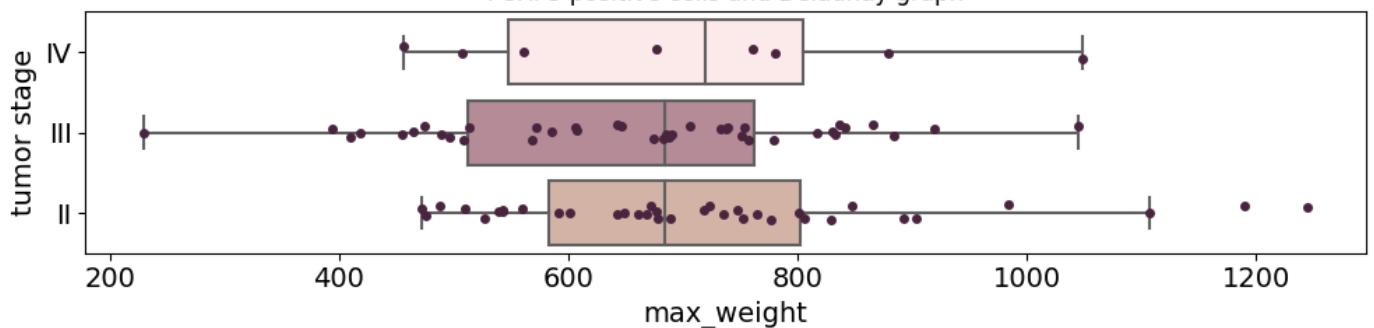
Boxplot of largest\_eigenvalue by Tumor stage  
FOXP3 positive cells and Delaunay graph



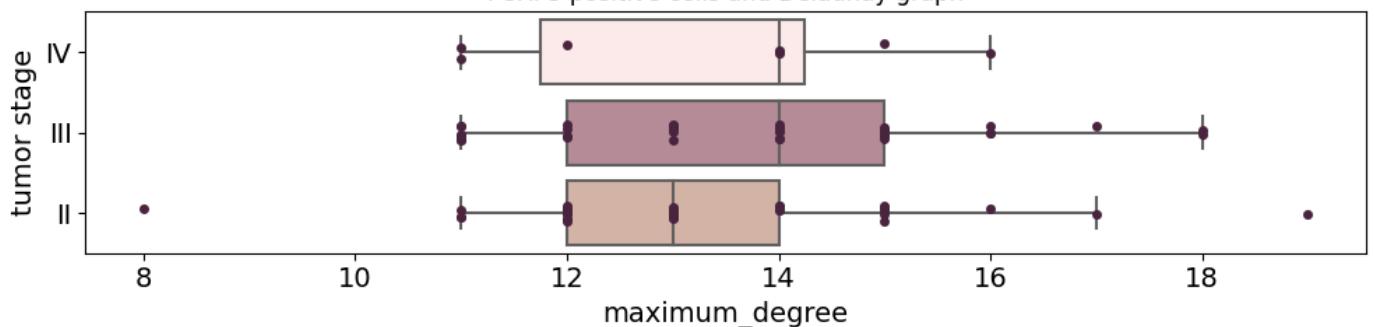
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FOXP3 positive cells and Delaunay graph



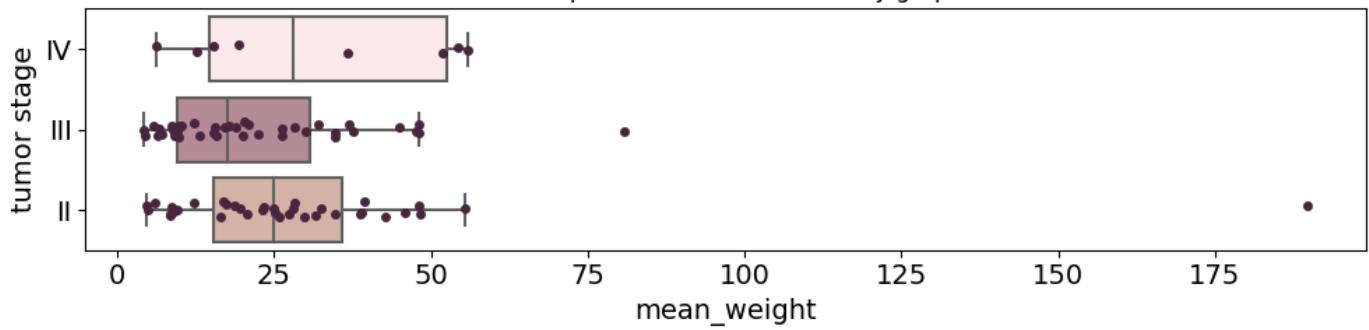
Boxplot of max\_weight by Tumor stage  
FOXP3 positive cells and Delaunay graph



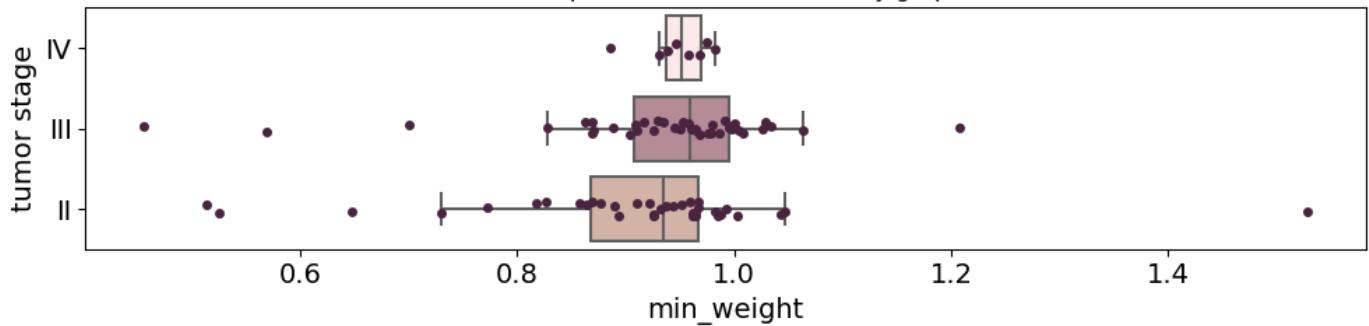
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FOXP3 positive cells and Delaunay graph



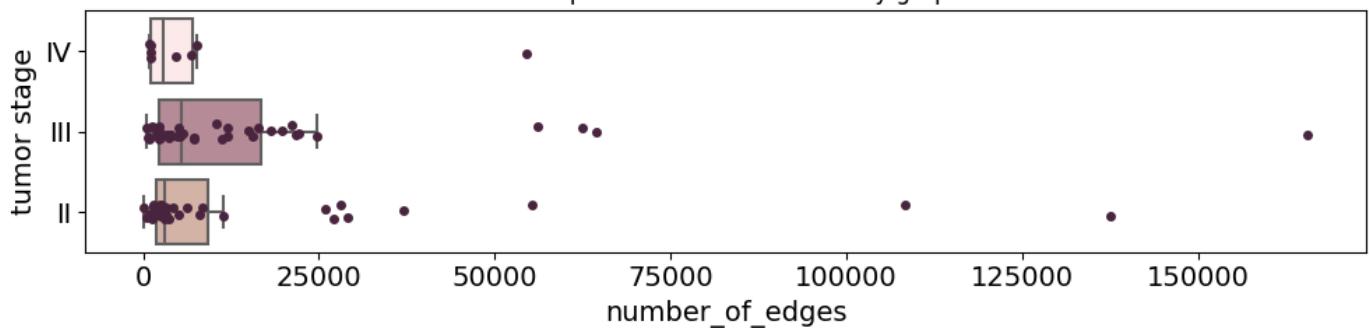
Boxplot of mean\_weight by Tumor stage  
FOXP3 positive cells and Delaunay graph



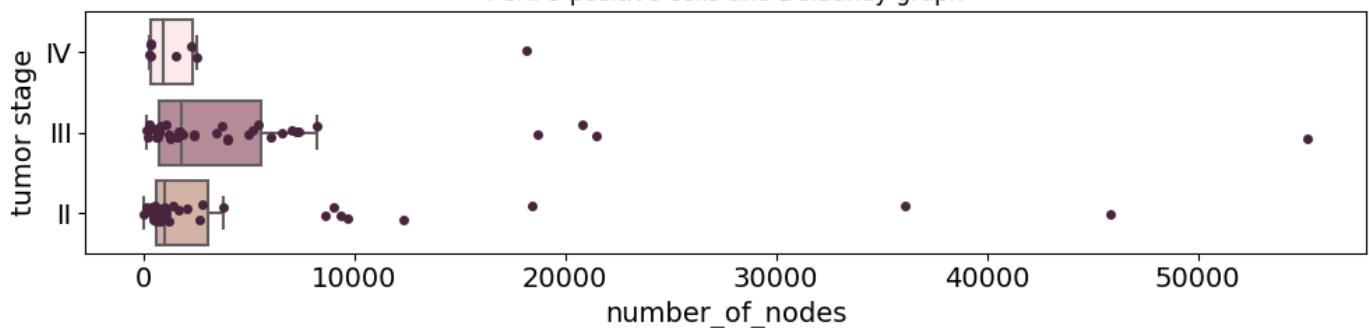
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FOXP3 positive cells and Delaunay graph



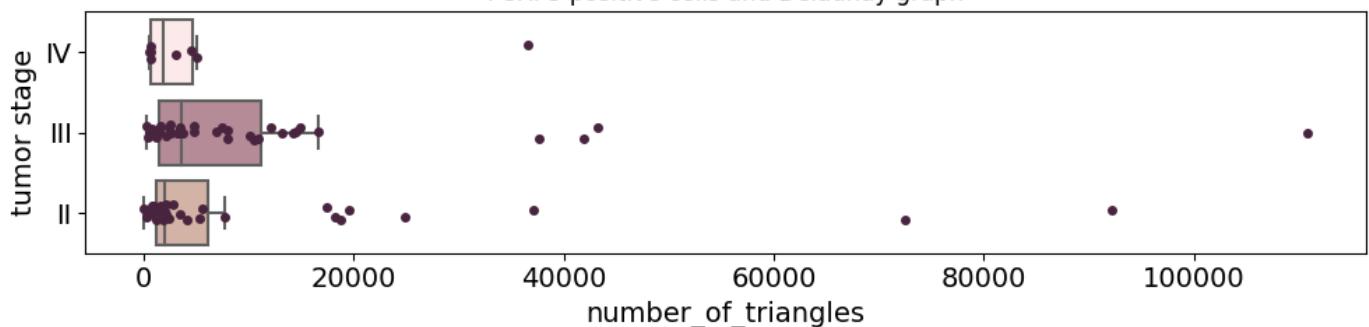
Boxplot of number\_of\_edges by Tumor stage  
FOXP3 positive cells and Delaunay graph



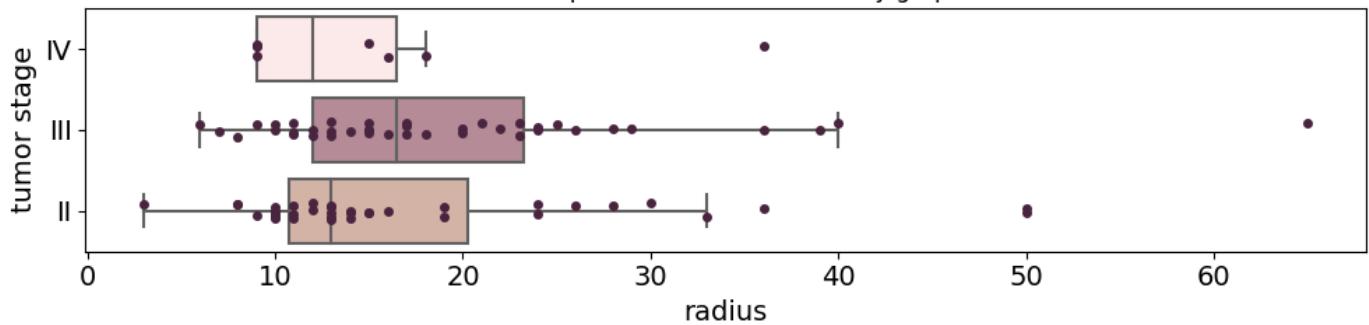
Boxplot of number\_of\_nodes by Tumor stage  
FOXP3 positive cells and Delaunay graph



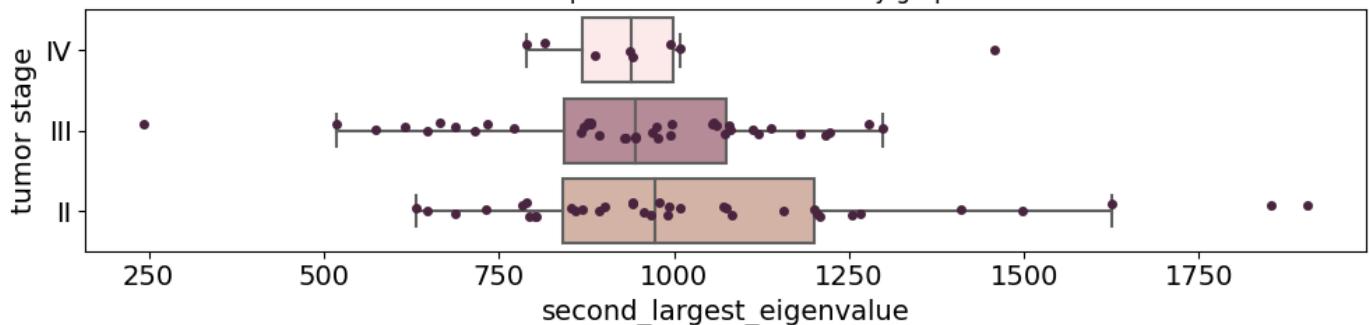
Boxplot of number\_of\_triangles by Tumor stage  
FOXP3 positive cells and Delaunay graph



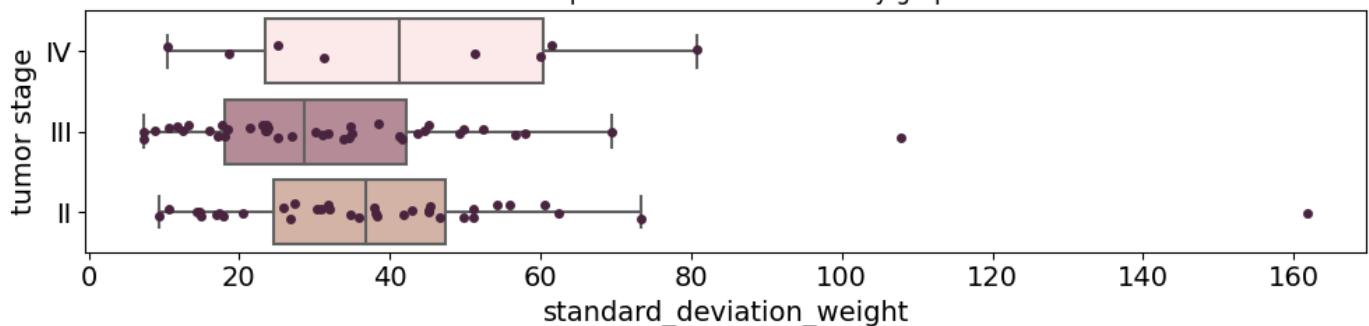
Boxplot of radius by Tumor stage  
FOXP3 positive cells and Delaunay graph



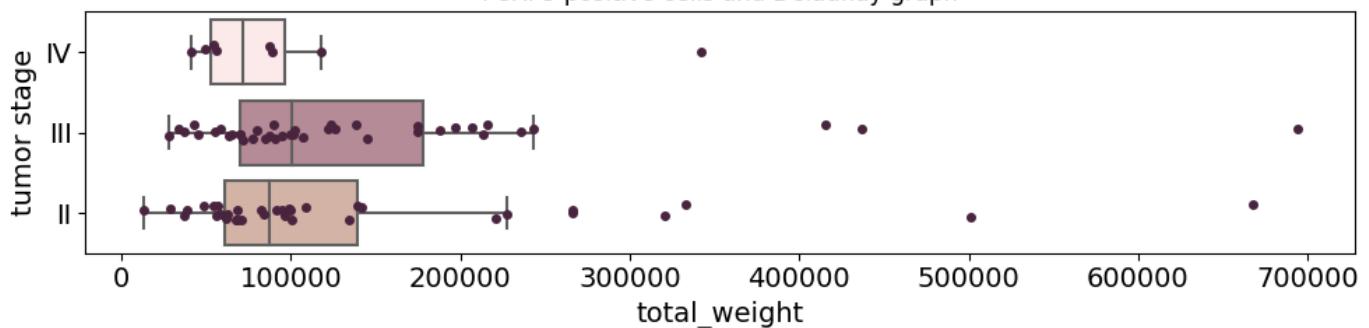
Boxplot of second\_largest\_eigenvalue by Tumor stage  
FOXP3 positive cells and Delaunay graph



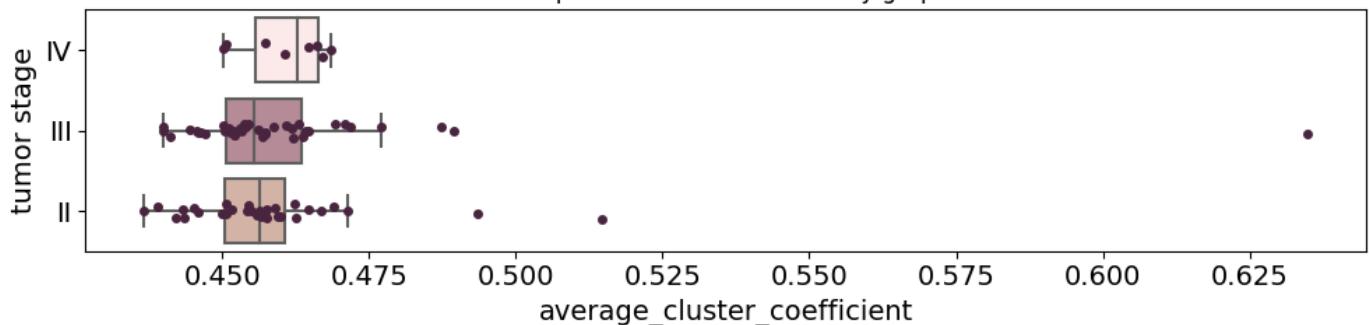
Boxplot of standard\_deviation\_weight by Tumor stage  
FOXP3 positive cells and Delaunay graph



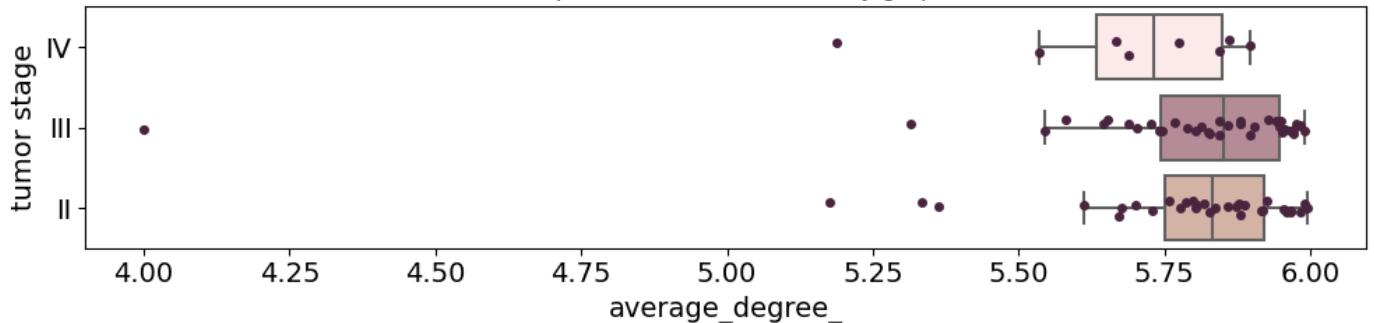
Boxplot of total\_weight by Tumor stage  
FOXP3 positive cells and Delaunay graph



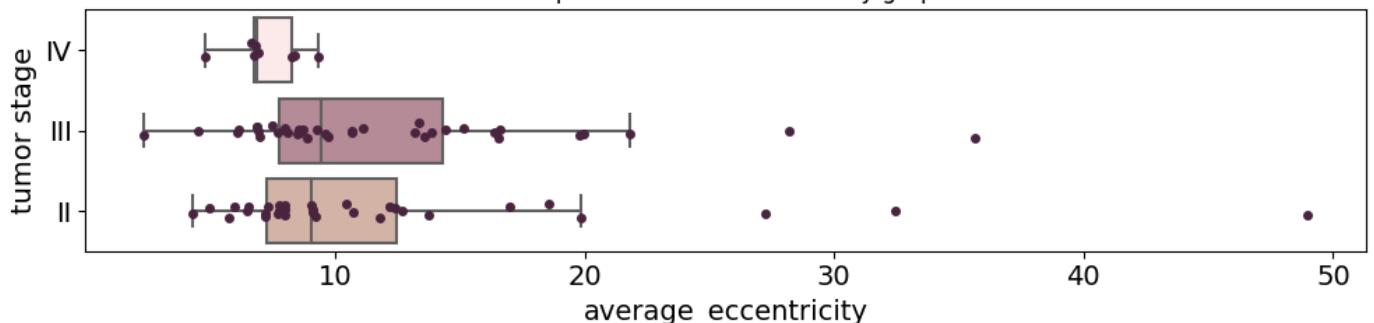
Boxplot of average\_cluster\_coefficient by Tumor stage  
PD1 positive cells and Delaunay graph



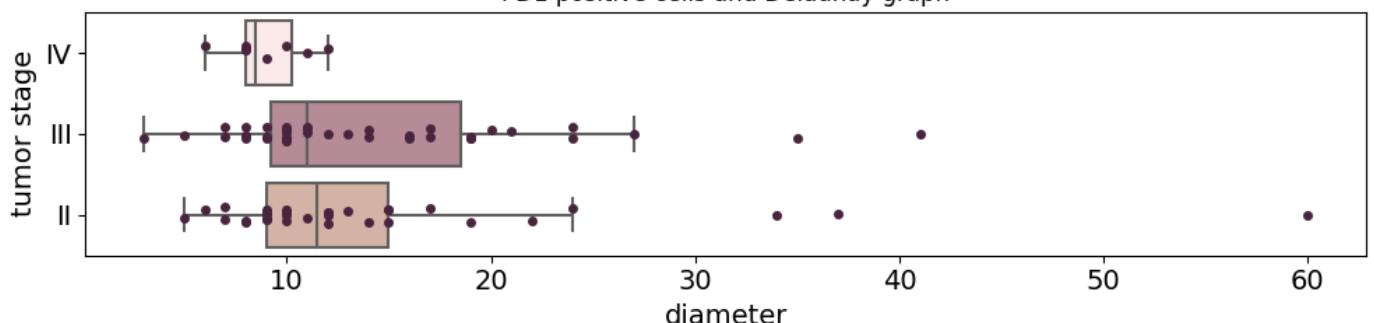
Boxplot of average\_degree\_ by Tumor stage  
PD1 positive cells and Delaunay graph



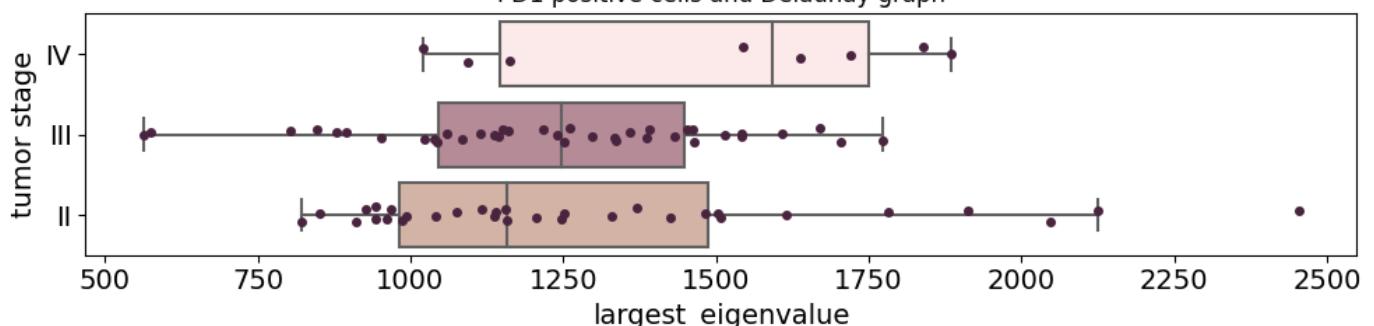
Boxplot of average\_eccentricity by Tumor stage  
PD1 positive cells and Delaunay graph



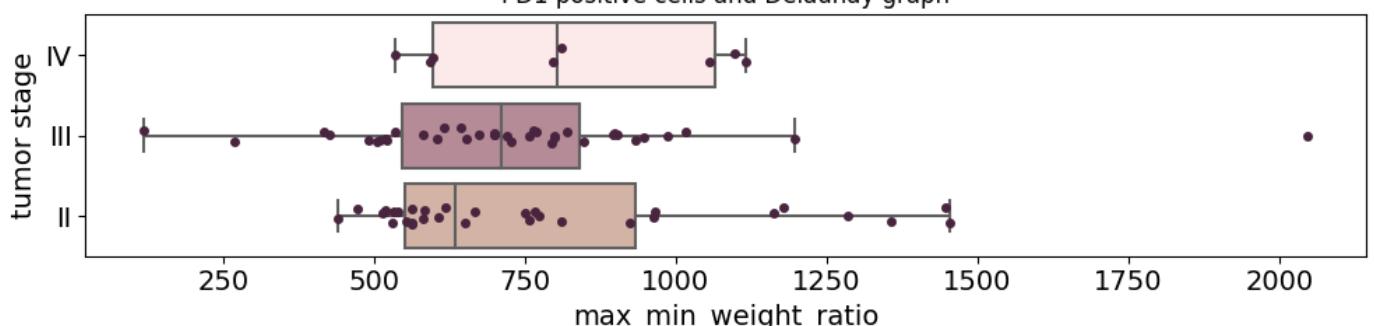
Boxplot of diameter by Tumor stage  
PD1 positive cells and Delaunay graph

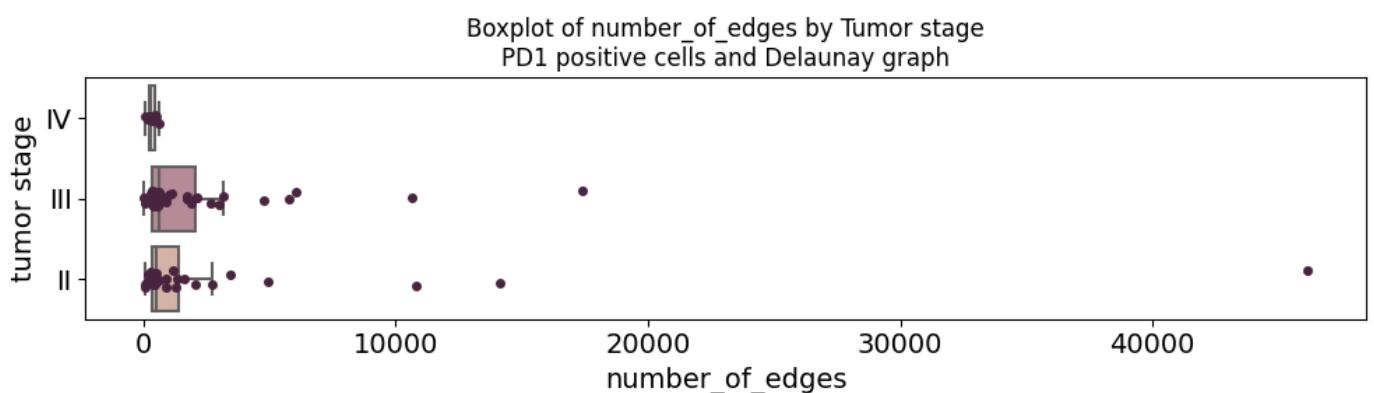
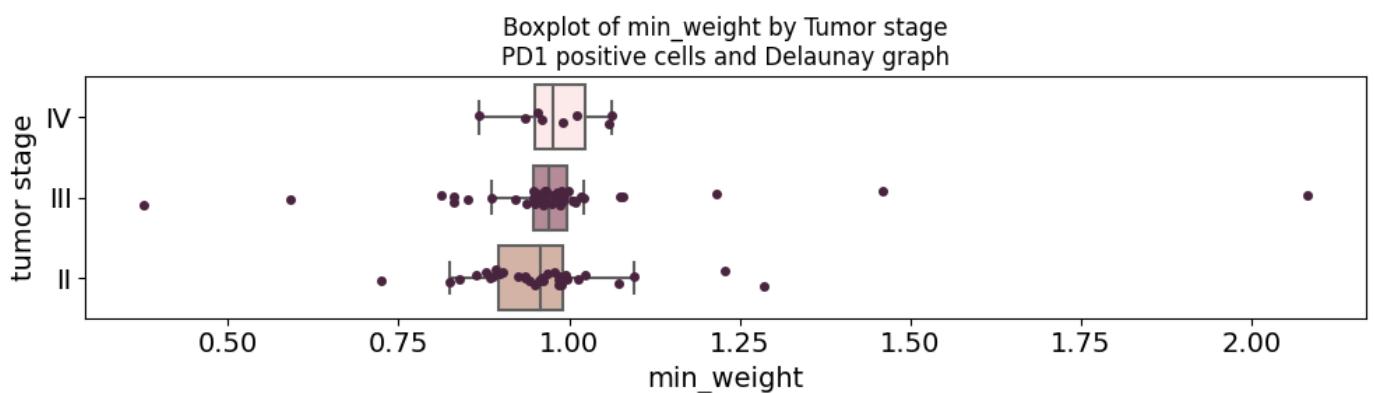
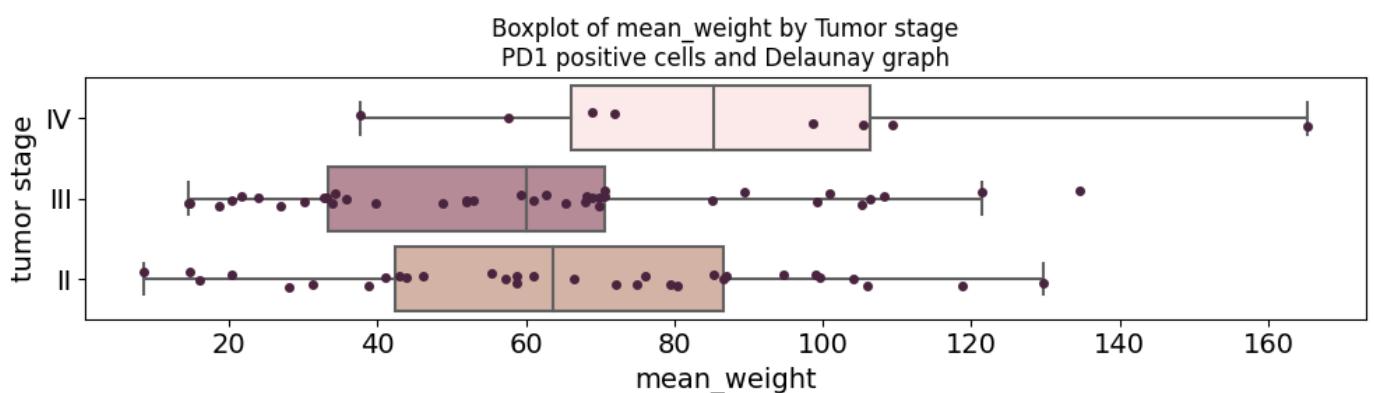
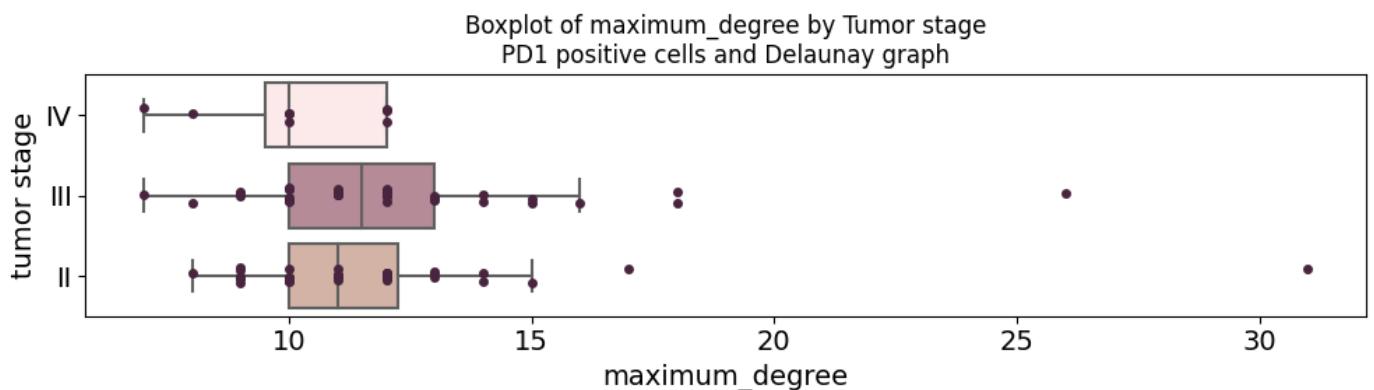
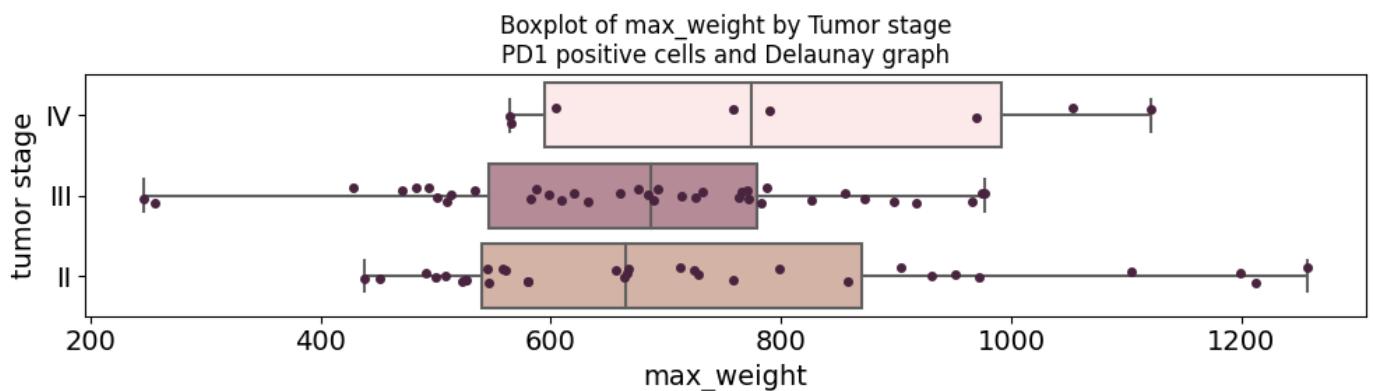


Boxplot of largest\_eigenvalue by Tumor stage  
PD1 positive cells and Delaunay graph

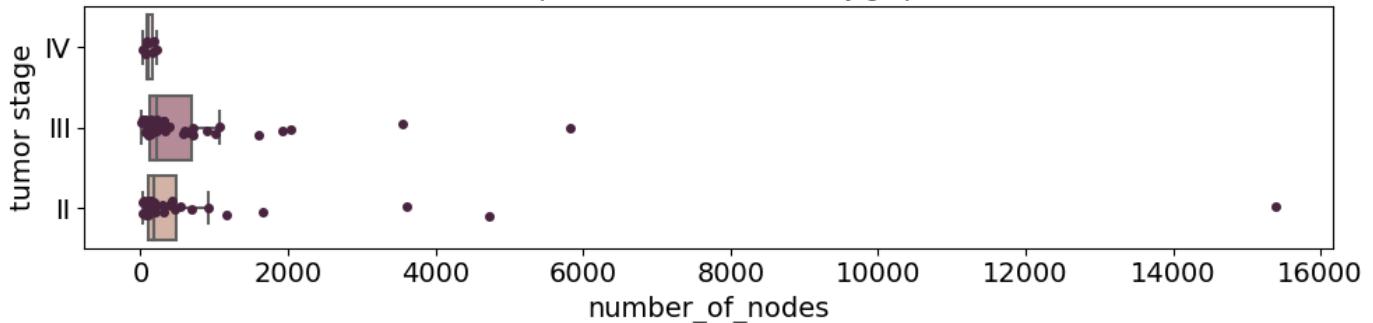


Boxplot of max\_min\_weight\_ratio by Tumor stage  
PD1 positive cells and Delaunay graph

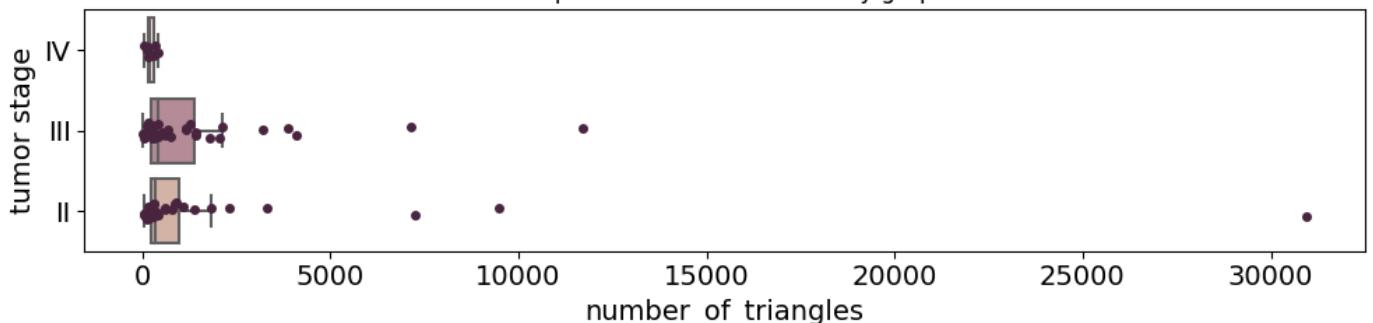




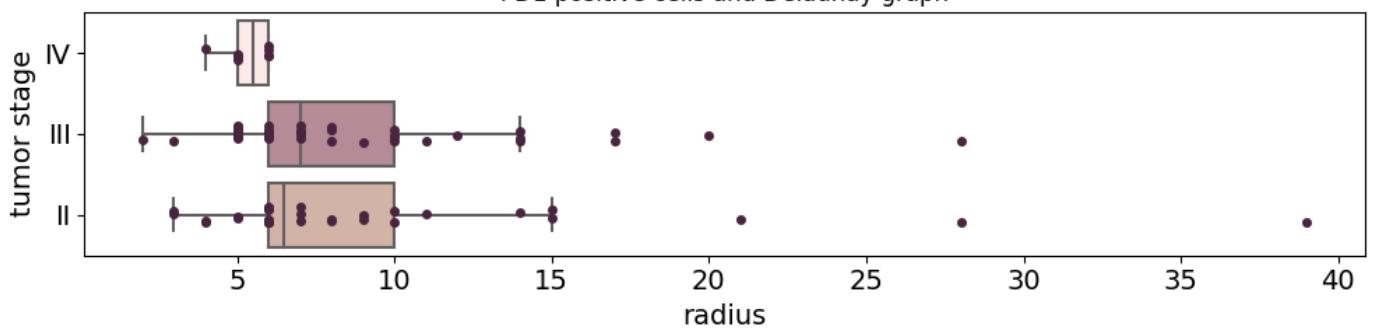
Boxplot of number\_of\_nodes by Tumor stage  
PD1 positive cells and Delaunay graph



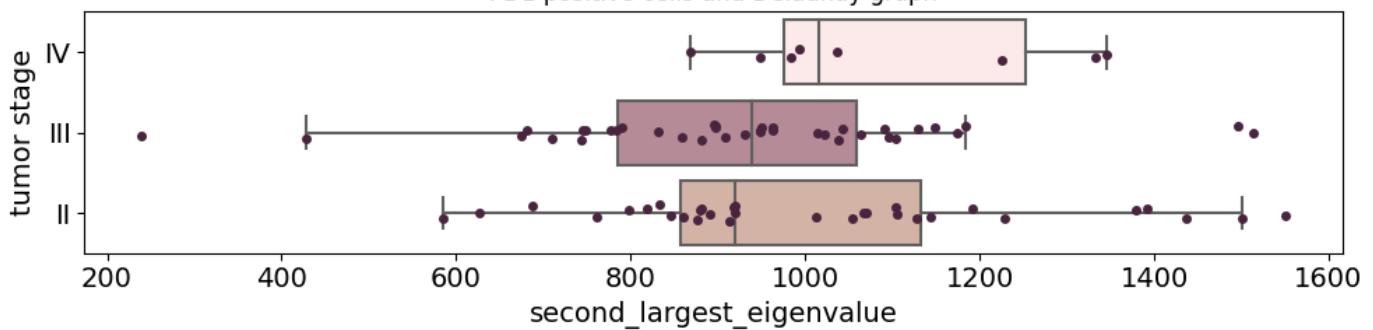
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PD1 positive cells and Delaunay graph



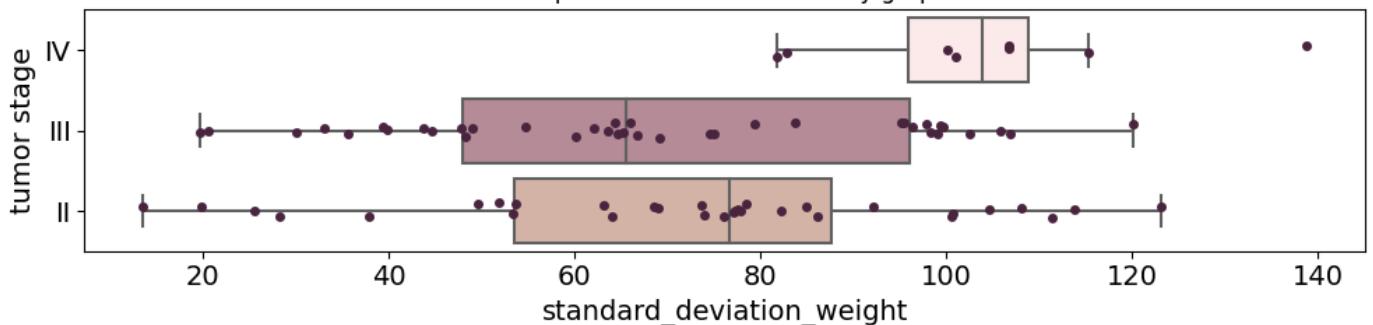
Boxplot of radius by Tumor stage  
PD1 positive cells and Delaunay graph



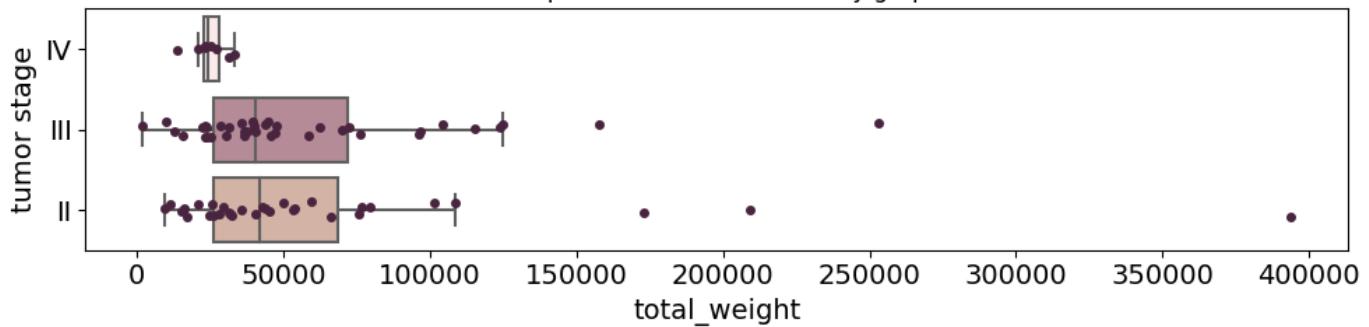
Boxplot of second\_largest\_eigenvalue by Tumor stage  
PD1 positive cells and Delaunay graph



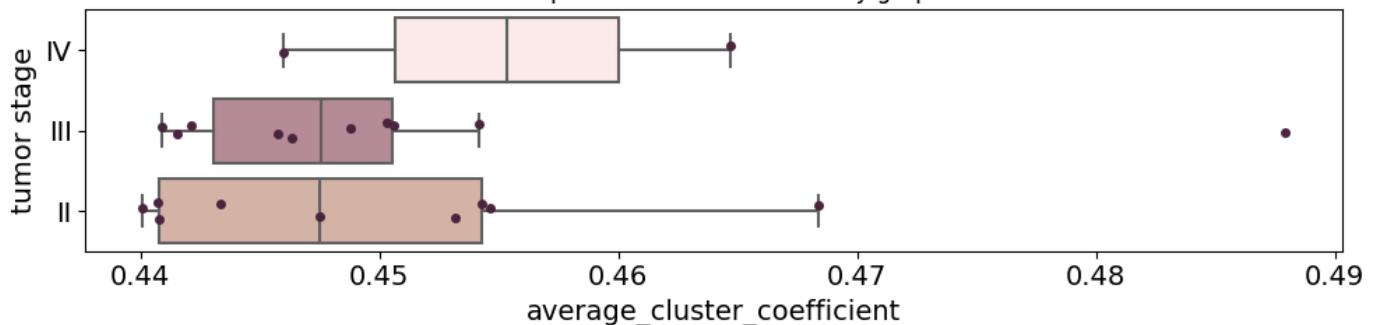
Boxplot of standard\_deviation\_weight by Tumor stage  
PD1 positive cells and Delaunay graph



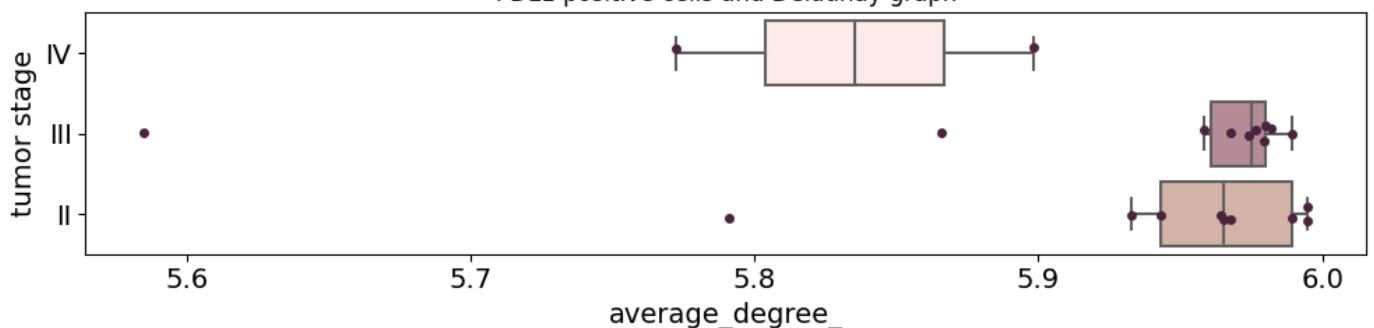
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PD1 positive cells and Delaunay graph



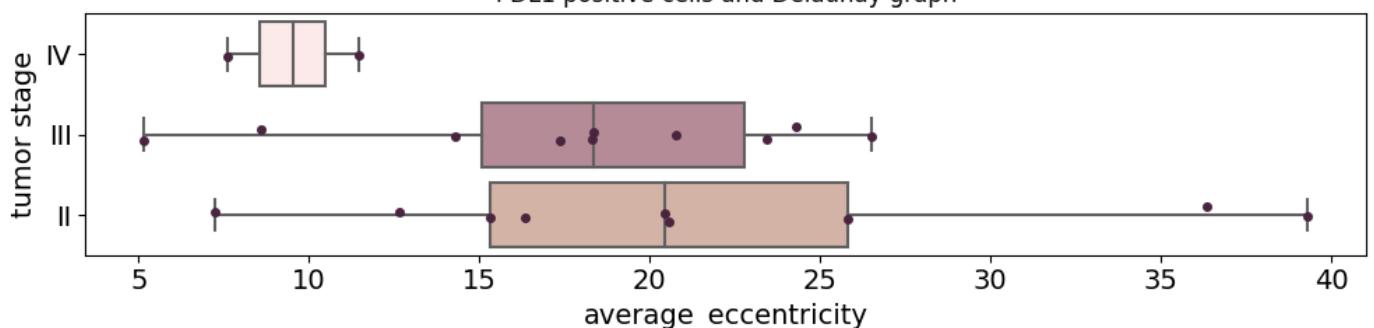
Boxplot of average\_cluster\_coefficient by Tumor stage  
PDL1 positive cells and Delaunay graph



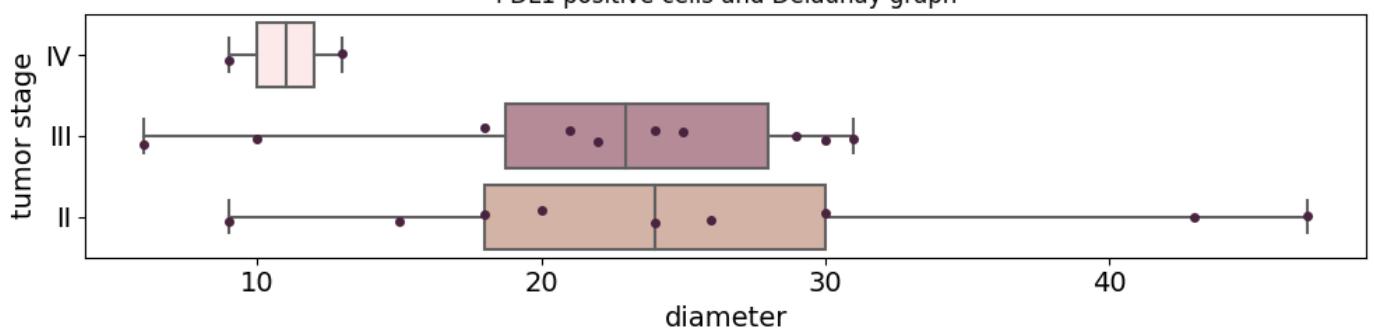
Boxplot of average\_degree\_ by Tumor stage  
PDL1 positive cells and Delaunay graph



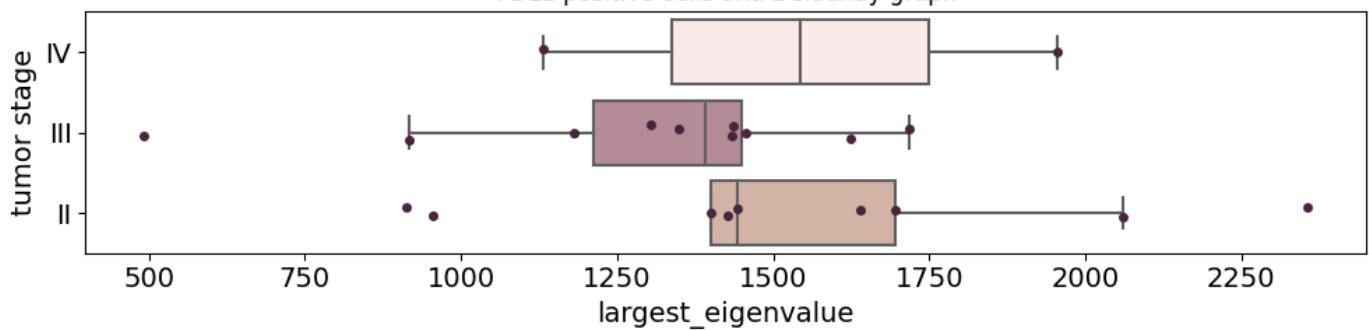
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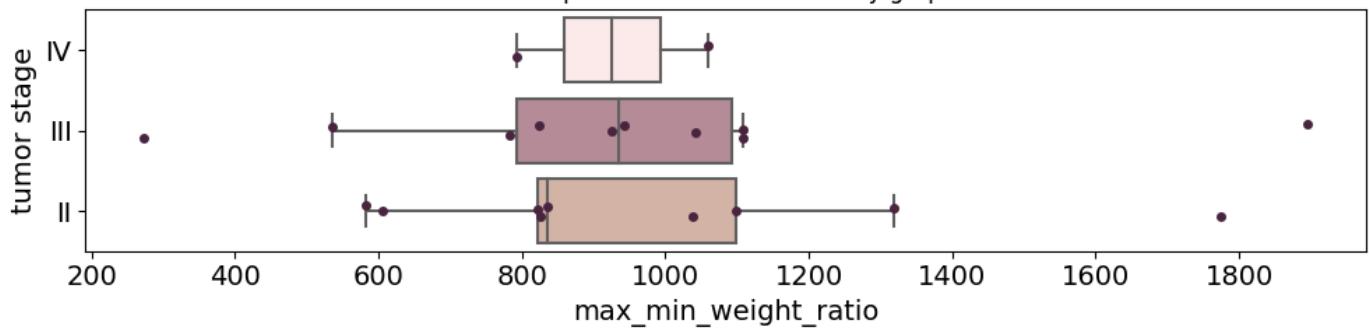
Boxplot of diameter by Tumor stage  
PDL1 positive cells and Delaunay graph



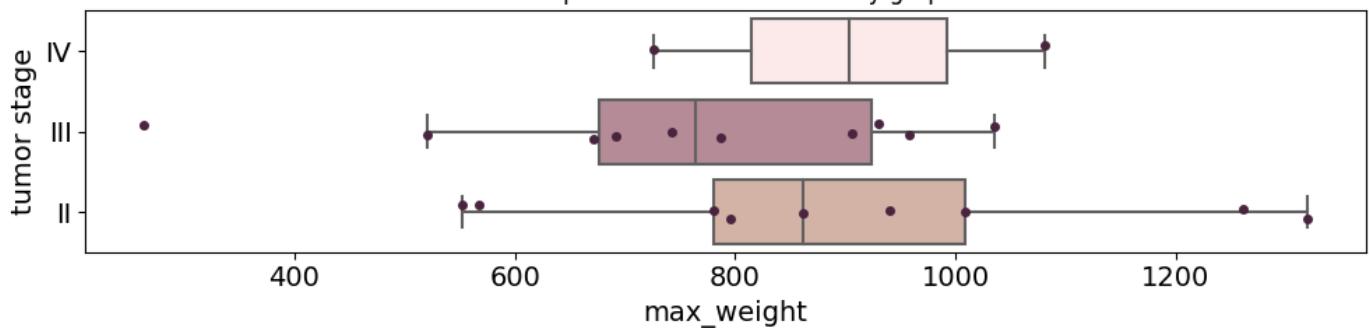
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PDL1 positive cells and Delaunay graph



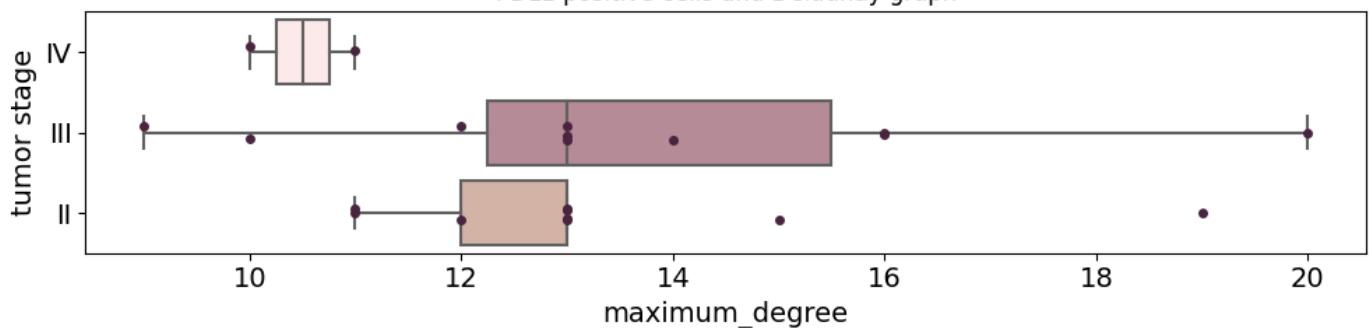
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PDL1 positive cells and Delaunay graph



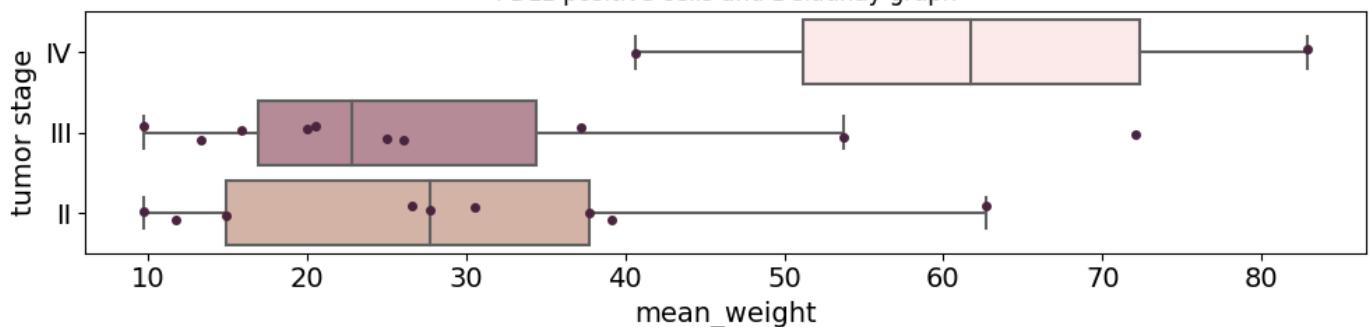
Boxplot of max\_weight by Tumor stage  
PDL1 positive cells and Delaunay graph



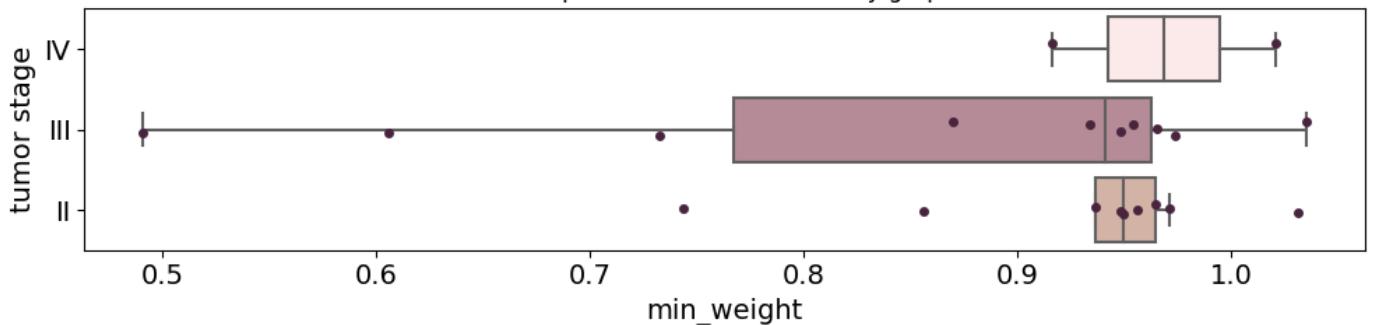
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PDL1 positive cells and Delaunay graph



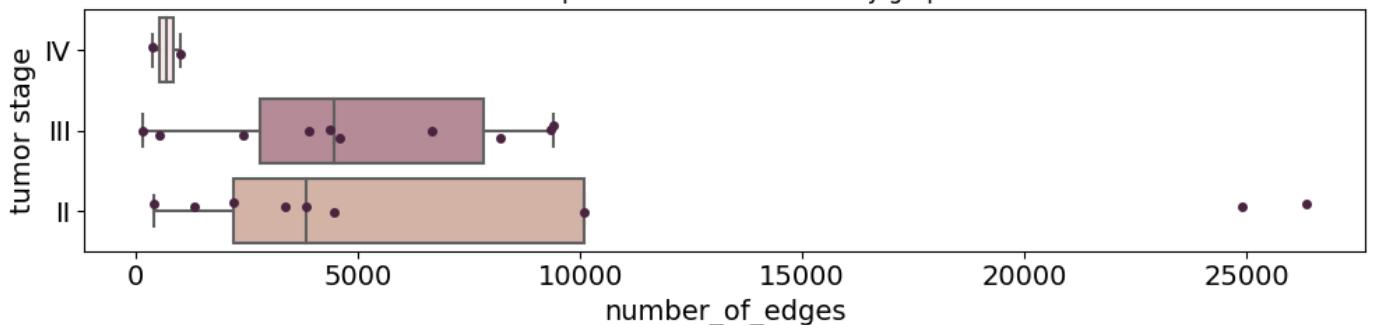
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PDL1 positive cells and Delaunay graph



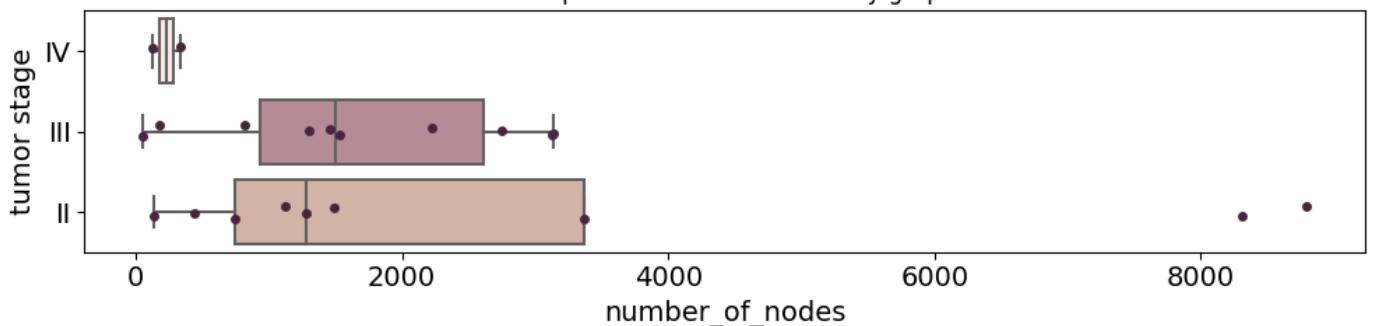
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PDL1 positive cells and Delaunay graph



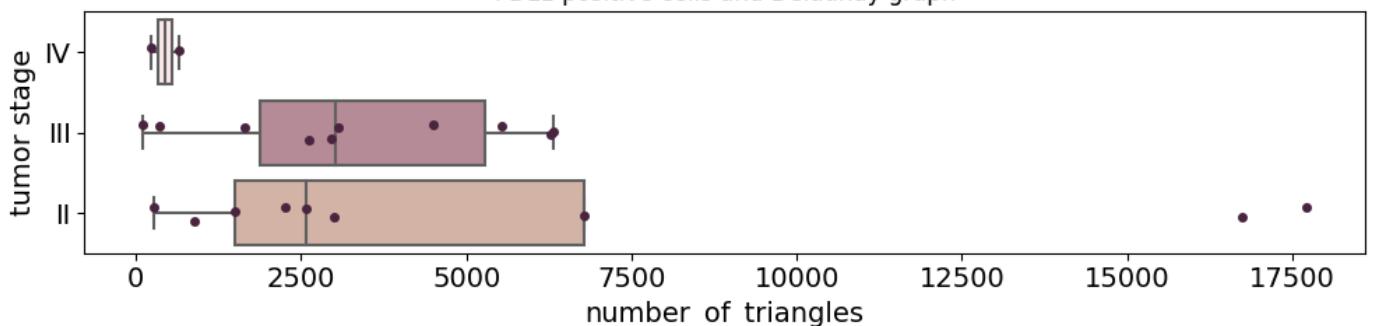
Boxplot of number\_of\_edges by Tumor stage  
PDL1 positive cells and Delaunay graph



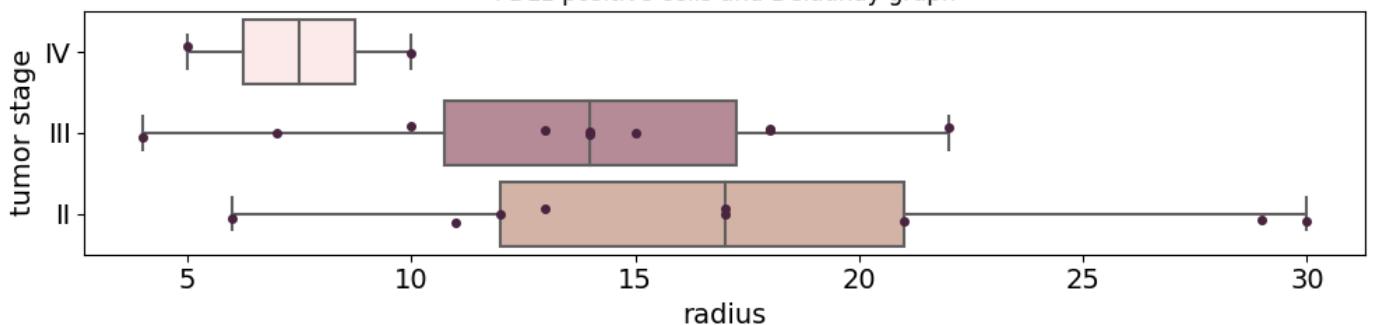
Boxplot of number\_of\_nodes by Tumor stage  
PDL1 positive cells and Delaunay graph

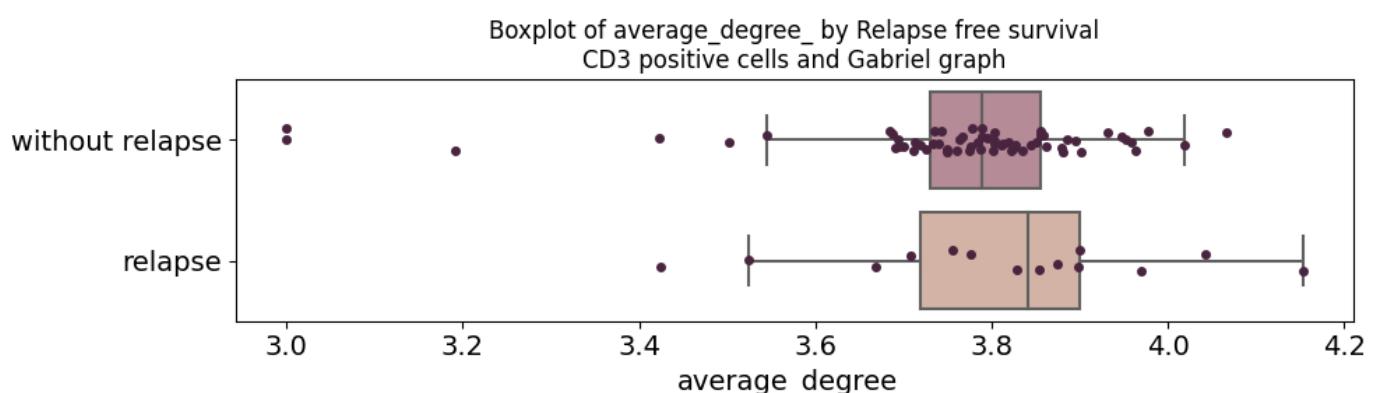
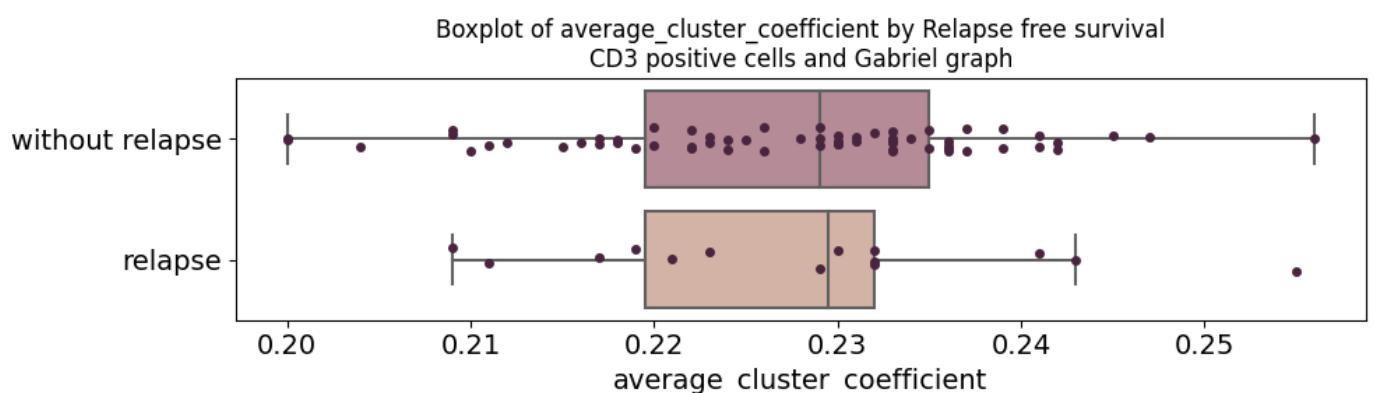
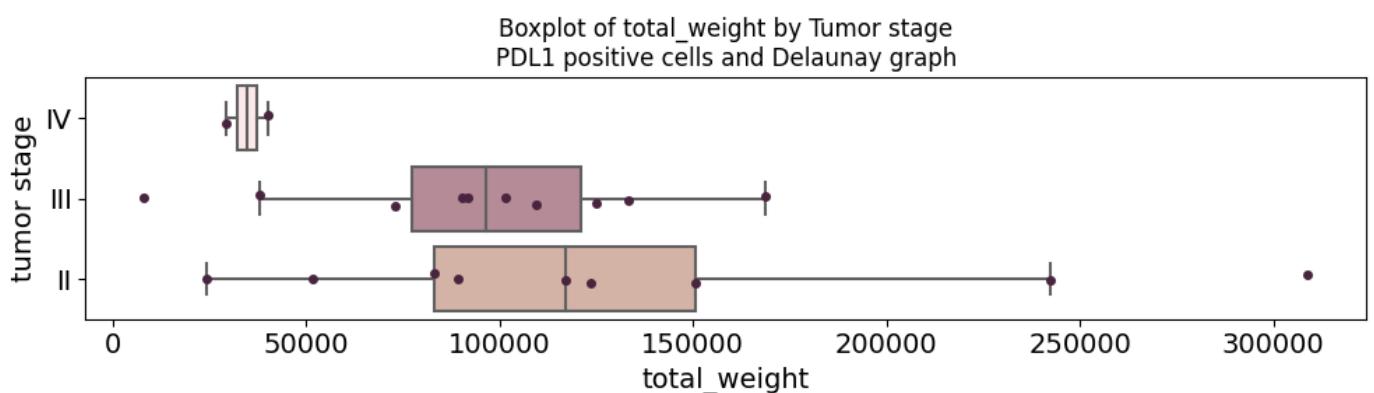
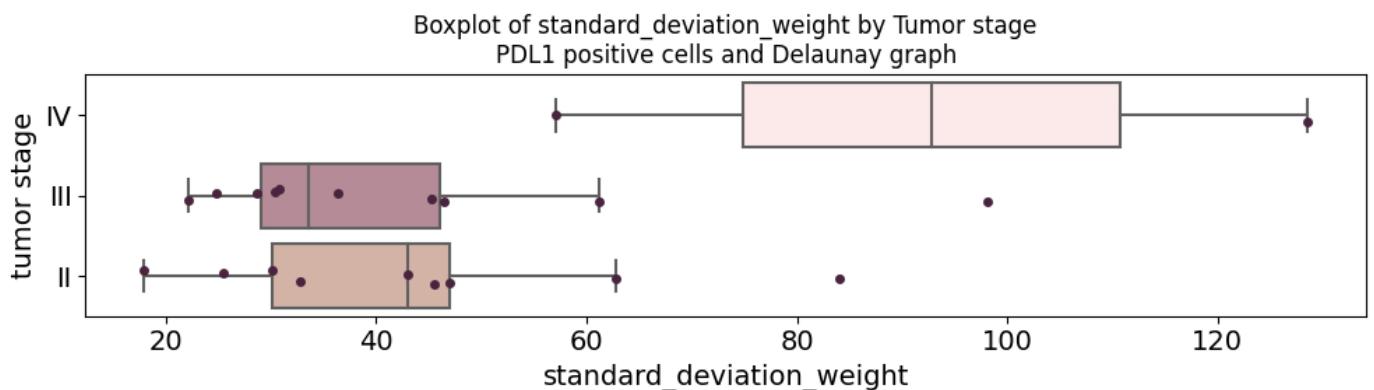
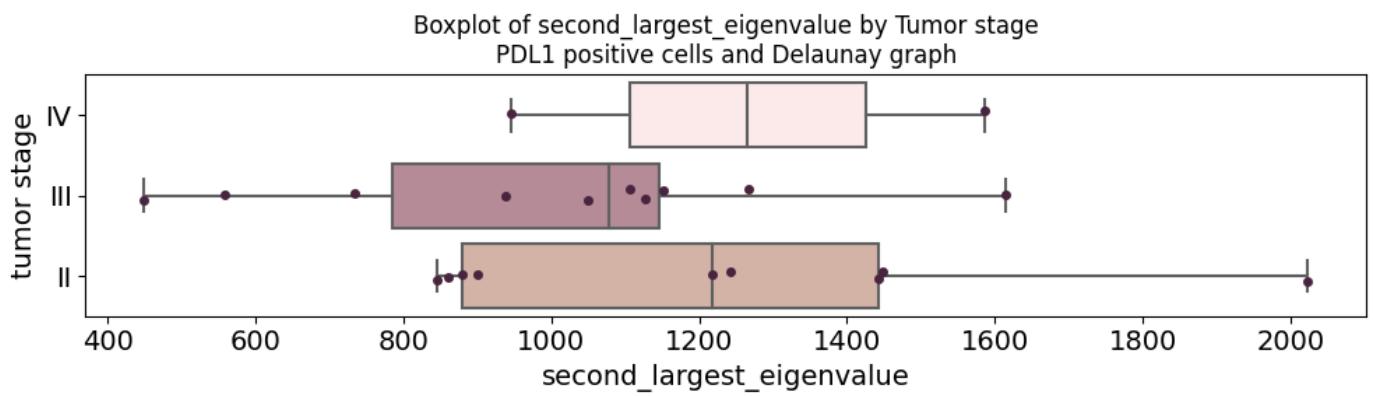


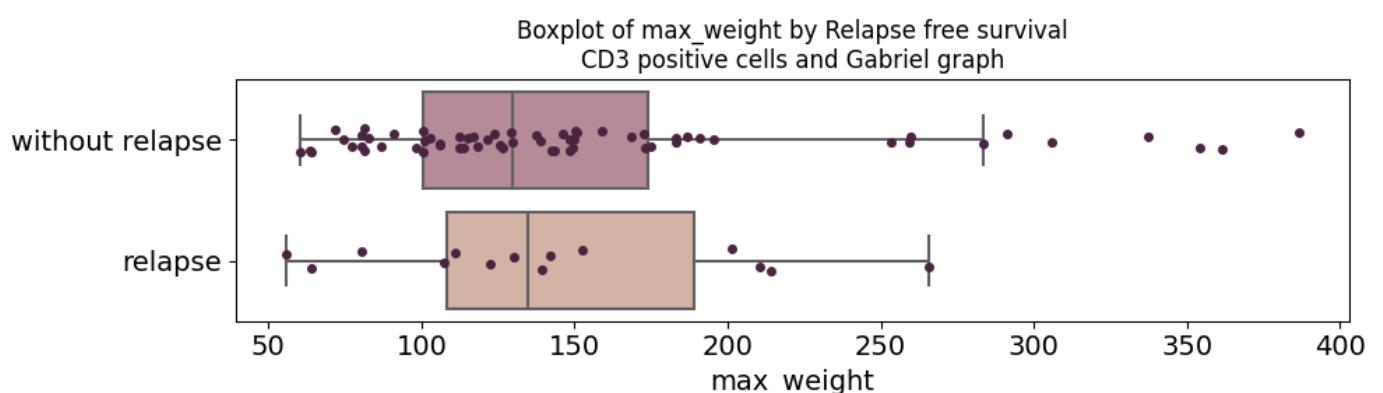
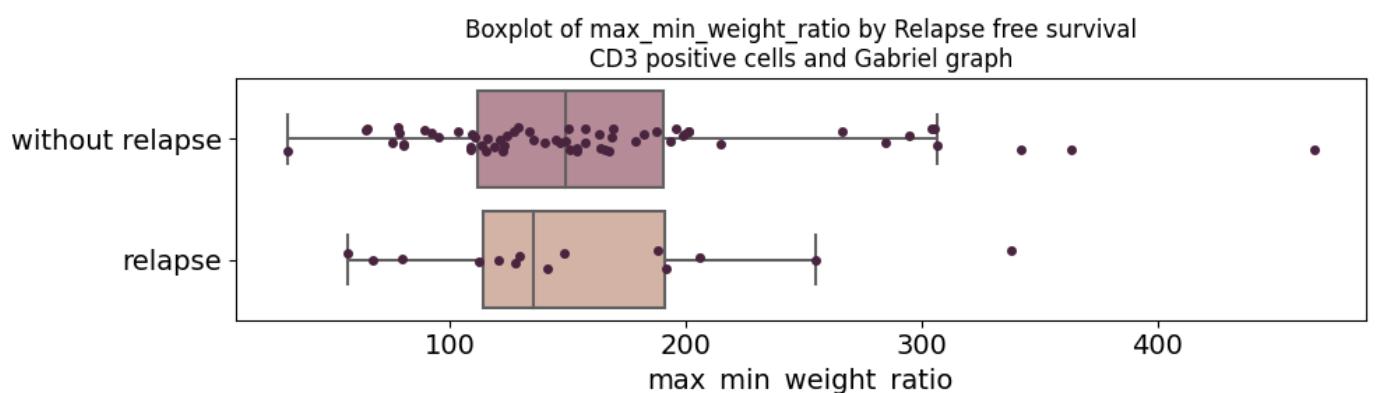
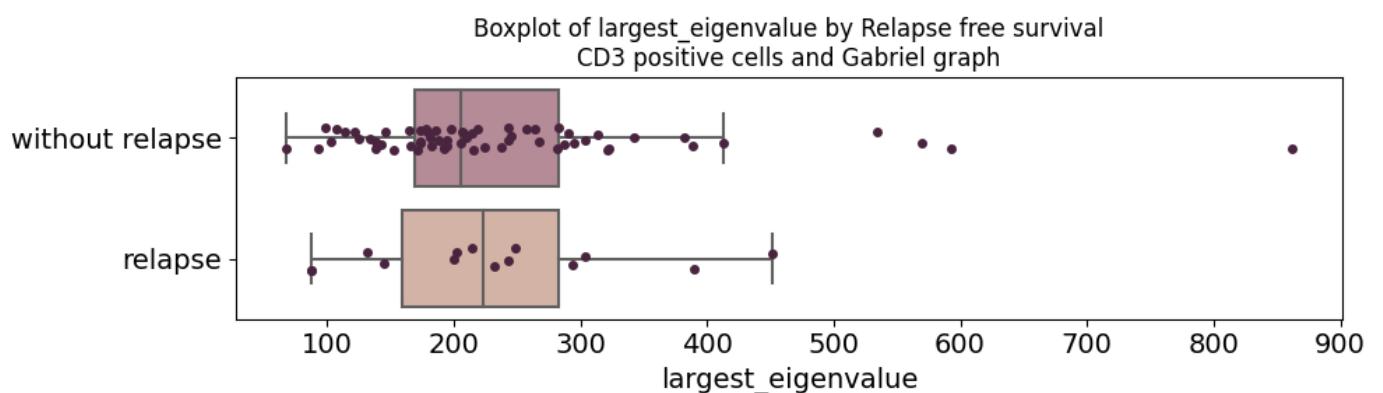
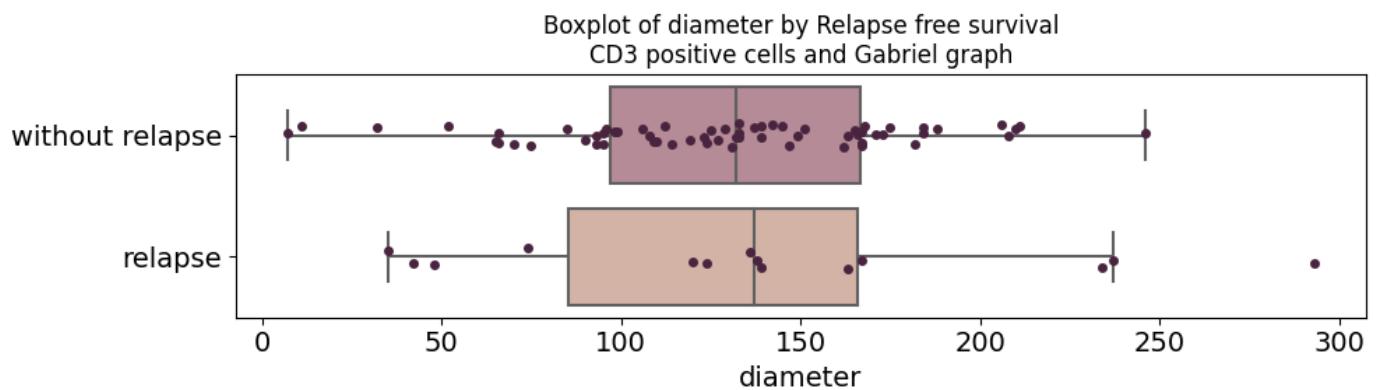
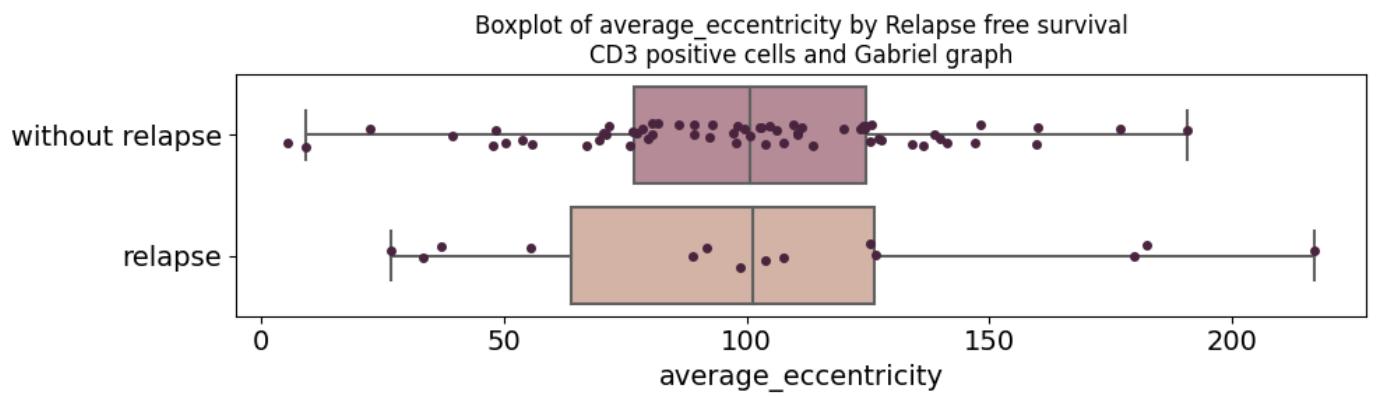
Boxplot of number\_of\_triangles by Tumor stage  
PDL1 positive cells and Delaunay graph

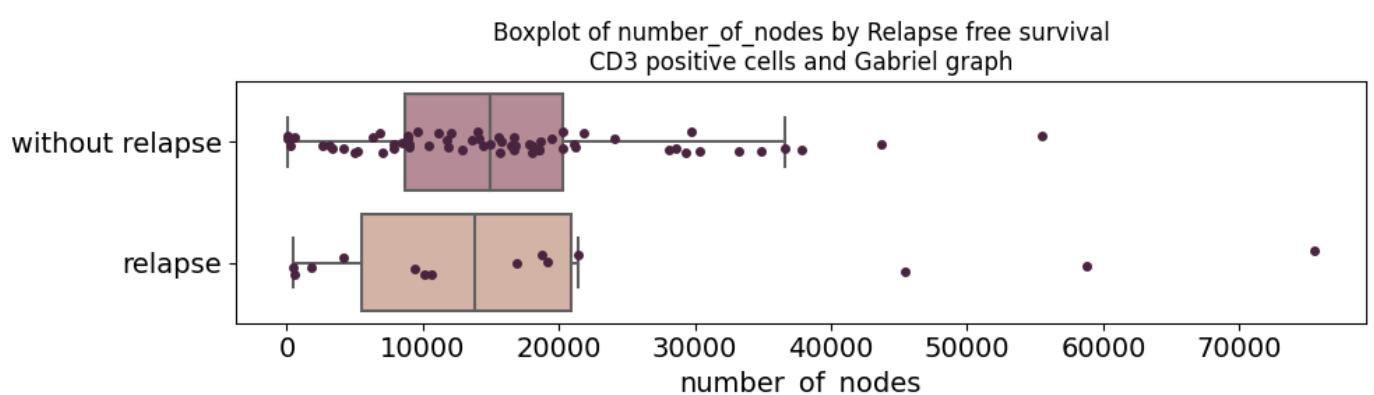
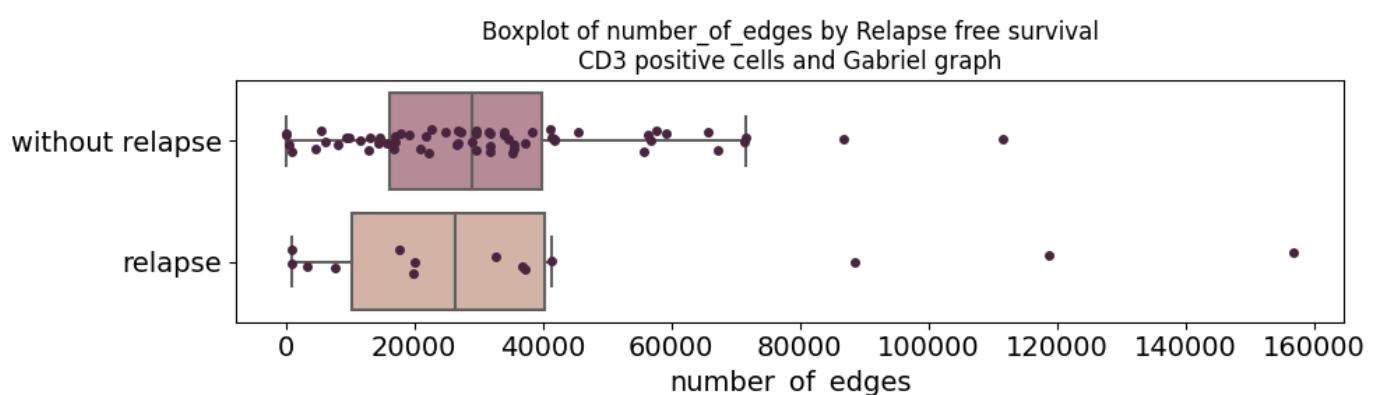
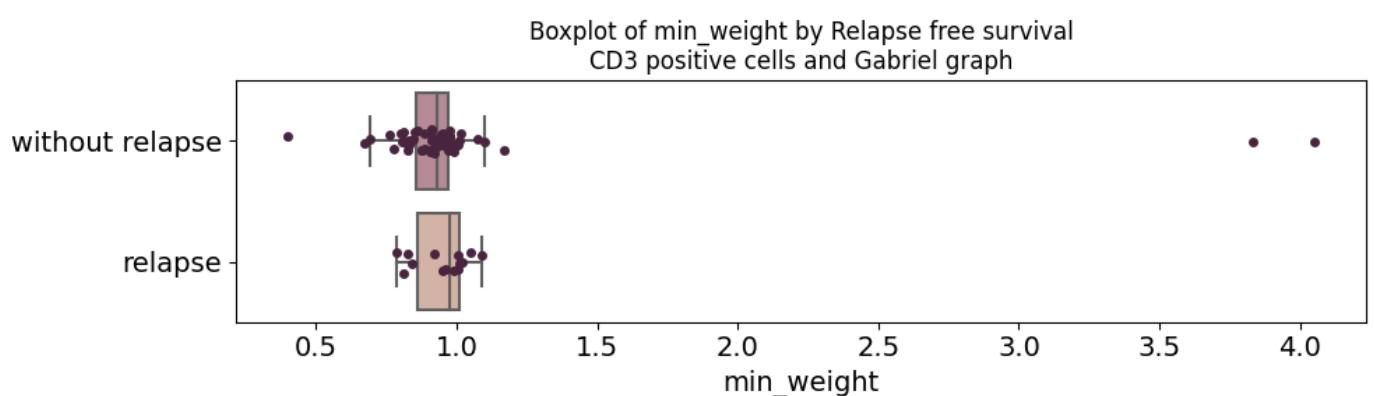
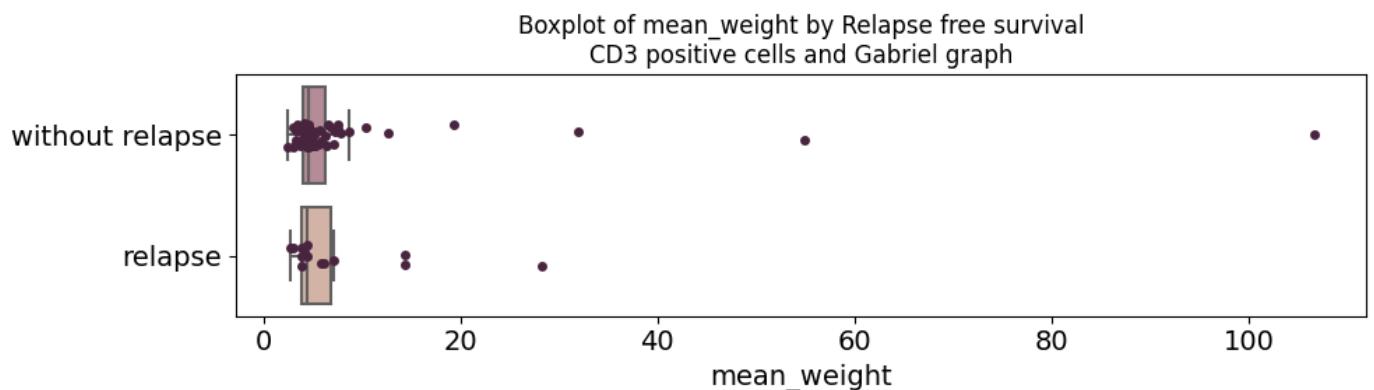
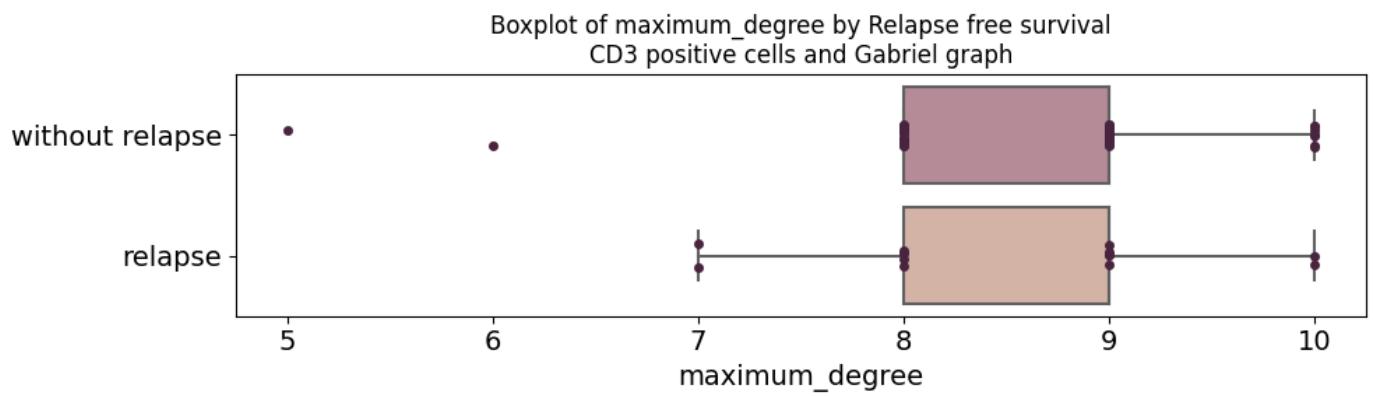


Boxplot of radius by Tumor stage  
PDL1 positive cells and Delaunay graph

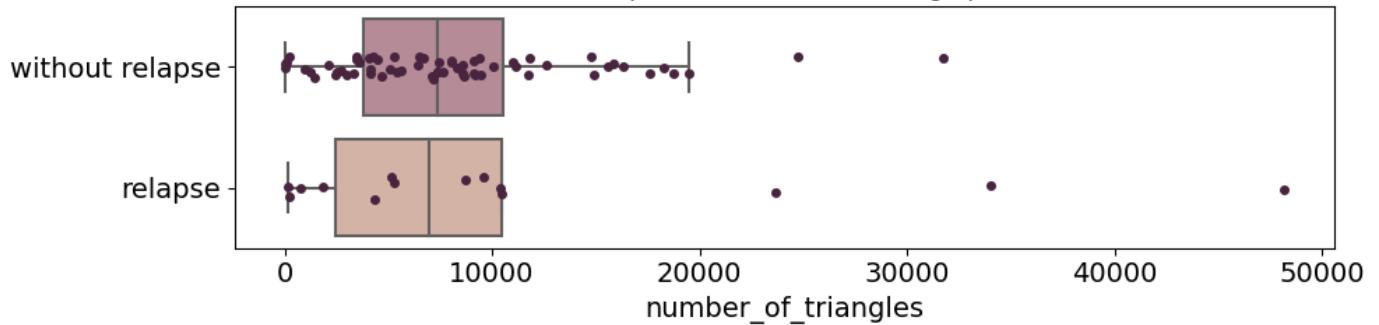




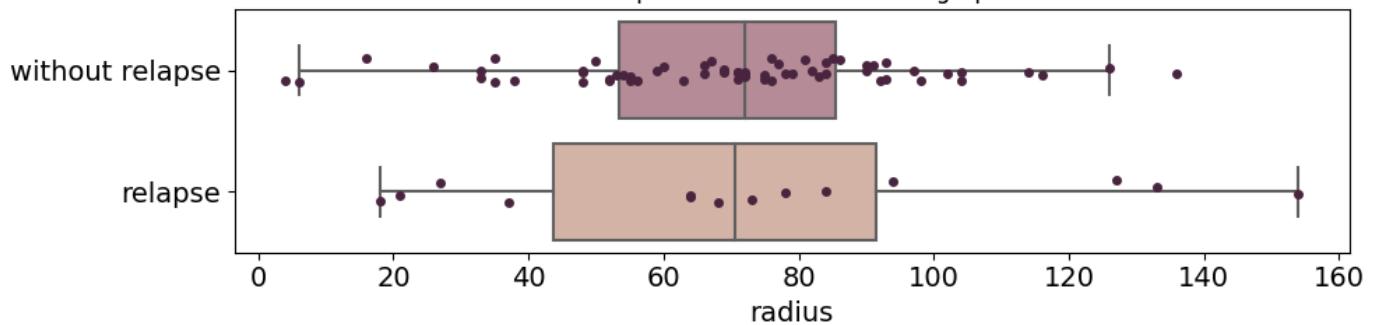




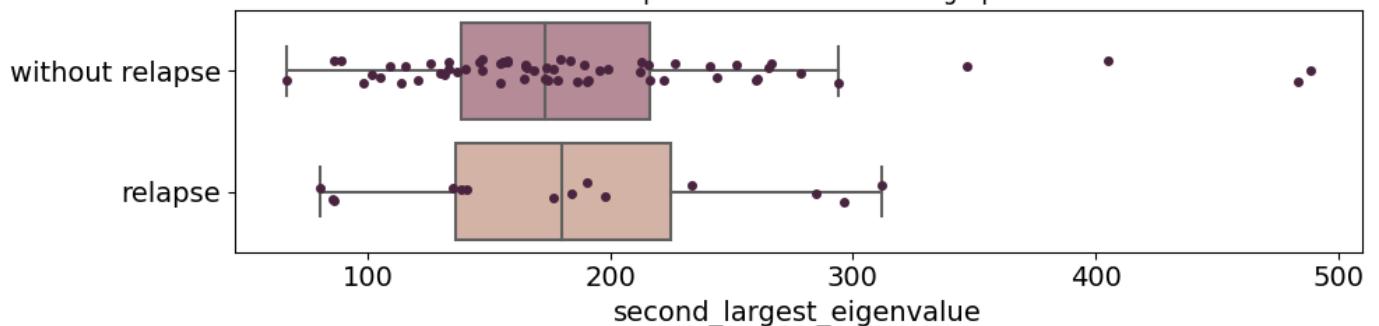
Boxplot of number\_of\_triangles by Relapse free survival  
CD3 positive cells and Gabriel graph



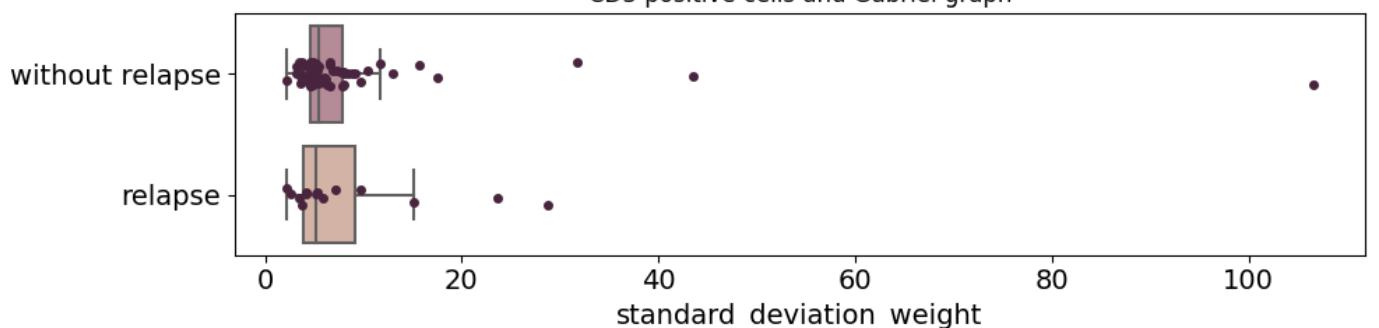
Boxplot of radius by Relapse free survival  
CD3 positive cells and Gabriel graph



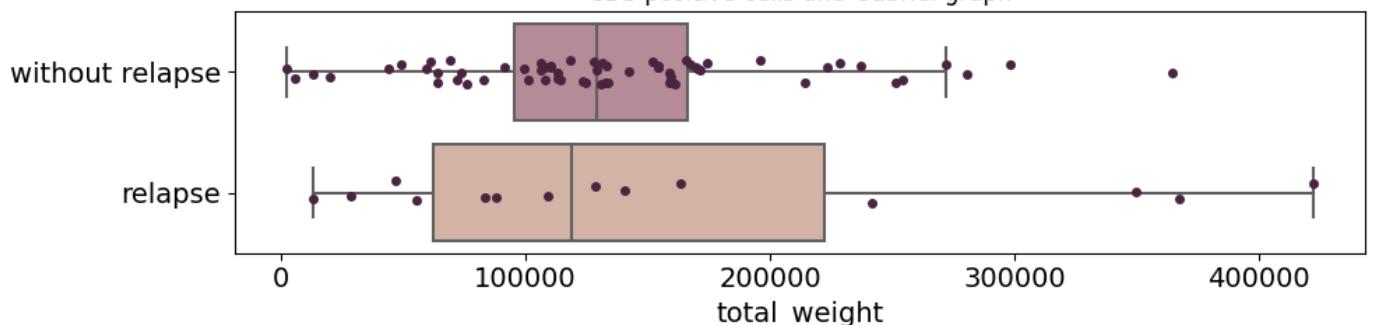
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD3 positive cells and Gabriel graph



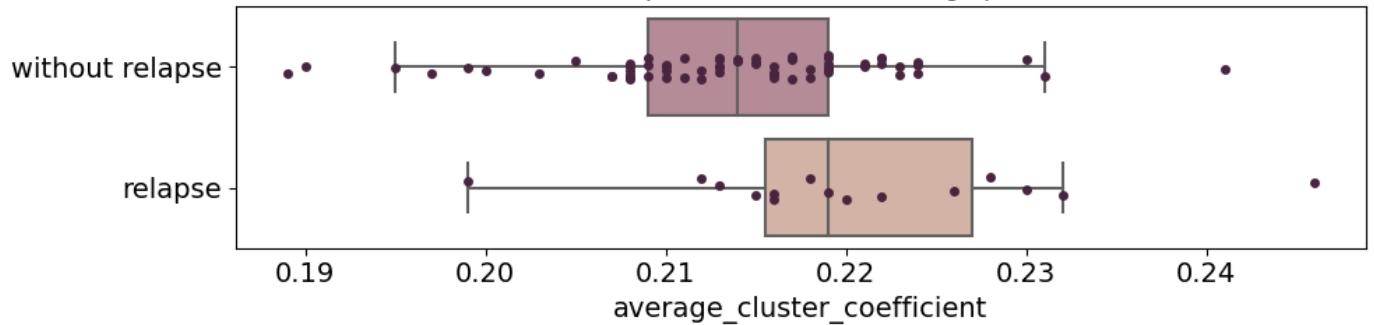
Boxplot of standard\_deviation\_weight by Relapse free survival  
CD3 positive cells and Gabriel graph



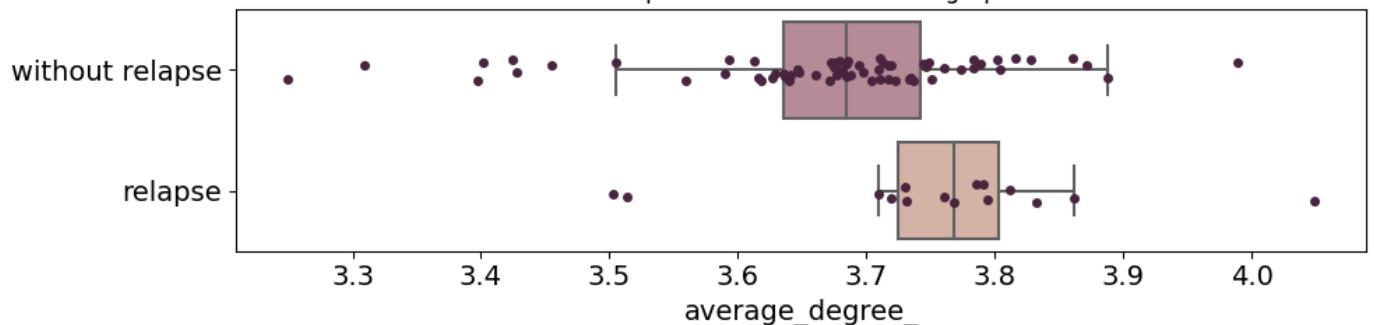
Boxplot of total\_weight by Relapse free survival  
CD3 positive cells and Gabriel graph



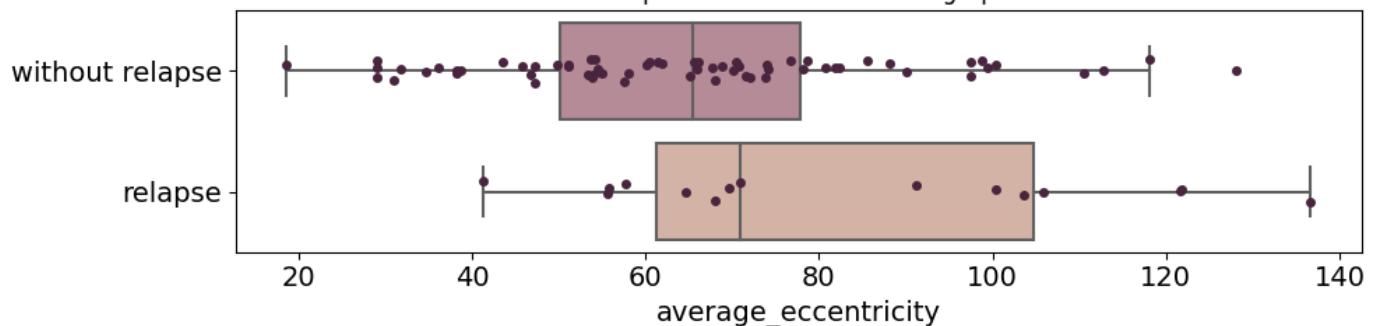
Boxplot of average\_cluster\_coefficient by Relapse free survival  
CD8 positive cells and Gabriel graph



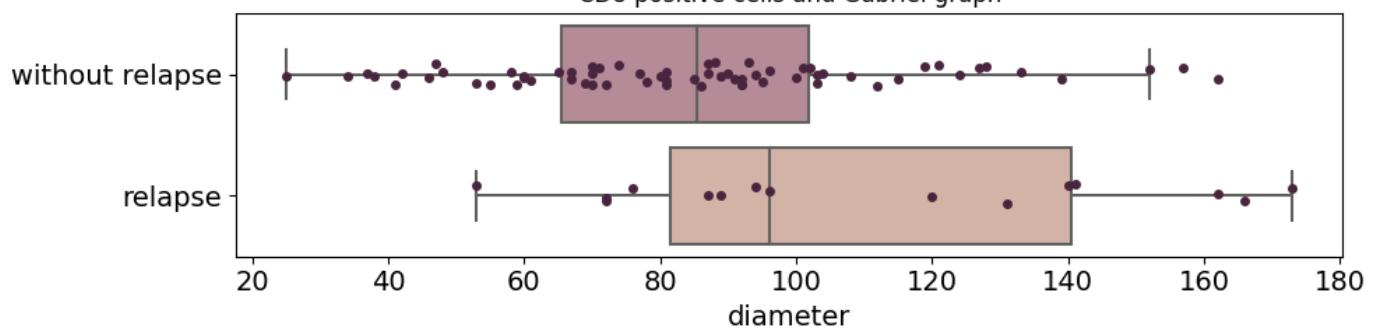
Boxplot of average\_degree\_ by Relapse free survival  
CD8 positive cells and Gabriel graph



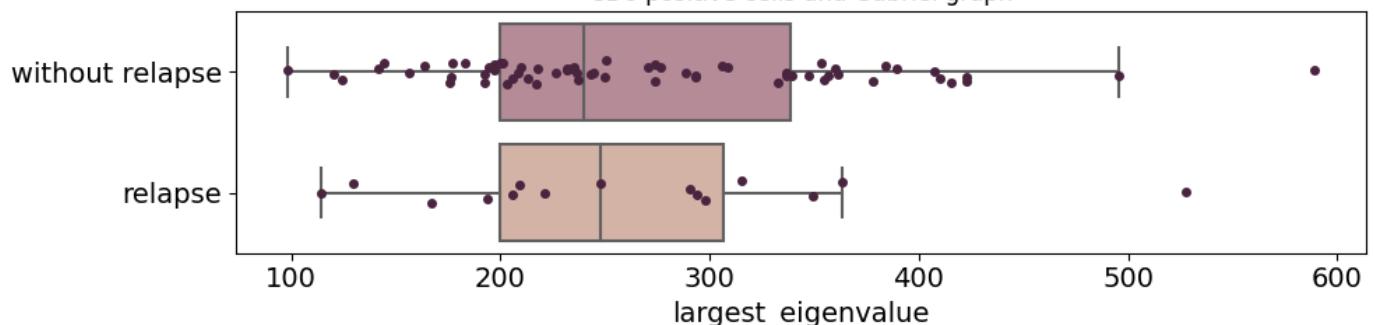
Boxplot of average\_eccentricity by Relapse free survival  
CD8 positive cells and Gabriel graph



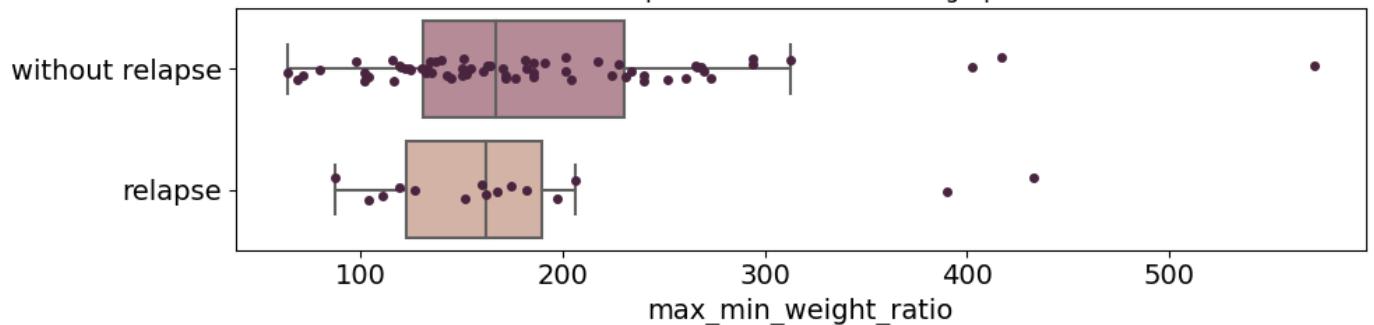
Boxplot of diameter by Relapse free survival  
CD8 positive cells and Gabriel graph



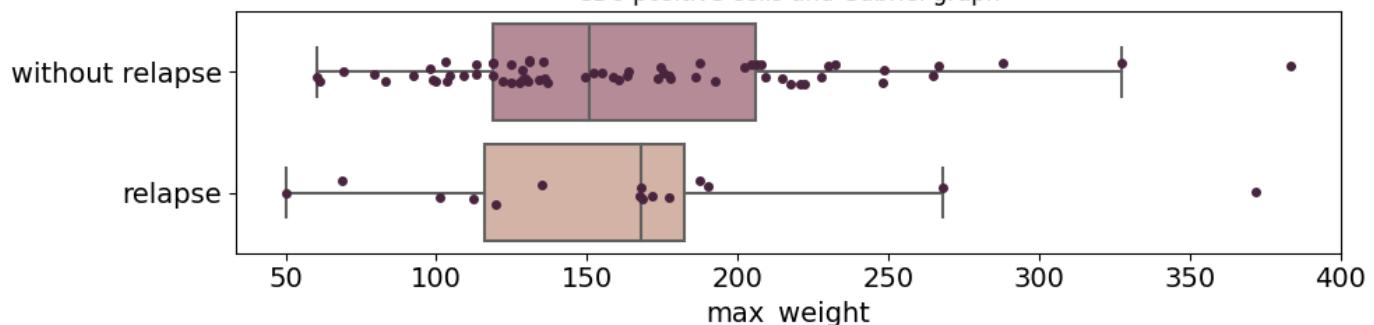
Boxplot of largest\_eigenvalue by Relapse free survival  
CD8 positive cells and Gabriel graph



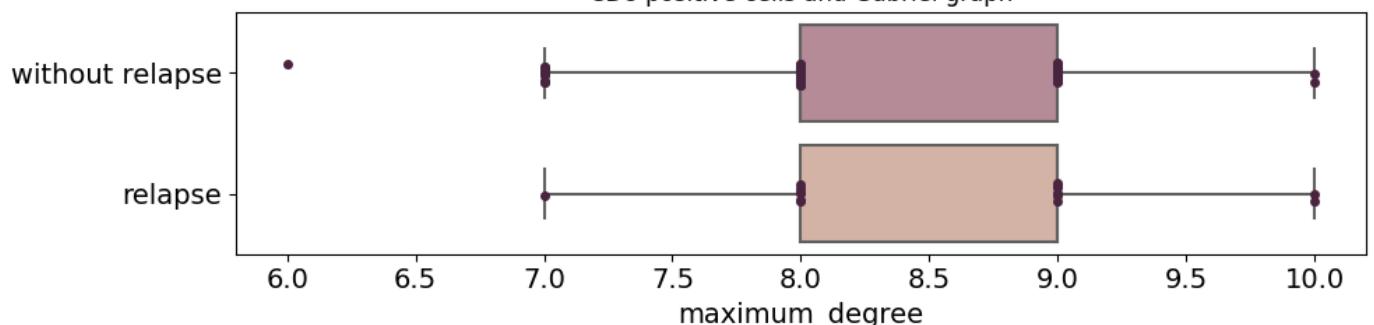
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD8 positive cells and Gabriel graph



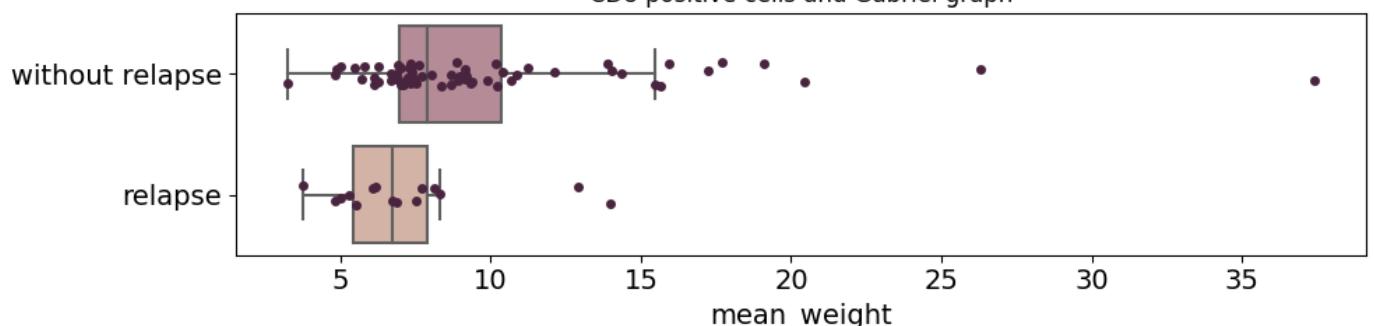
Boxplot of max\_weight by Relapse free survival  
CD8 positive cells and Gabriel graph



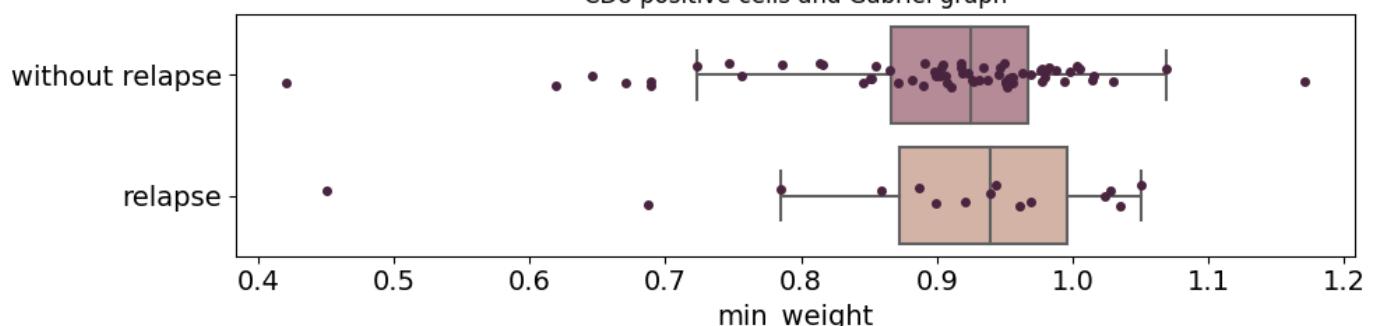
Boxplot of maximum\_degree by Relapse free survival  
CD8 positive cells and Gabriel graph



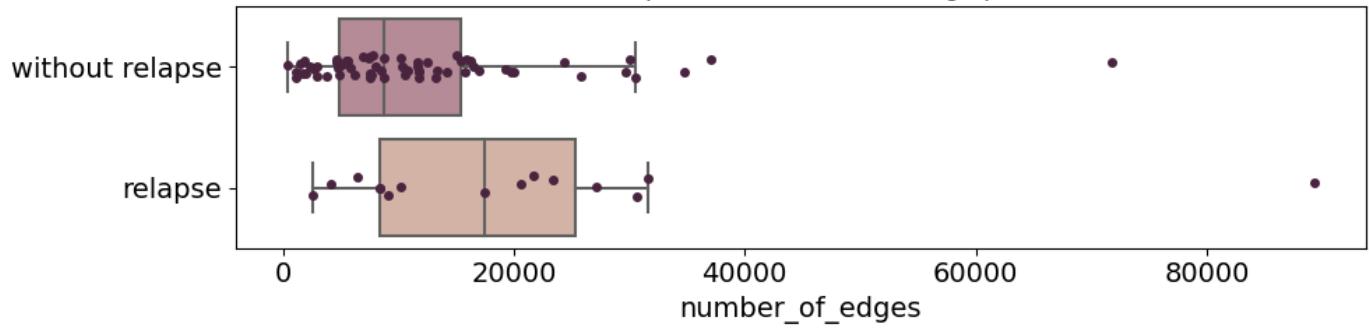
Boxplot of mean\_weight by Relapse free survival  
CD8 positive cells and Gabriel graph



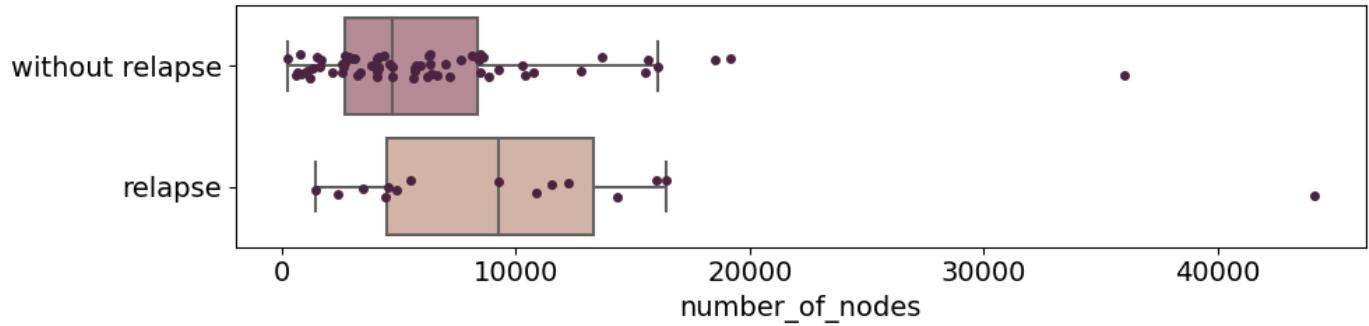
Boxplot of min\_weight by Relapse free survival  
CD8 positive cells and Gabriel graph



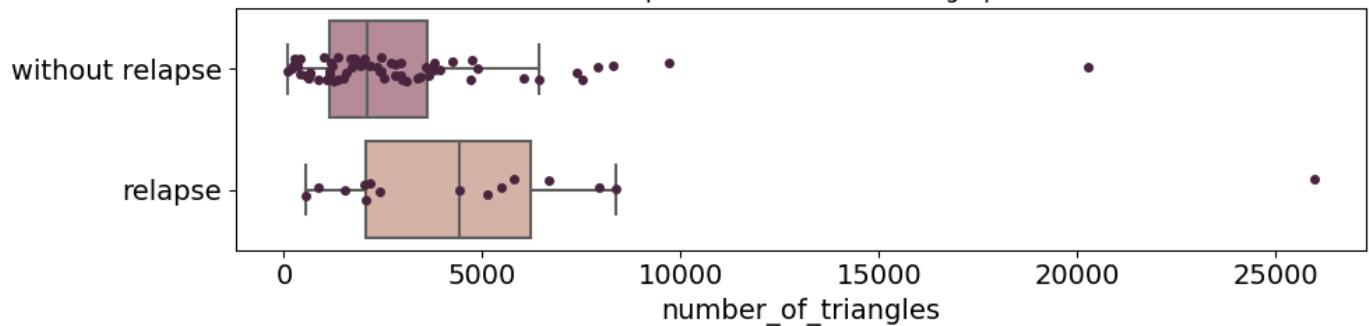
Boxplot of number\_of\_edges by Relapse free survival  
CD8 positive cells and Gabriel graph



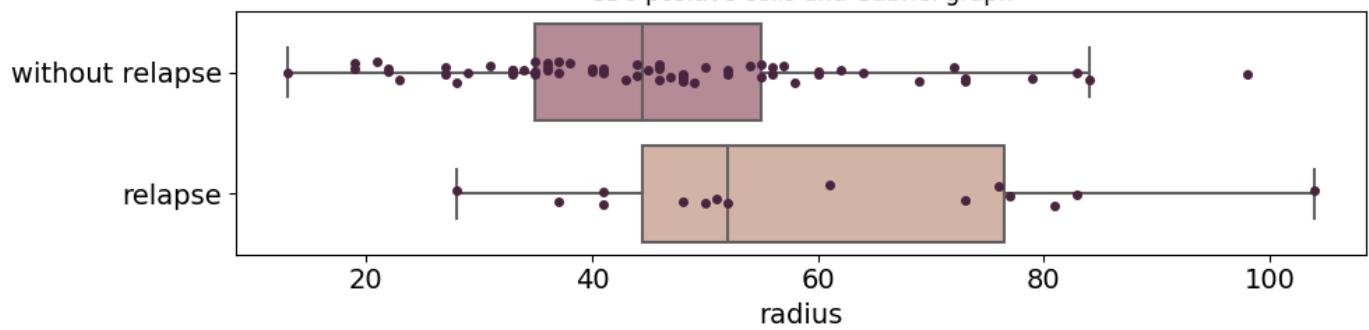
Boxplot of number\_of\_nodes by Relapse free survival  
CD8 positive cells and Gabriel graph



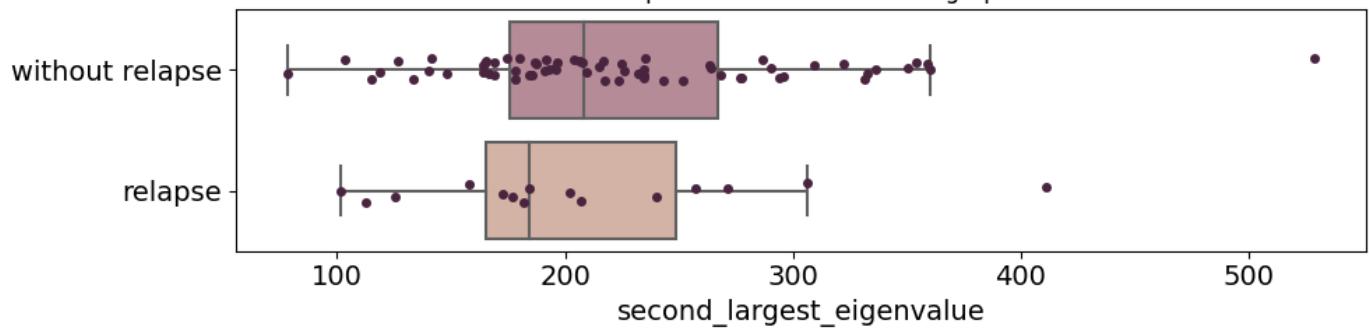
Boxplot of number\_of\_triangles by Relapse free survival  
CD8 positive cells and Gabriel graph



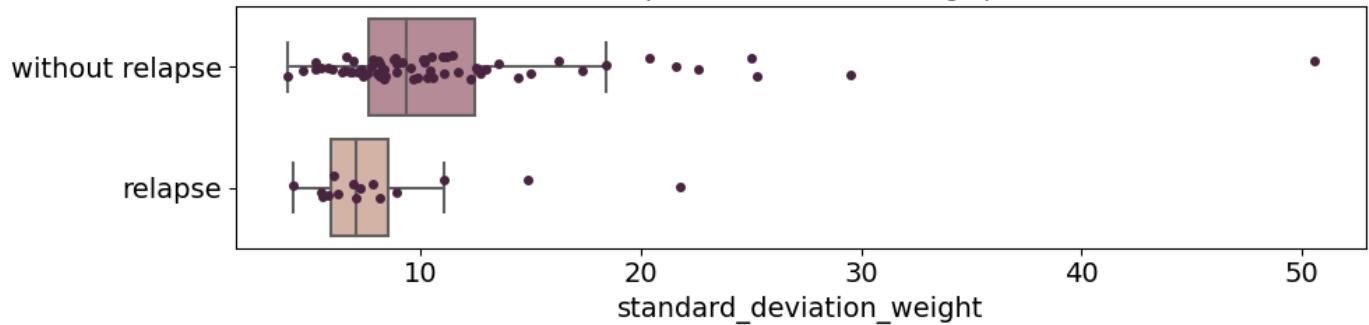
Boxplot of radius by Relapse free survival  
CD8 positive cells and Gabriel graph



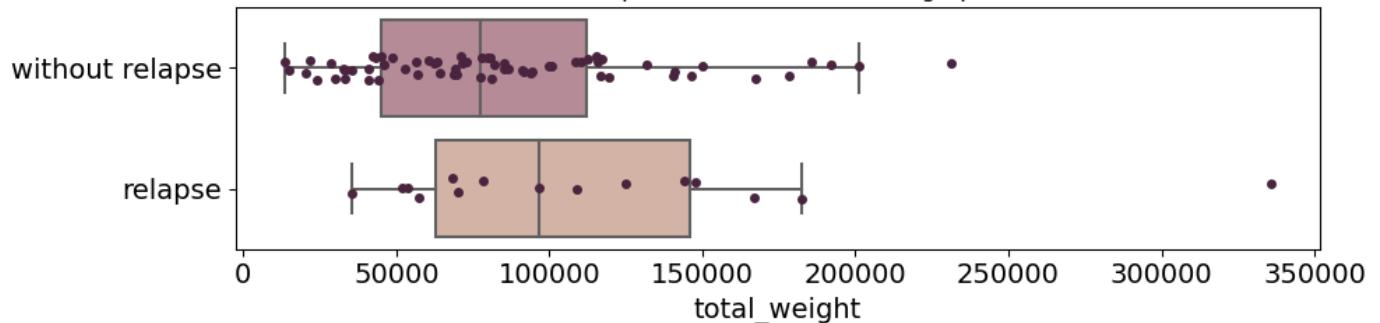
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD8 positive cells and Gabriel graph



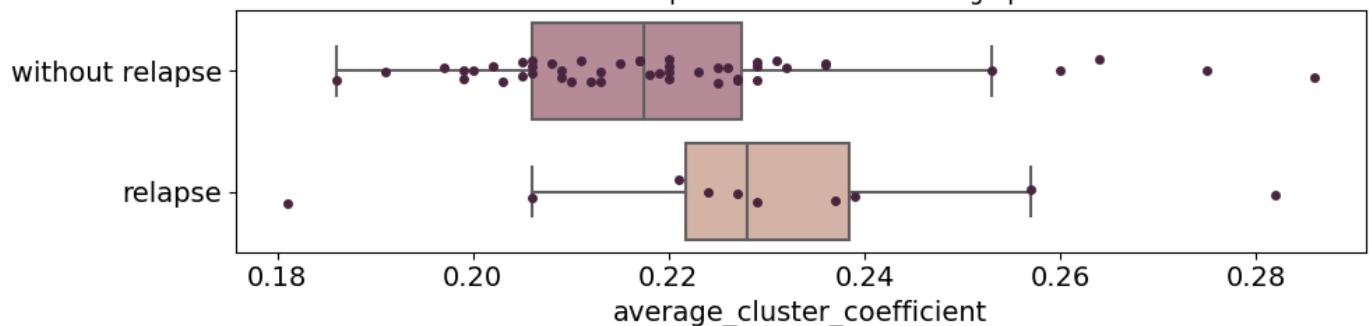
Boxplot of standard\_deviation\_weight by Relapse free survival  
CD8 positive cells and Gabriel graph



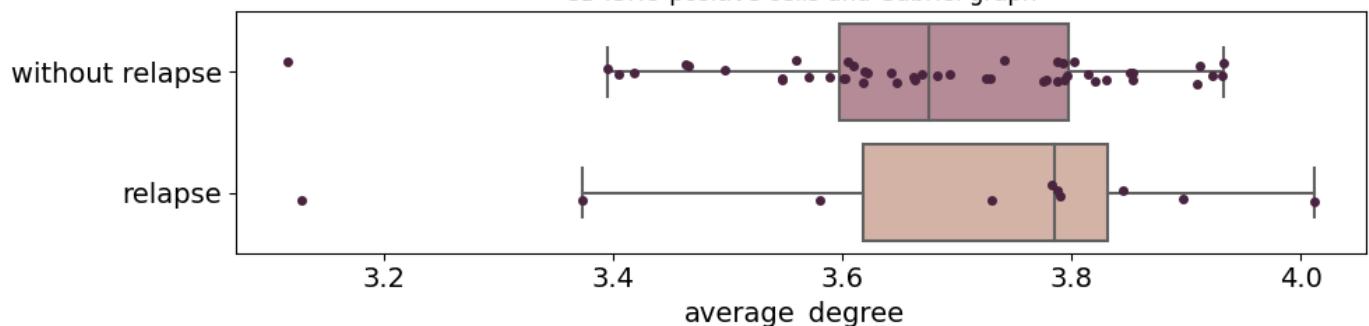
Boxplot of total\_weight by Relapse free survival  
CD8 positive cells and Gabriel graph



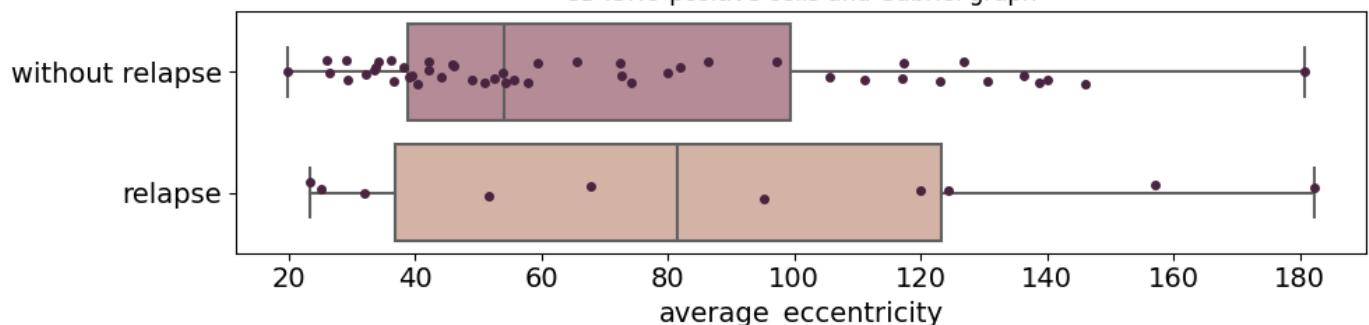
Boxplot of average\_cluster\_coefficient by Relapse free survival  
CD45RO positive cells and Gabriel graph

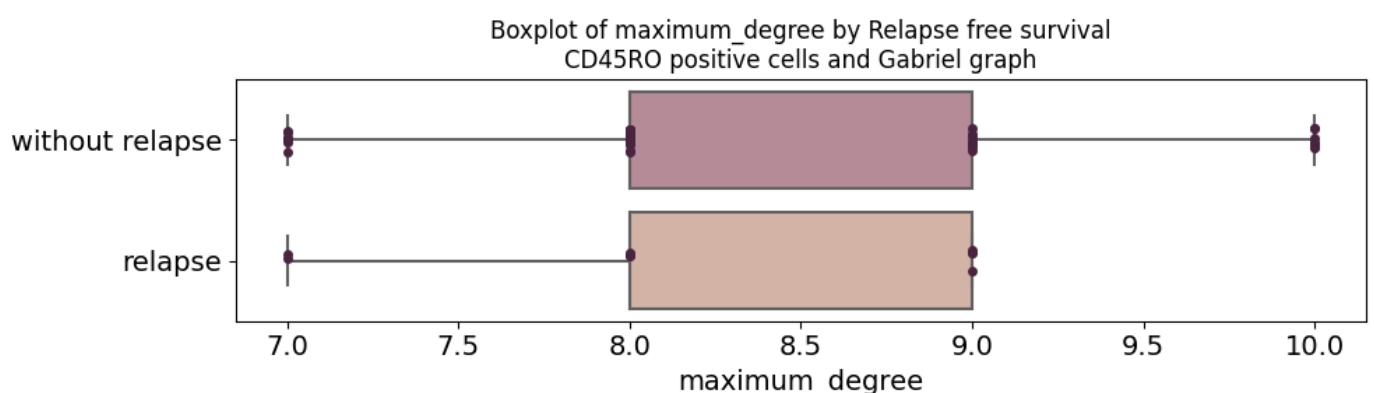
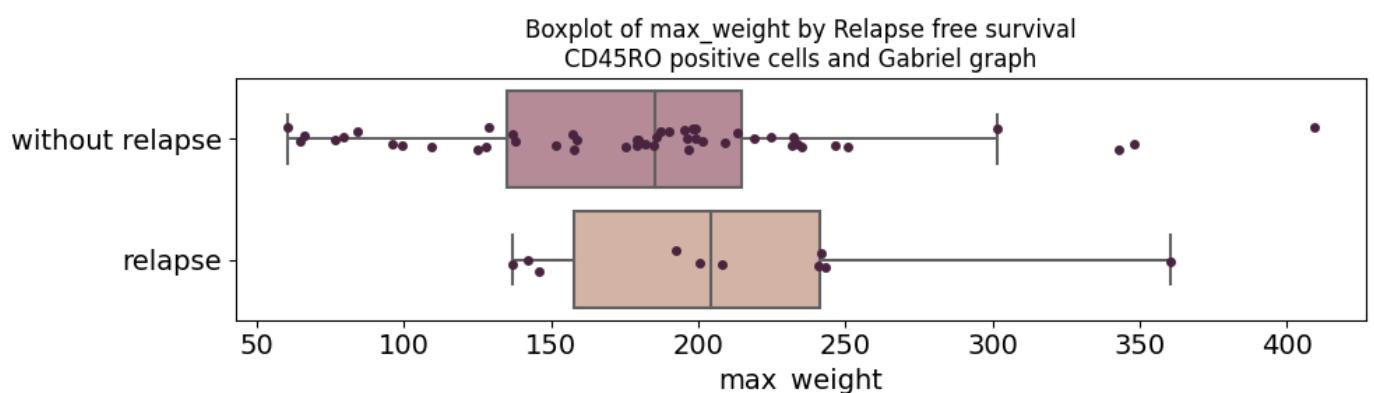
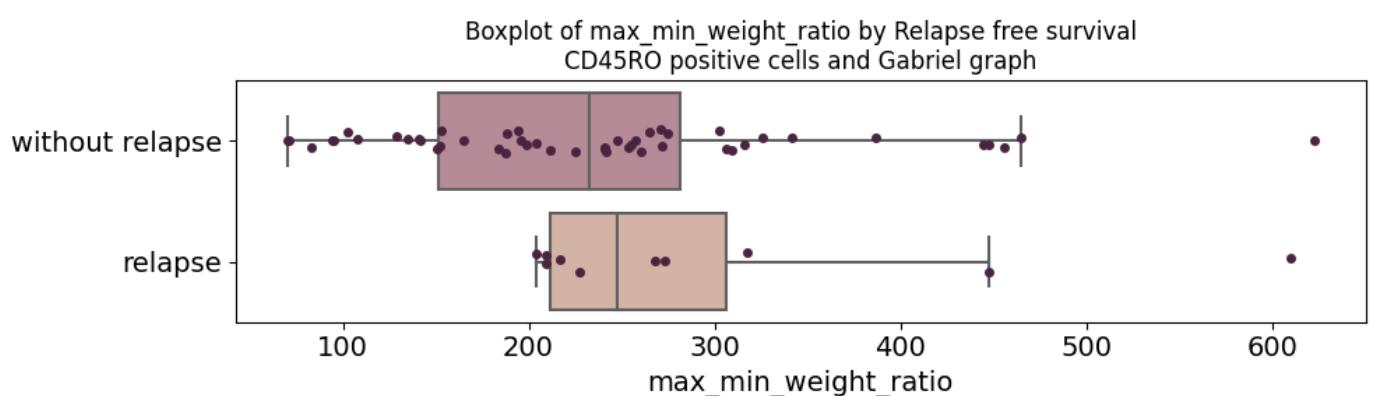
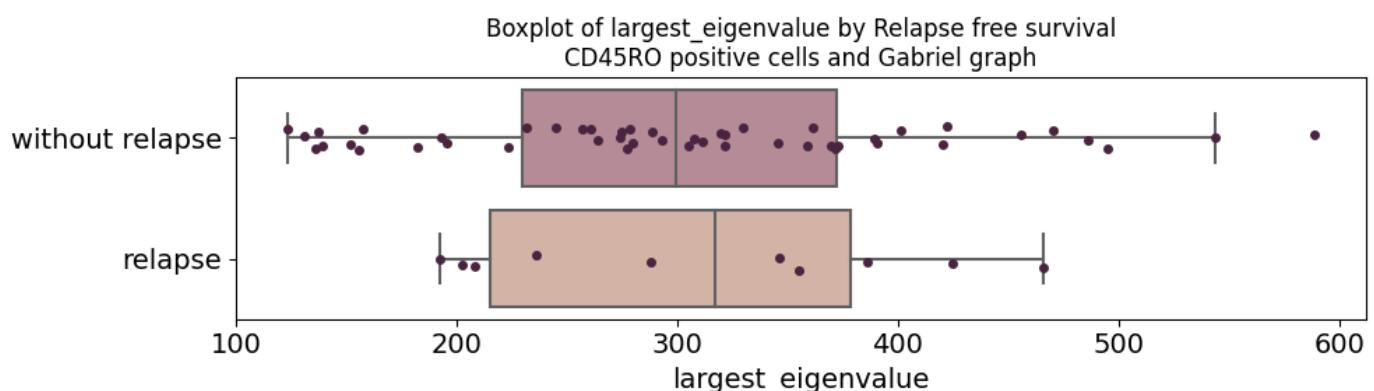
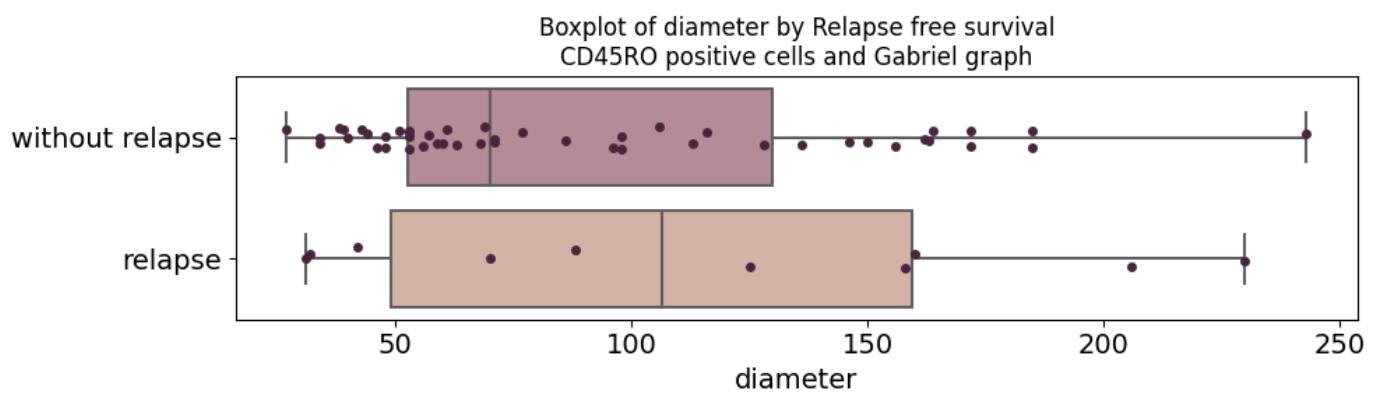


Boxplot of average\_degree\_ by Relapse free survival  
CD45RO positive cells and Gabriel graph

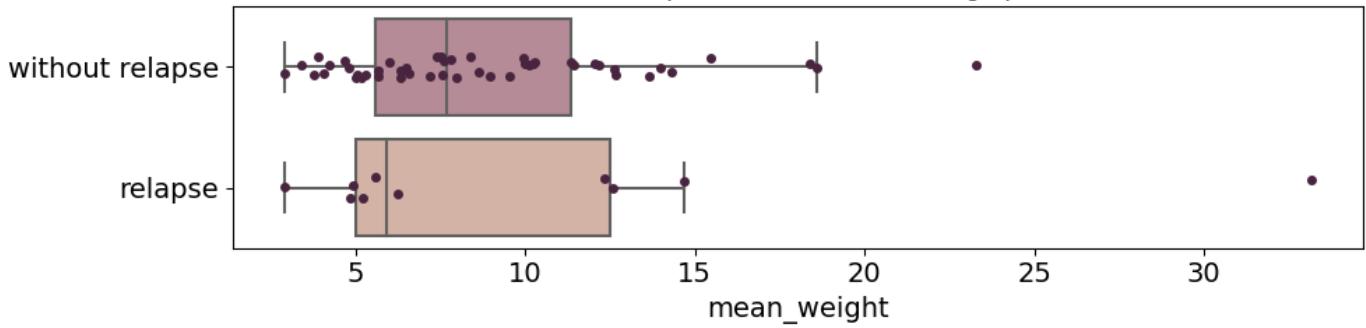


Boxplot of average\_eccentricity by Relapse free survival  
CD45RO positive cells and Gabriel graph

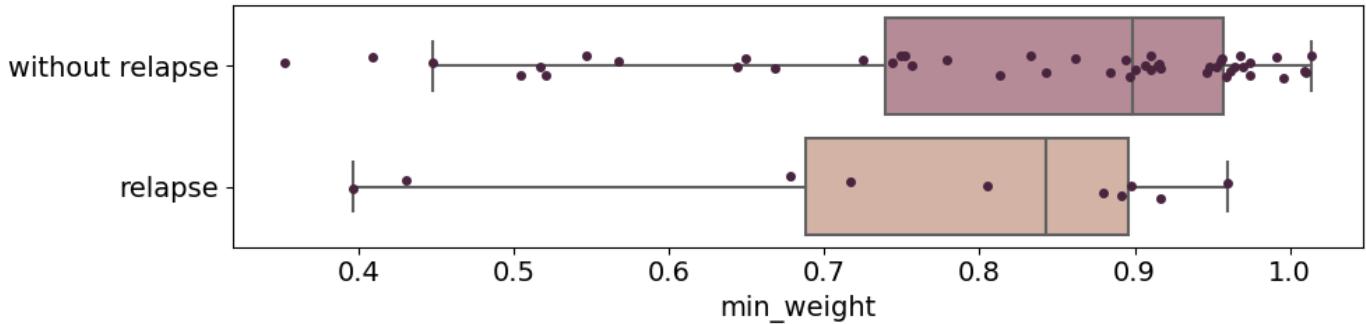




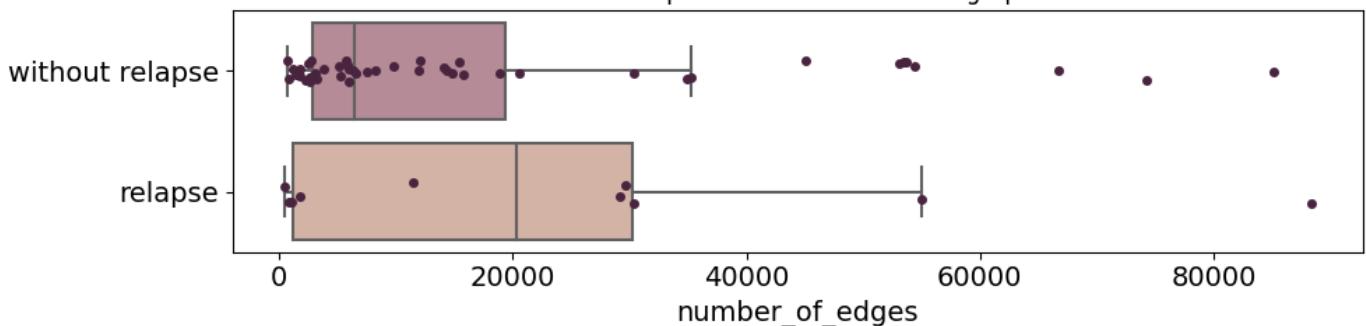
Boxplot of mean\_weight by Relapse free survival  
CD45RO positive cells and Gabriel graph



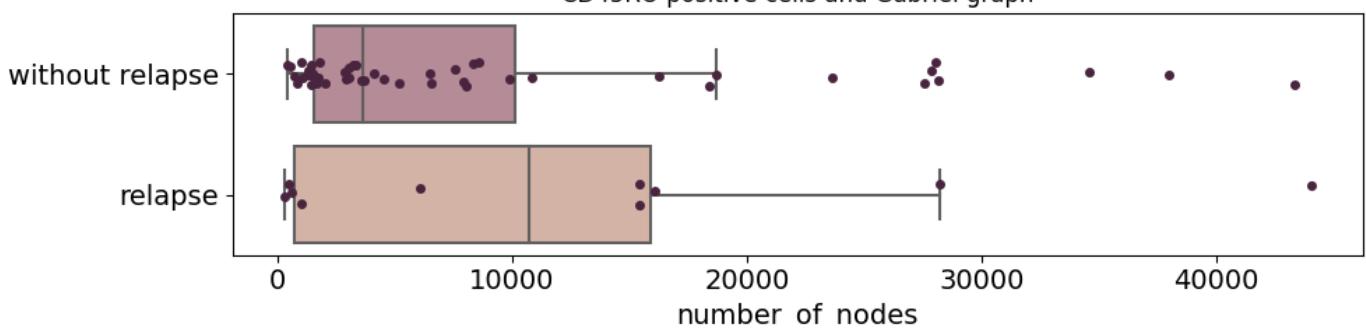
Boxplot of min\_weight by Relapse free survival  
CD45RO positive cells and Gabriel graph



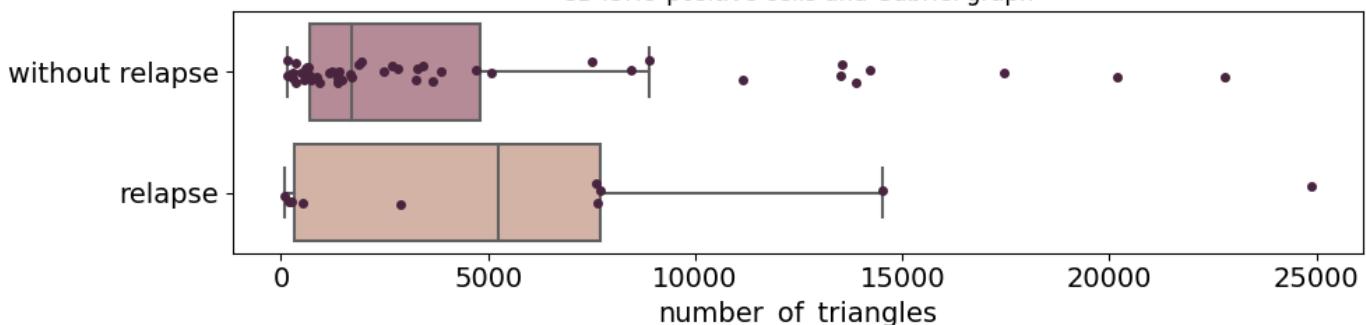
Boxplot of number\_of\_edges by Relapse free survival  
CD45RO positive cells and Gabriel graph

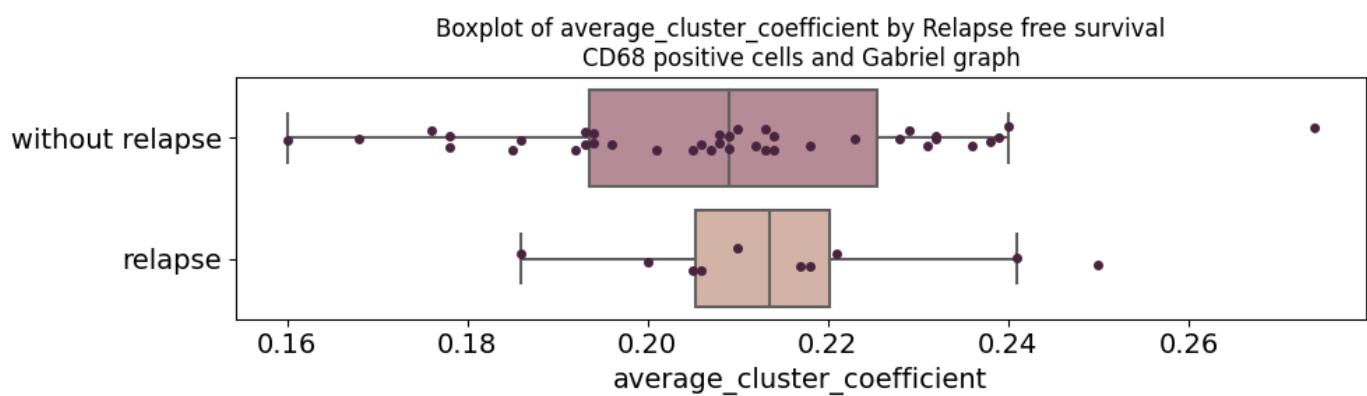
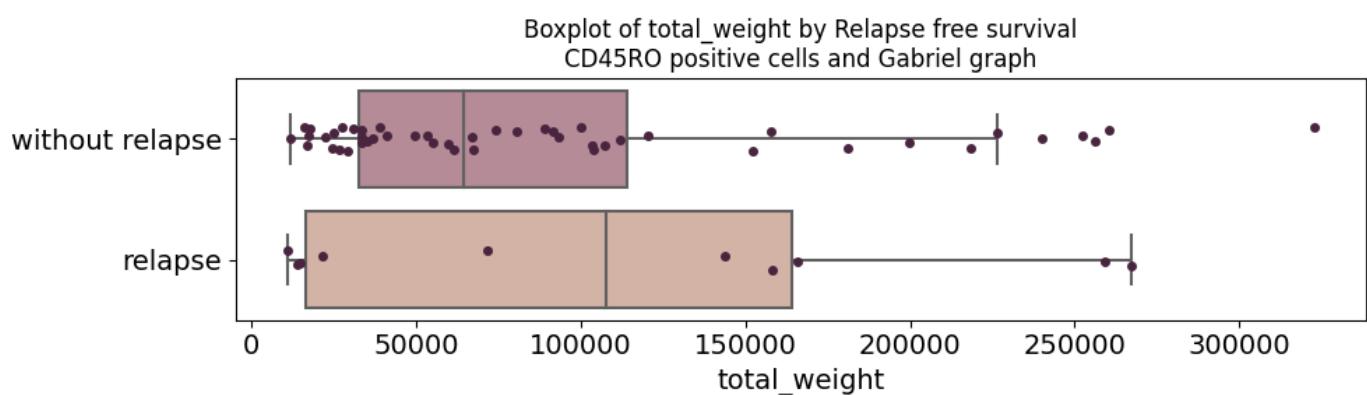
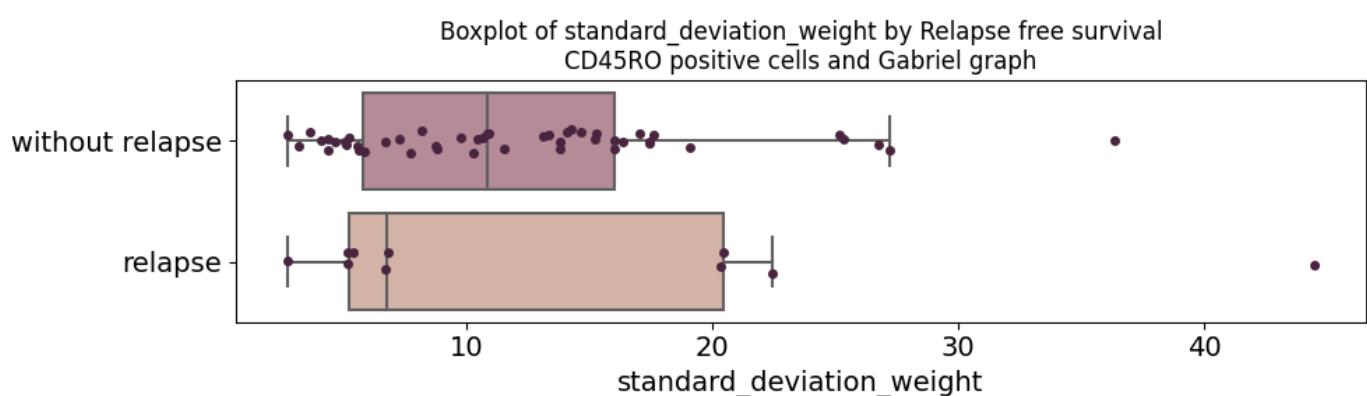
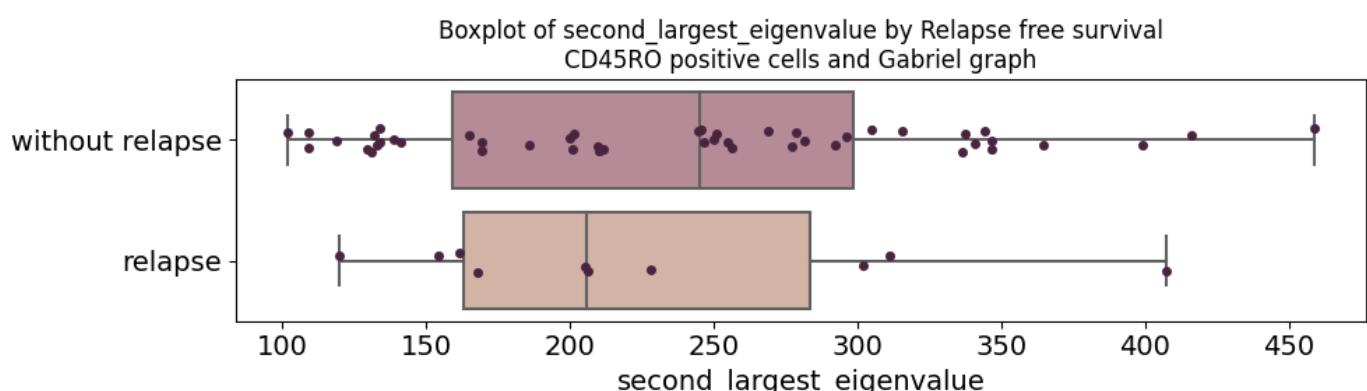
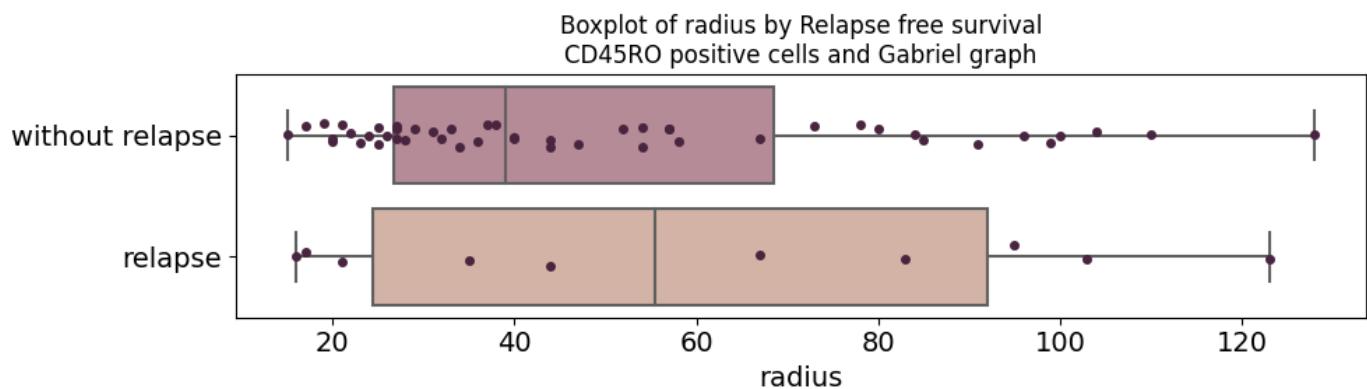


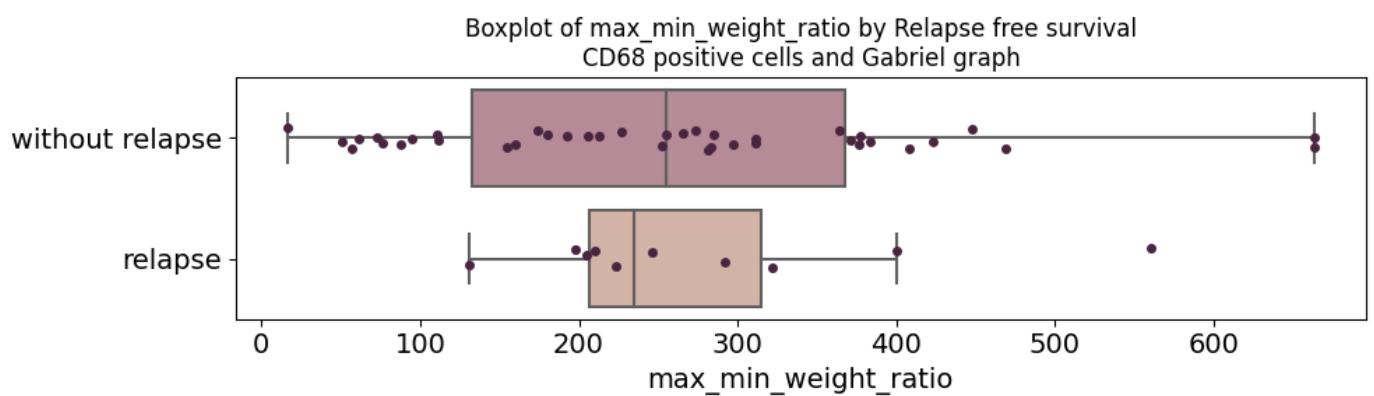
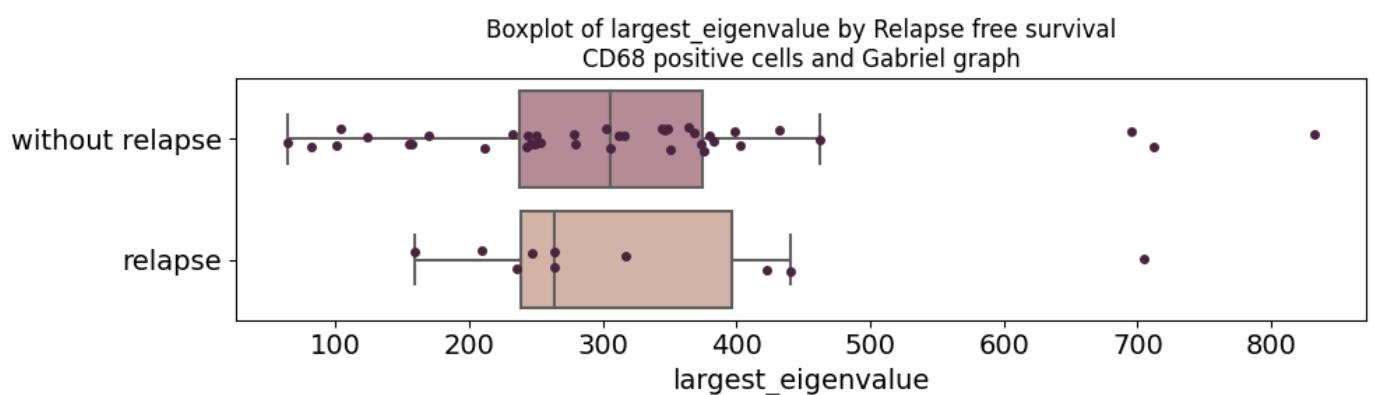
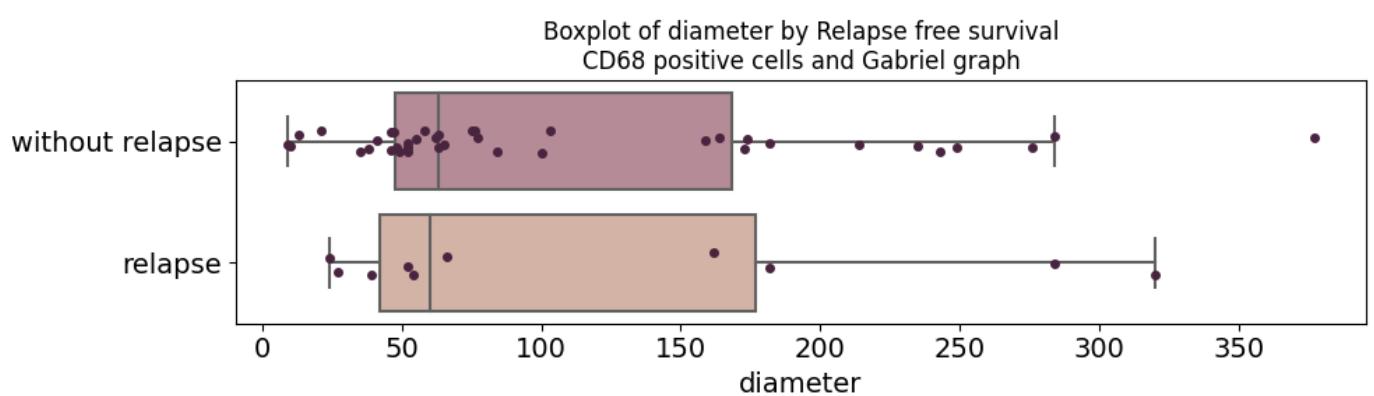
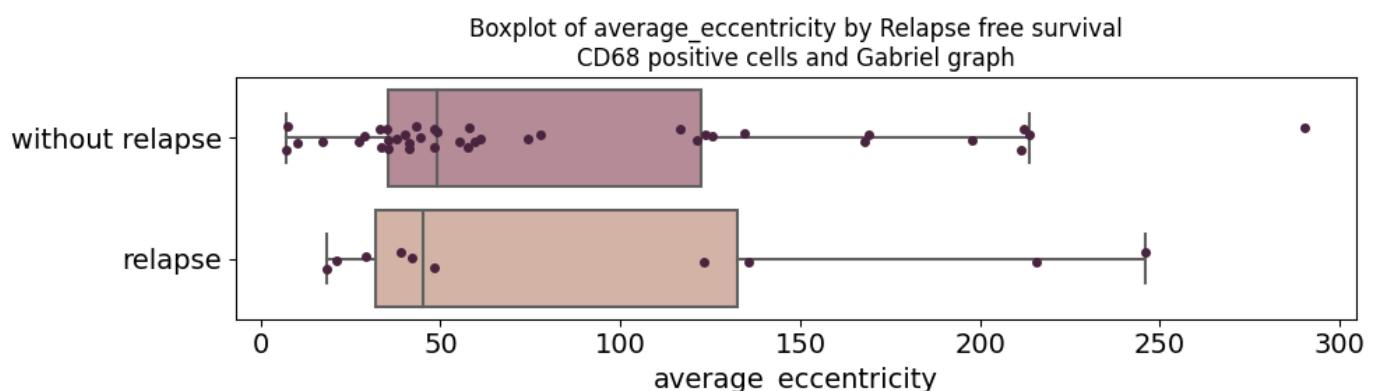
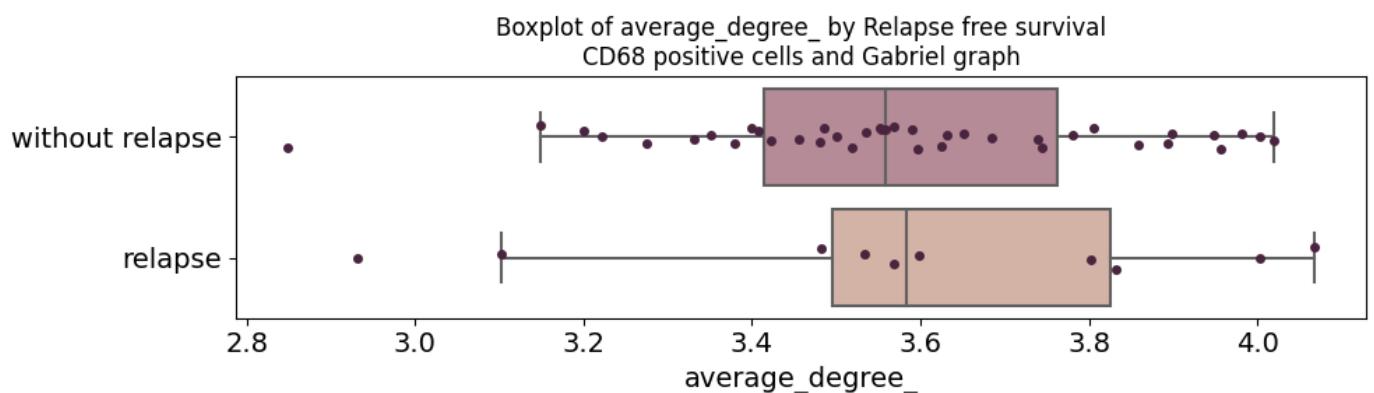
Boxplot of number\_of\_nodes by Relapse free survival  
CD45RO positive cells and Gabriel graph

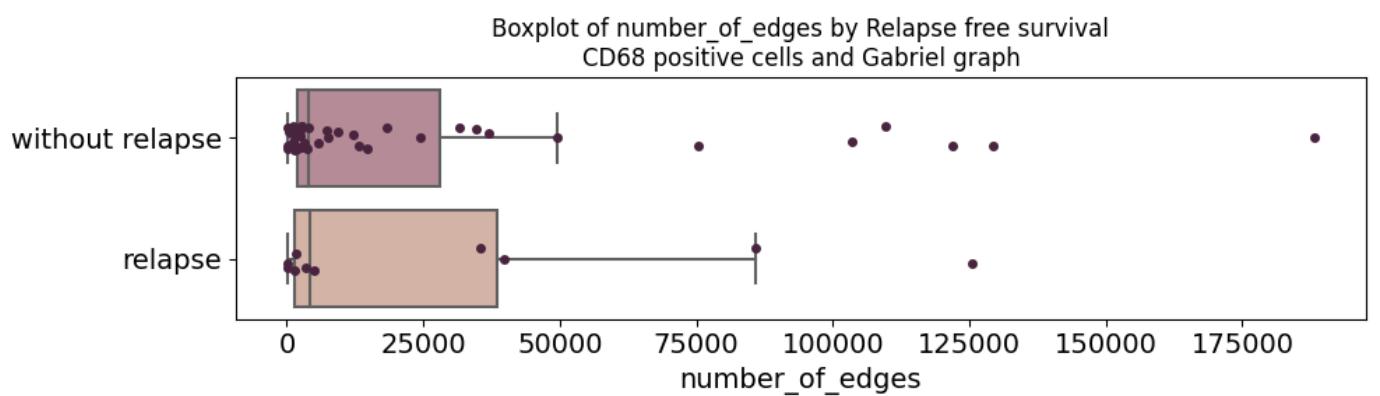
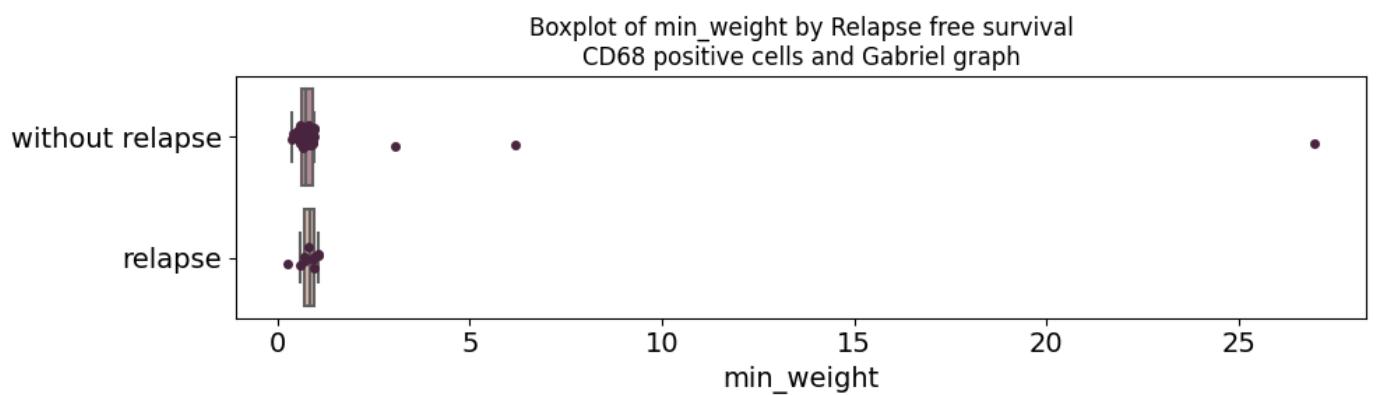
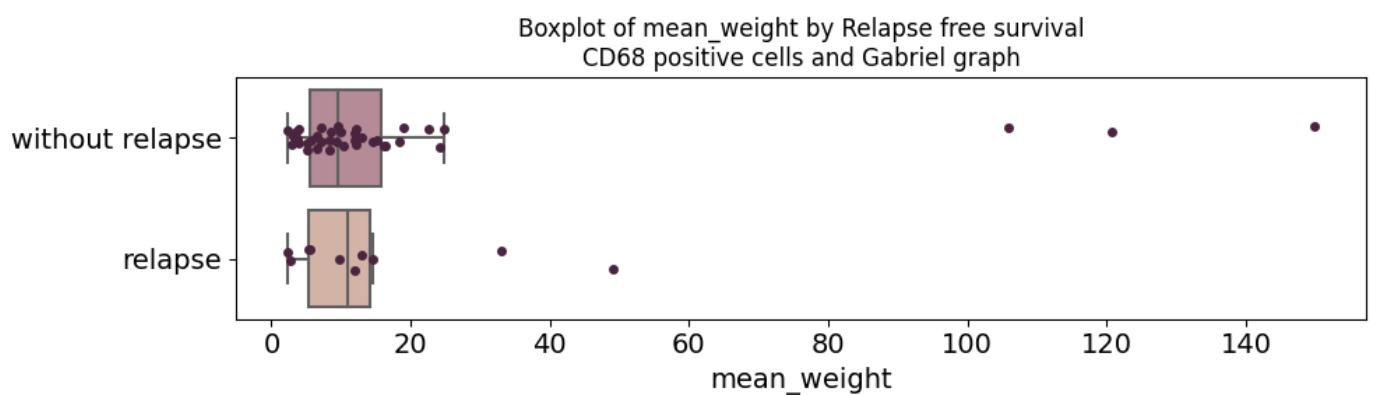
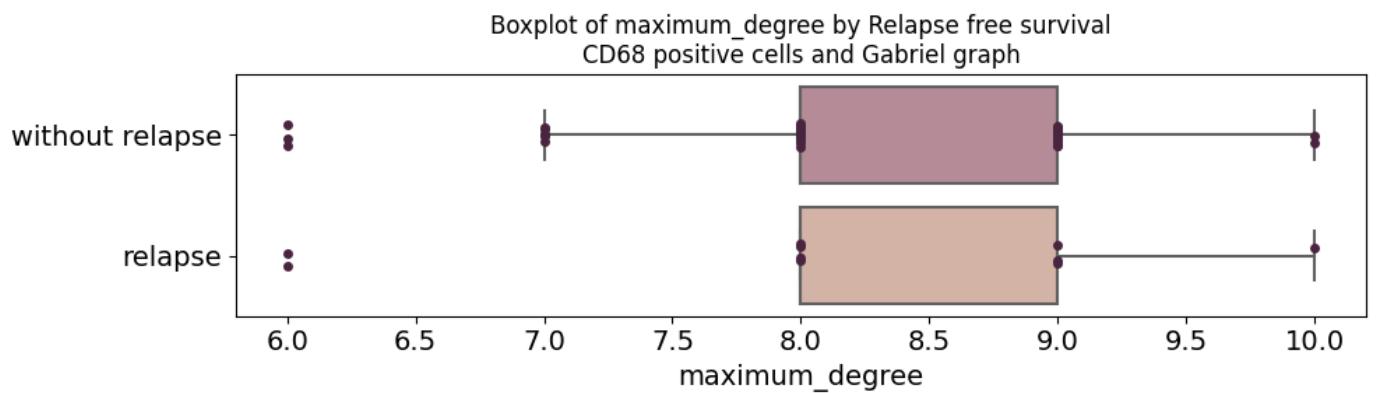
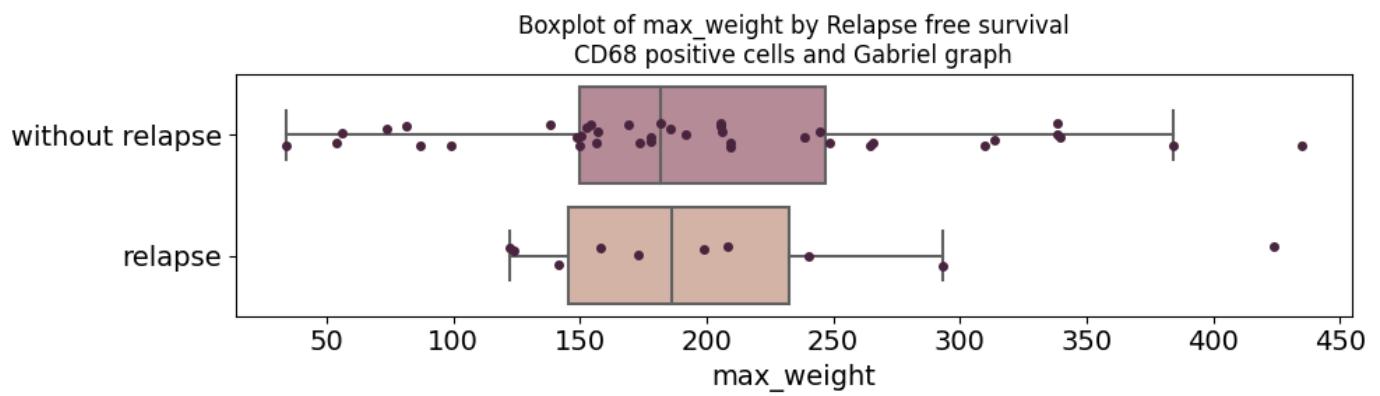


Boxplot of number\_of\_triangles by Relapse free survival  
CD45RO positive cells and Gabriel graph

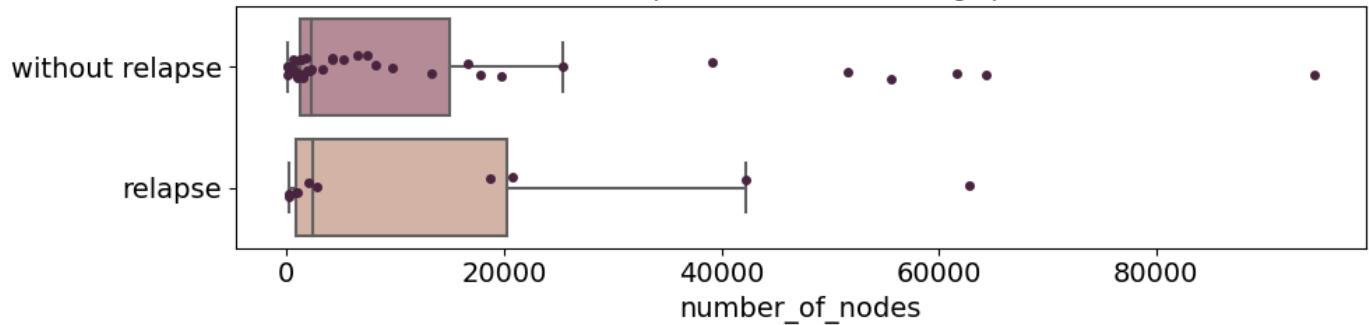




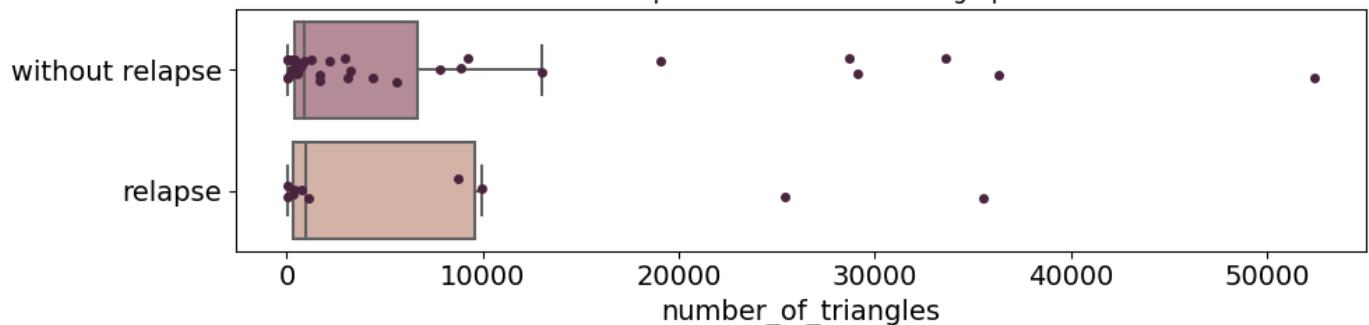




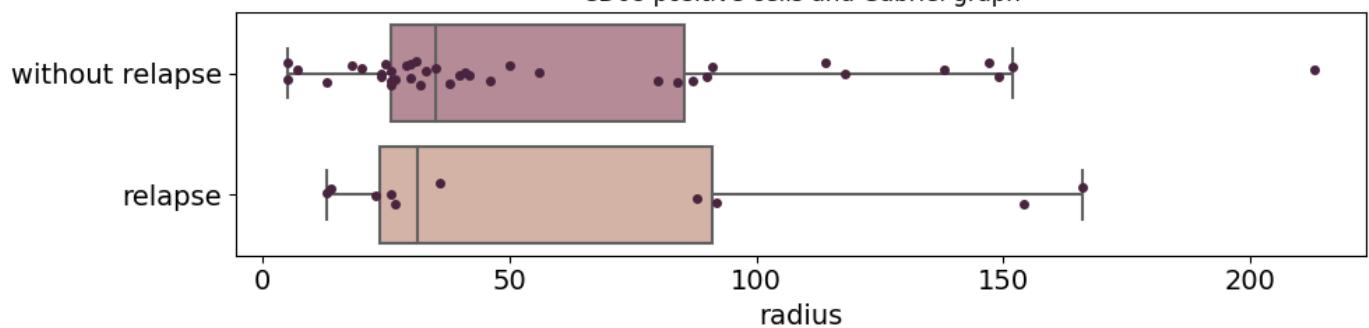
Boxplot of number\_of\_nodes by Relapse free survival  
CD68 positive cells and Gabriel graph



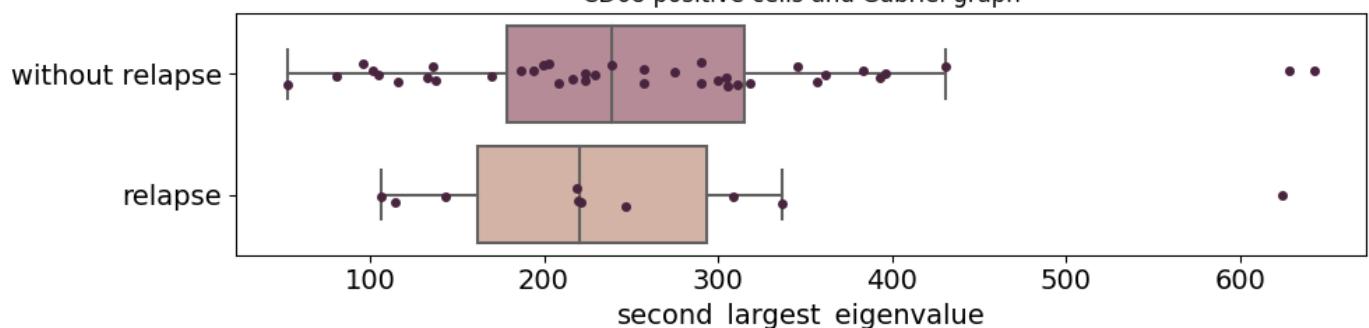
Boxplot of number\_of\_triangles by Relapse free survival  
CD68 positive cells and Gabriel graph



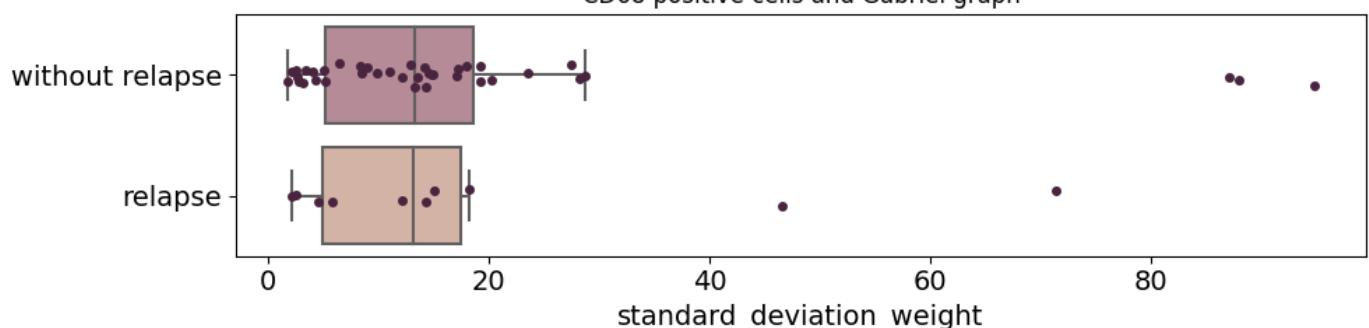
Boxplot of radius by Relapse free survival  
CD68 positive cells and Gabriel graph

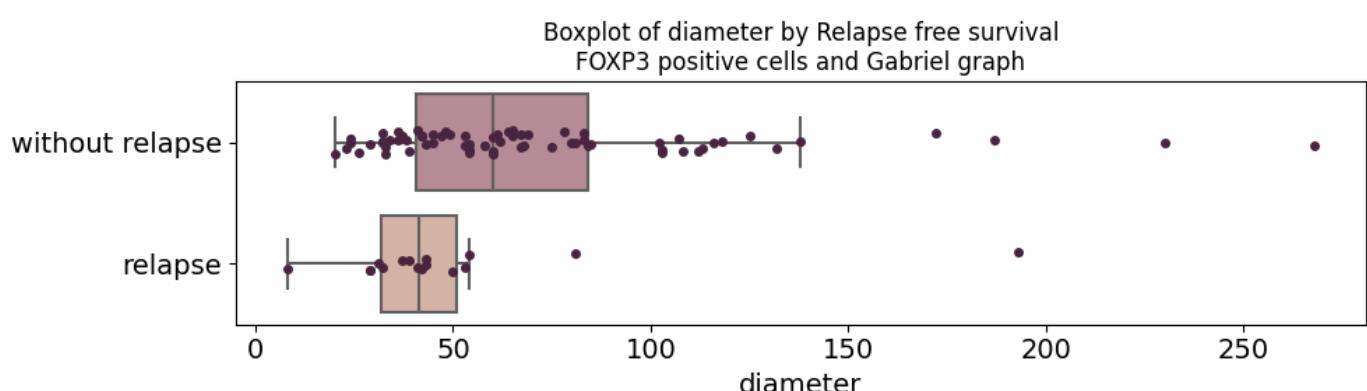
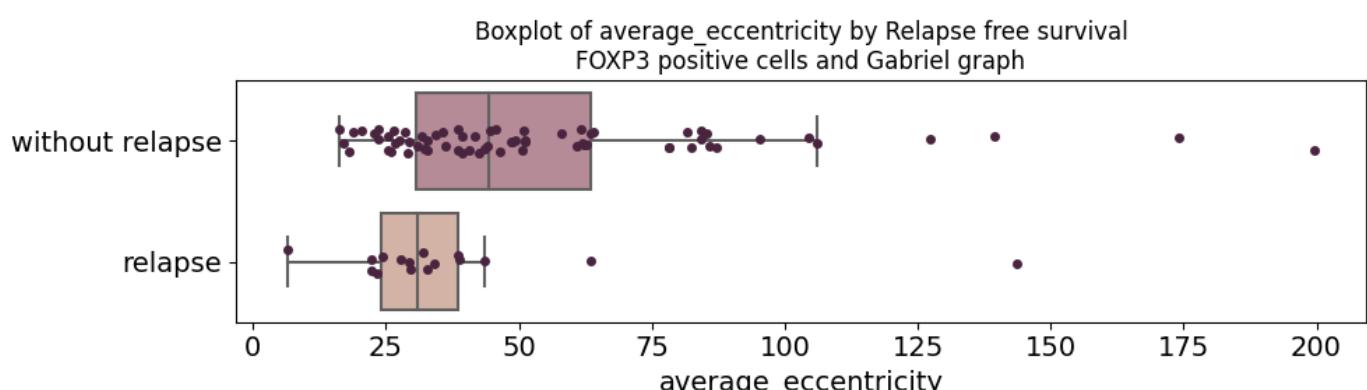
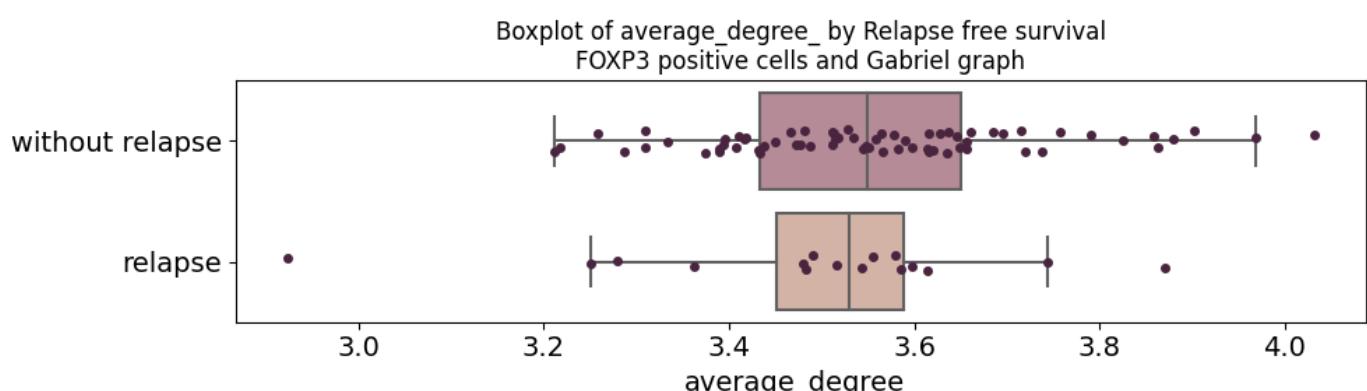
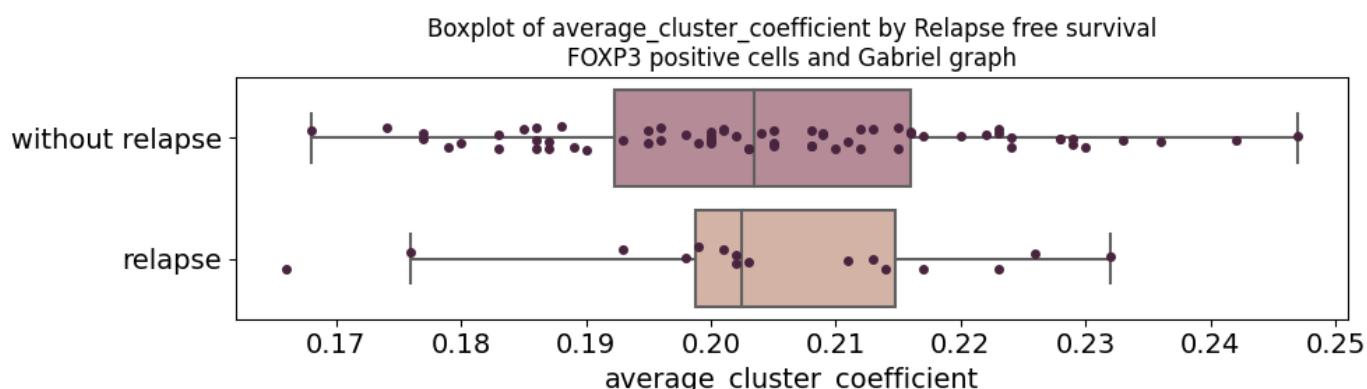
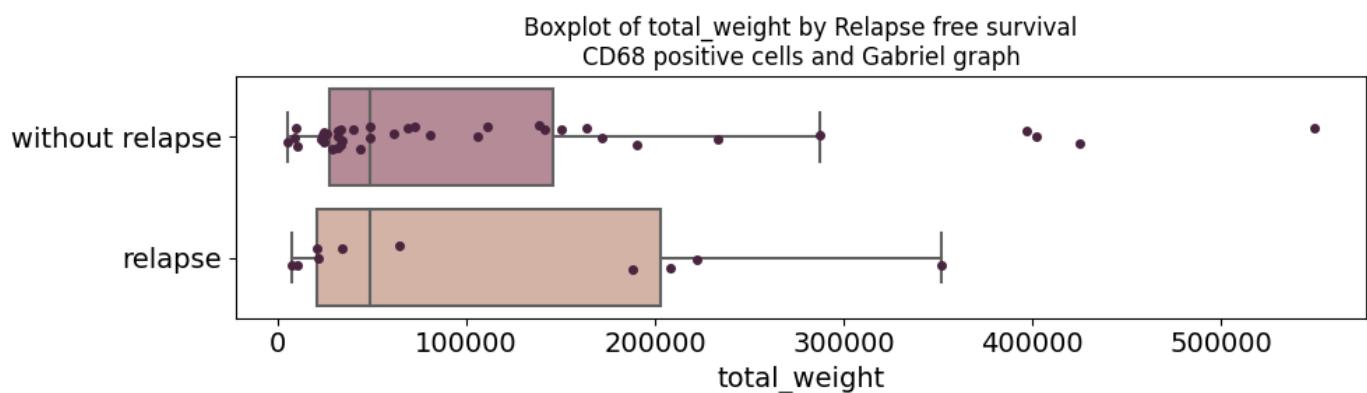


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD68 positive cells and Gabriel graph

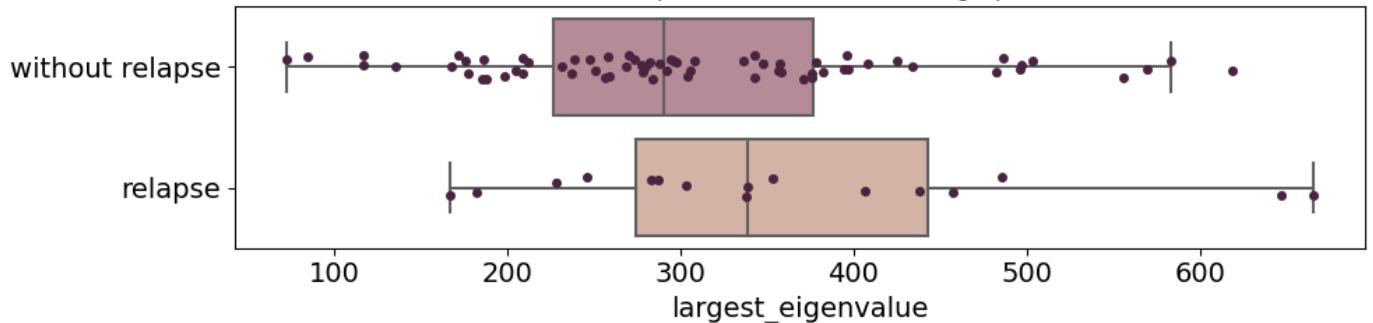


Boxplot of standard\_deviation\_weight by Relapse free survival  
CD68 positive cells and Gabriel graph

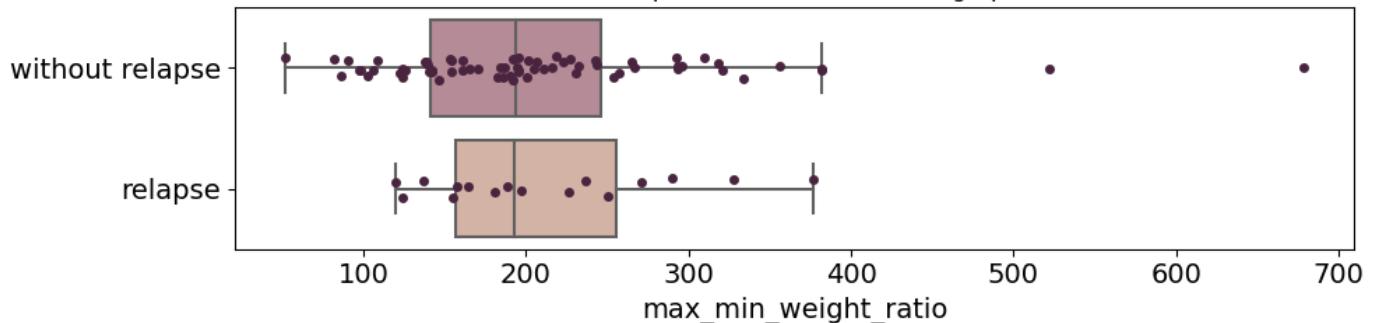




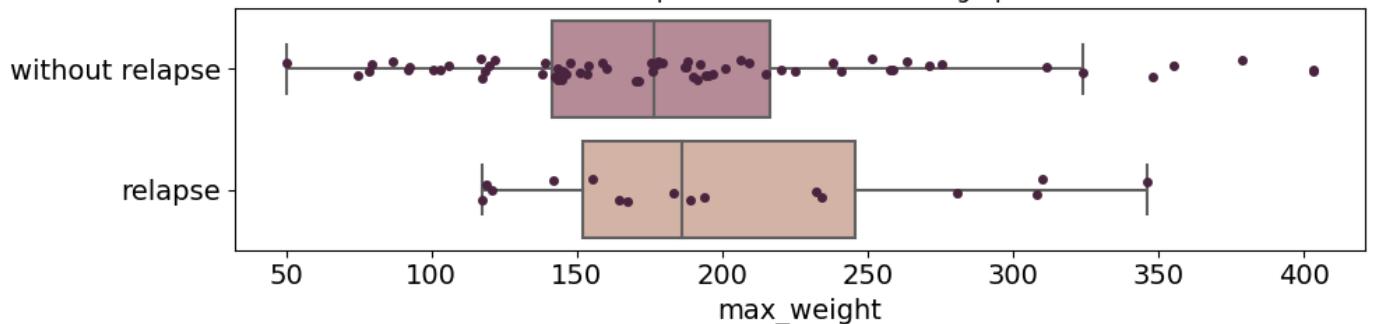
Boxplot of largest\_eigenvalue by Relapse free survival  
FOXP3 positive cells and Gabriel graph



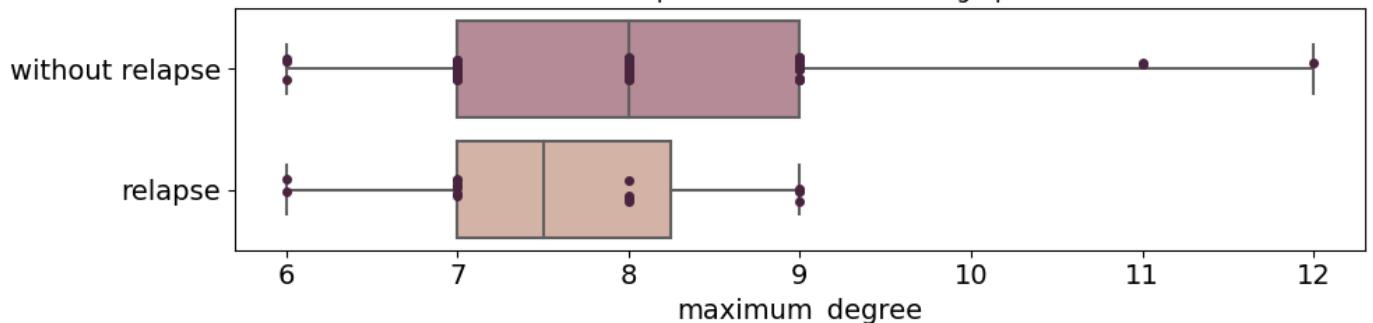
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
FOXP3 positive cells and Gabriel graph



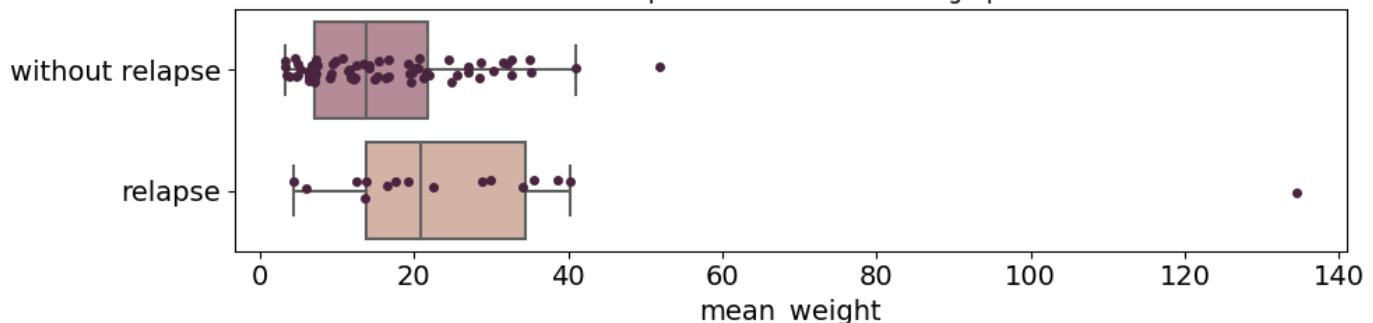
Boxplot of max\_weight by Relapse free survival  
FOXP3 positive cells and Gabriel graph

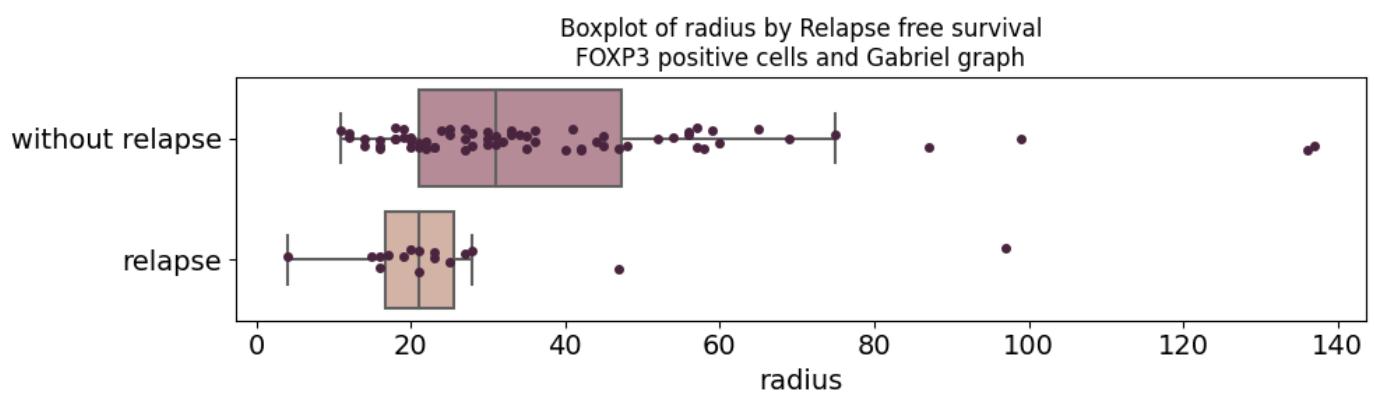
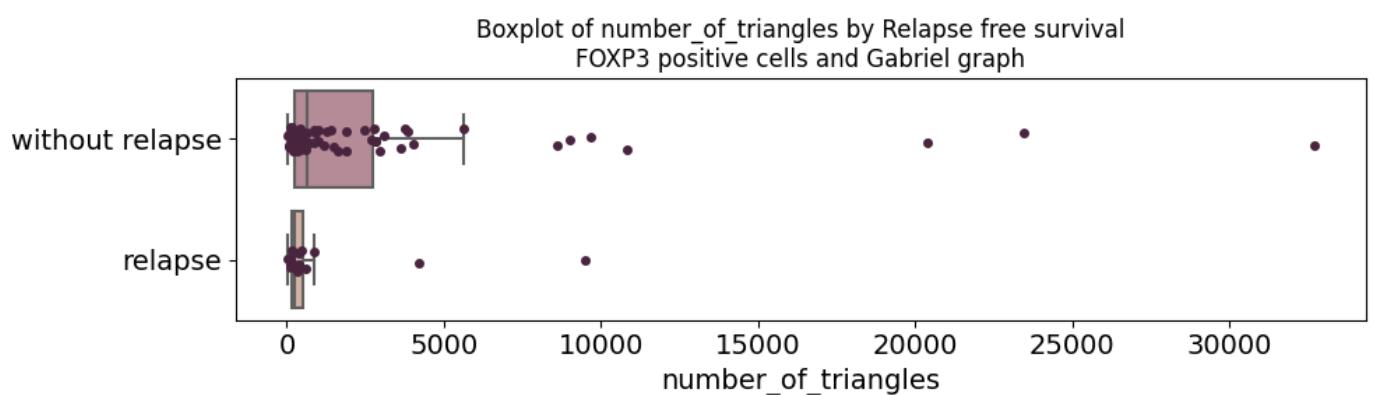
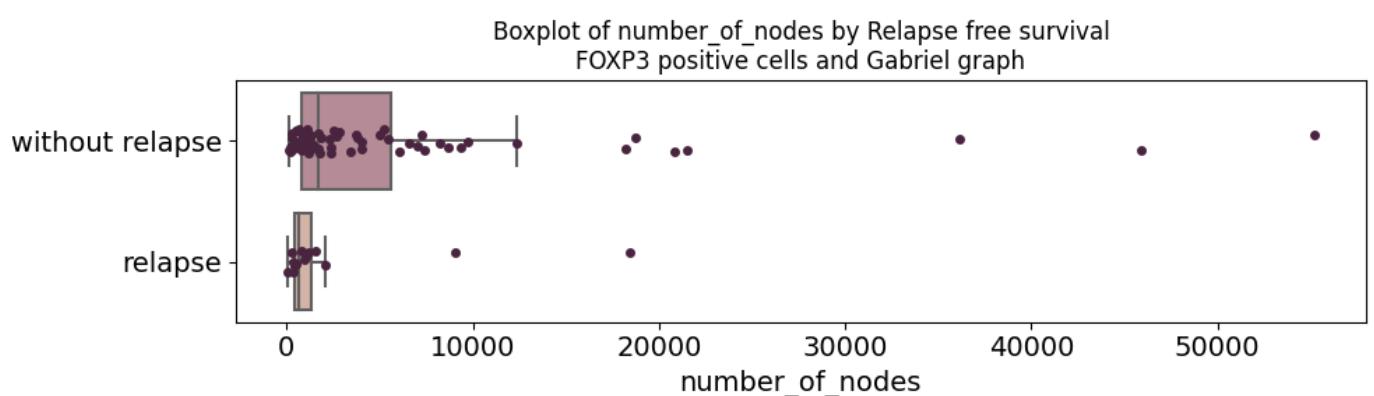
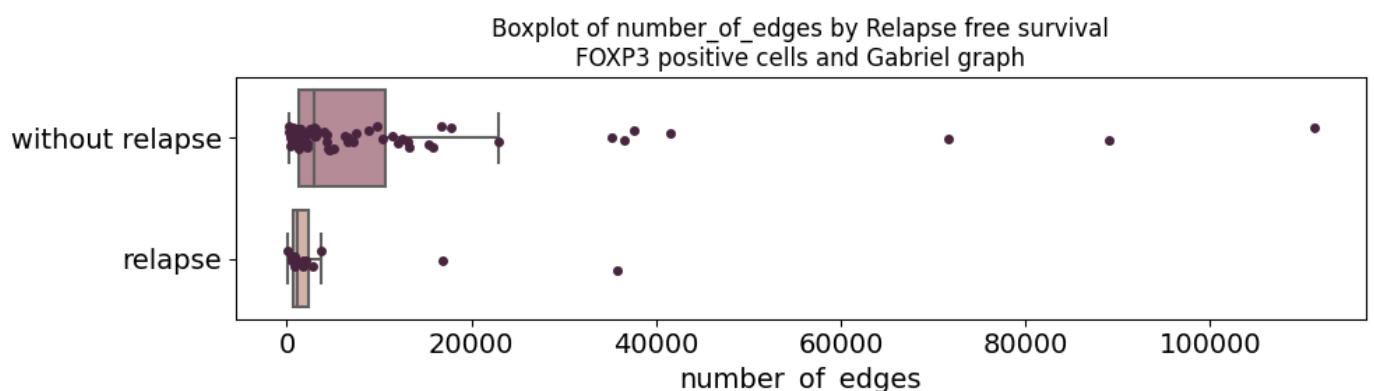
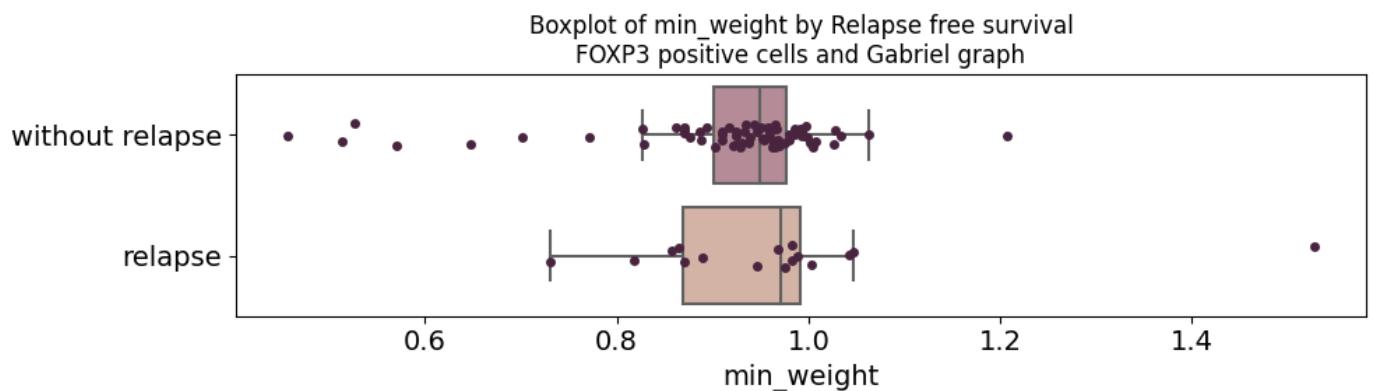


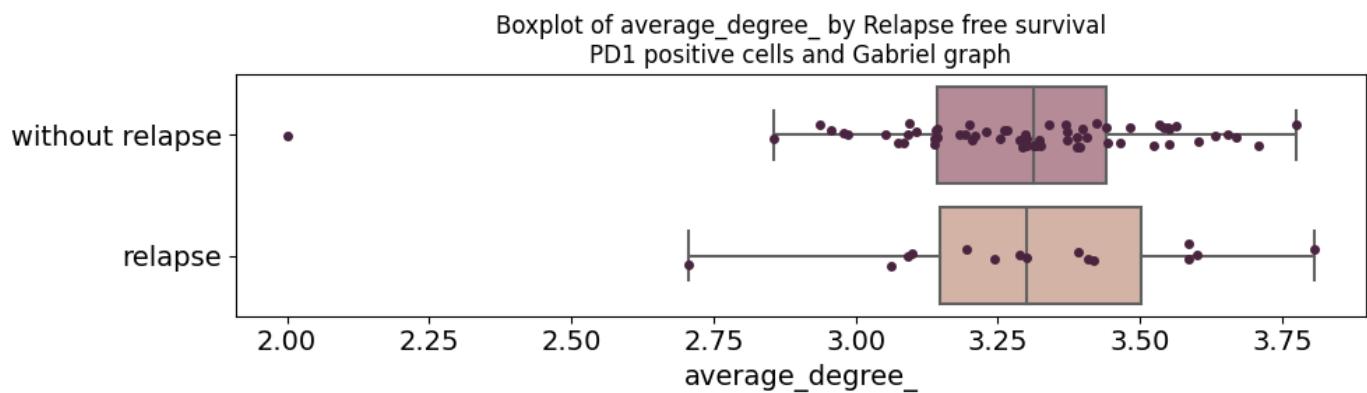
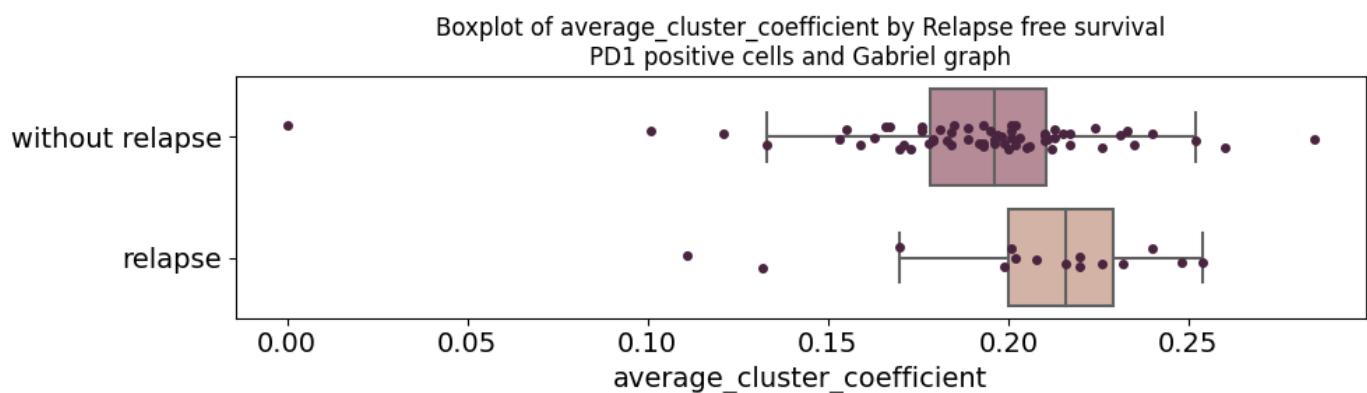
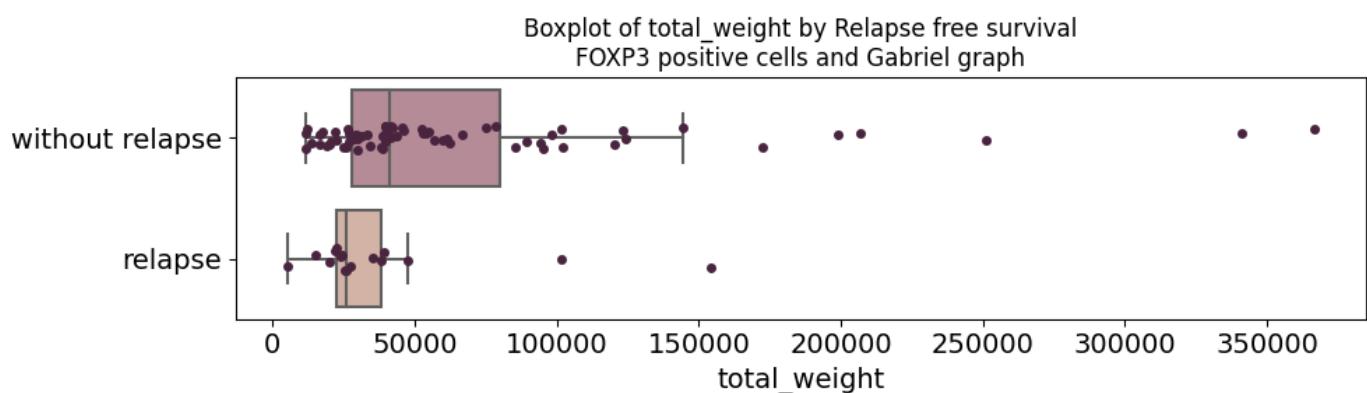
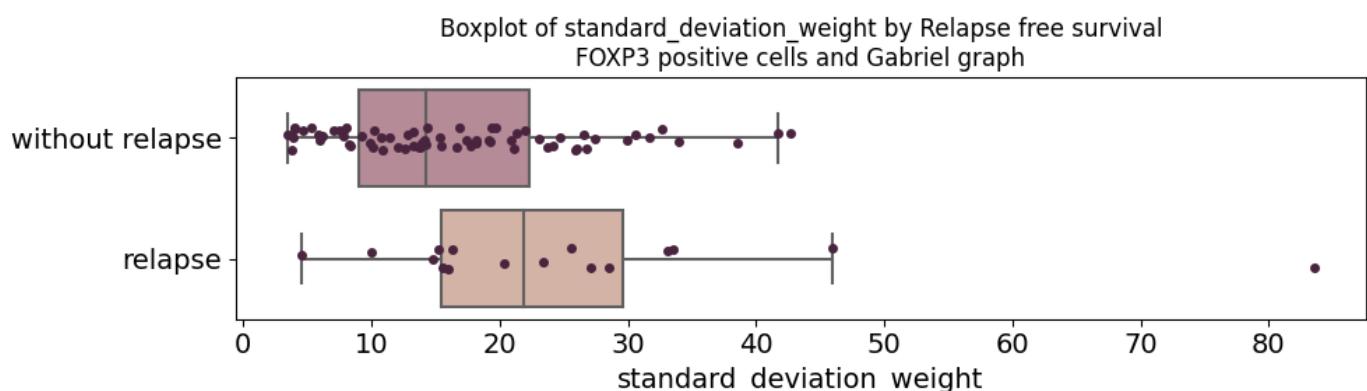
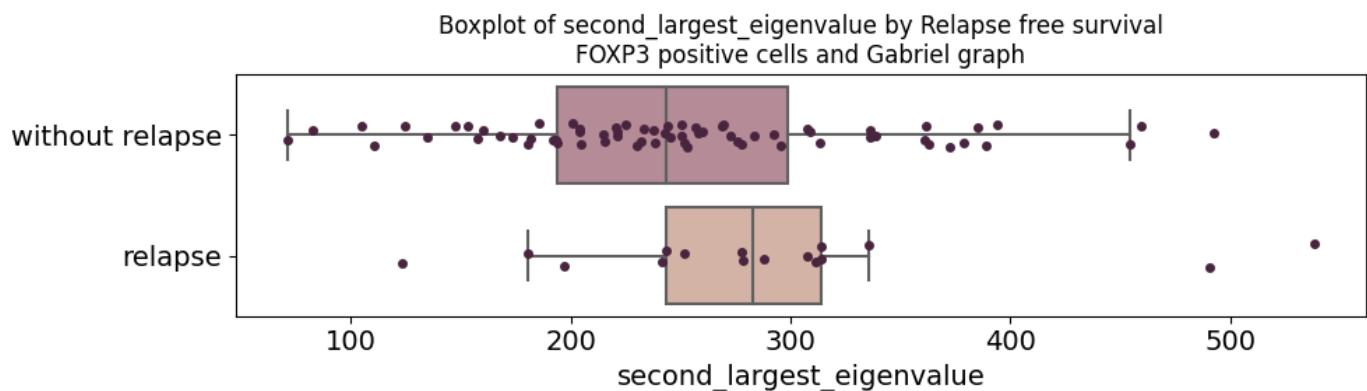
Boxplot of maximum\_degree by Relapse free survival  
FOXP3 positive cells and Gabriel graph



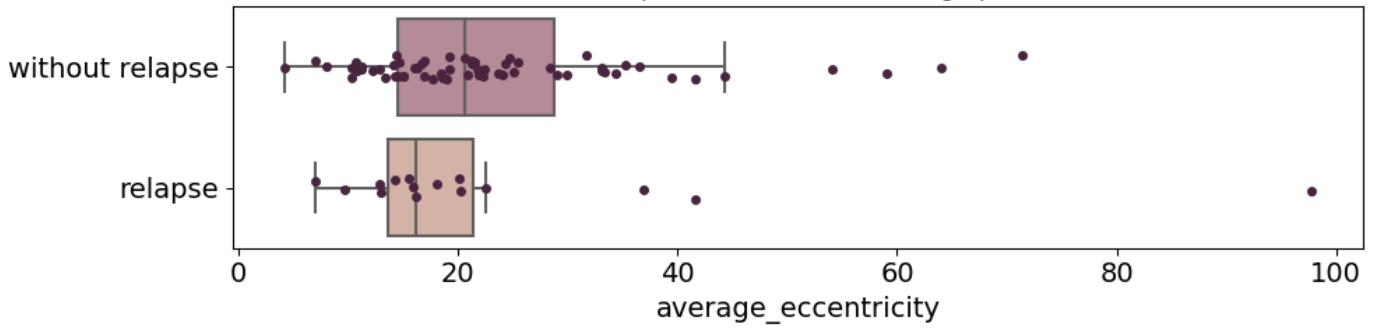
Boxplot of mean\_weight by Relapse free survival  
FOXP3 positive cells and Gabriel graph



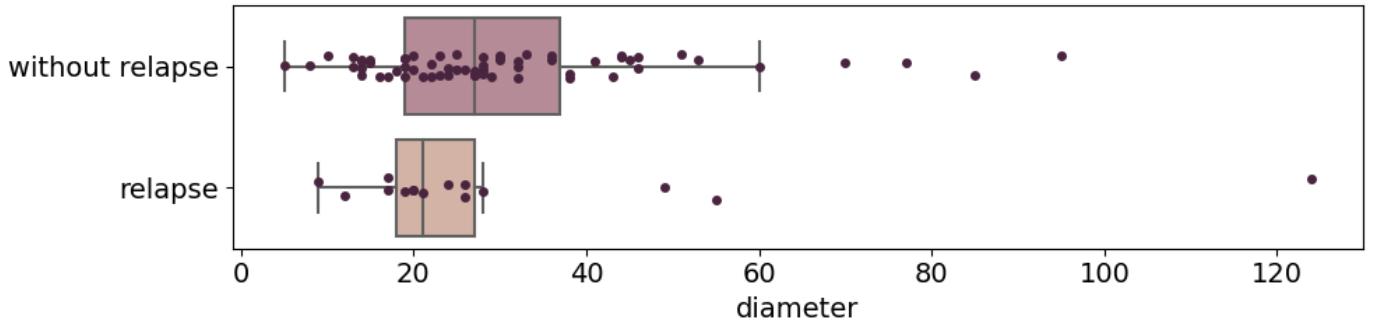




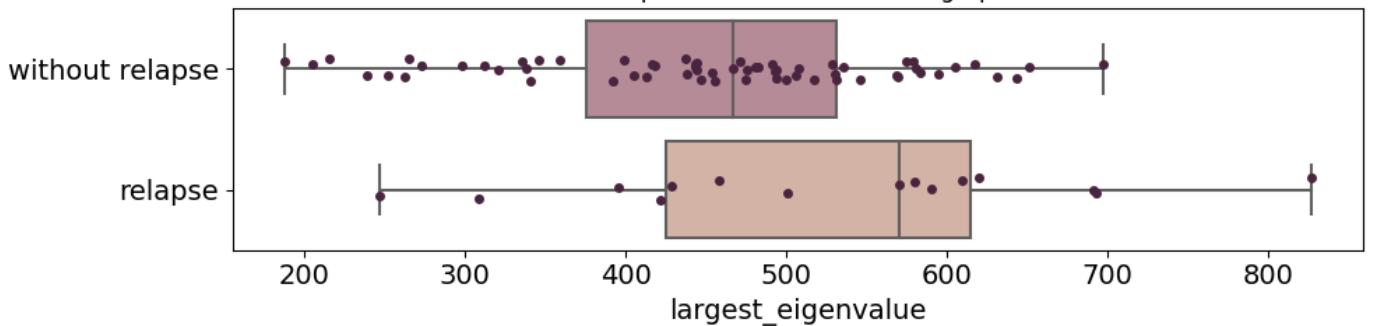
Boxplot of average\_eccentricity by Relapse free survival  
PD1 positive cells and Gabriel graph



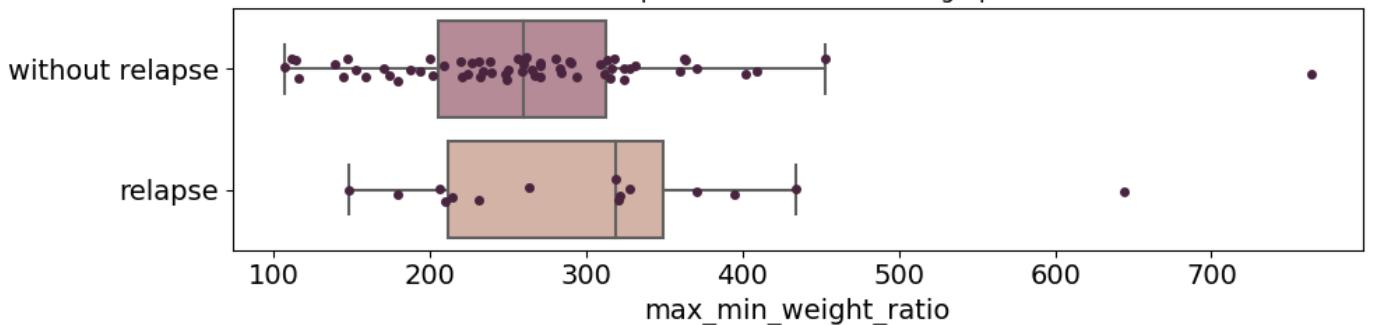
Boxplot of diameter by Relapse free survival  
PD1 positive cells and Gabriel graph



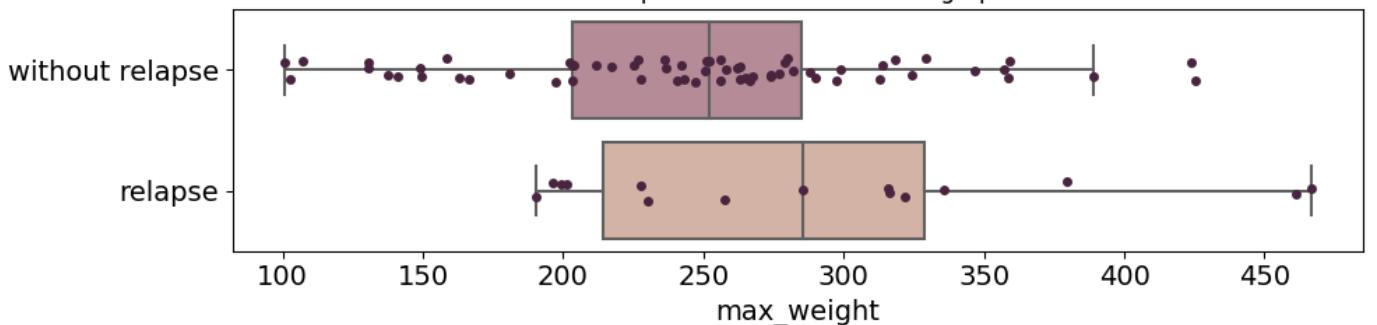
Boxplot of largest\_eigenvalue by Relapse free survival  
PD1 positive cells and Gabriel graph

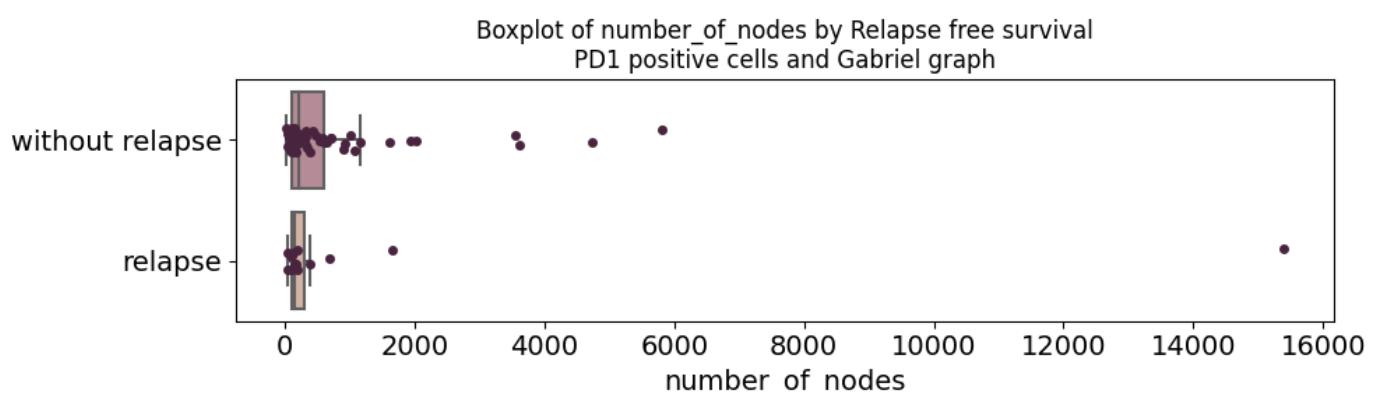
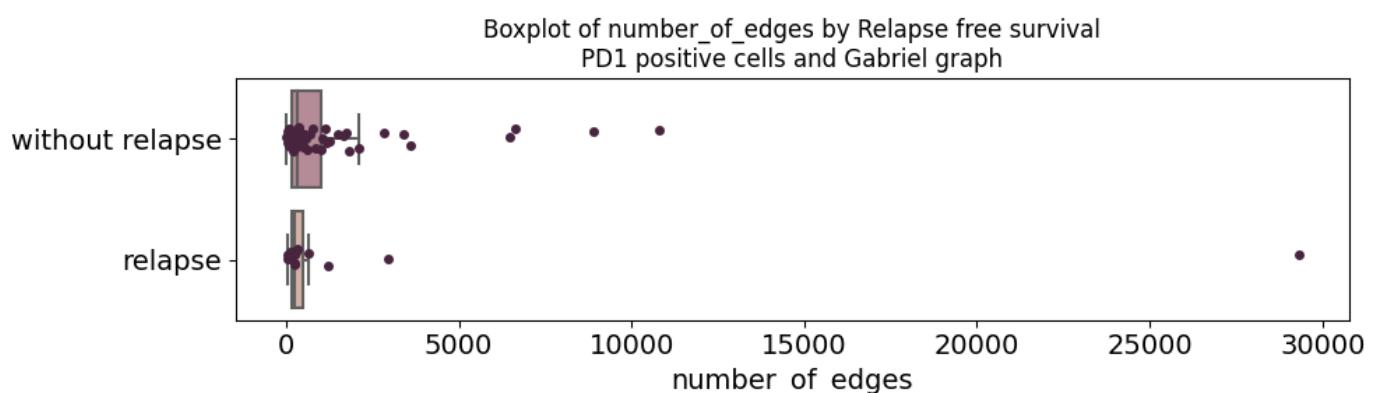
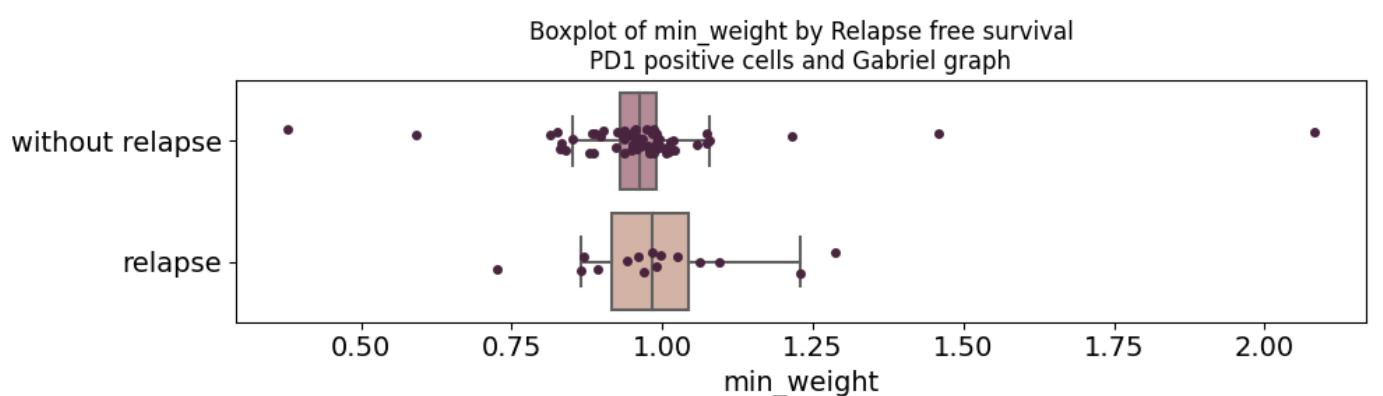
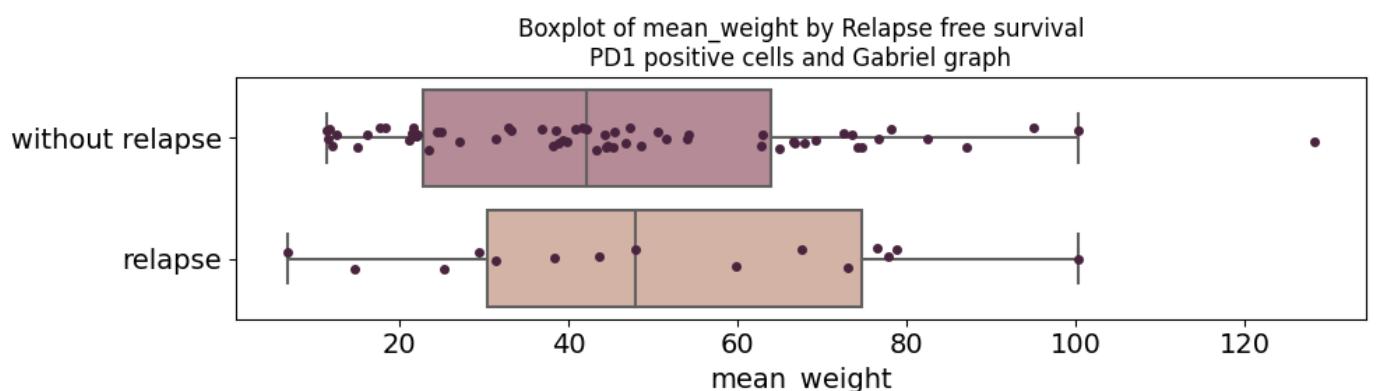
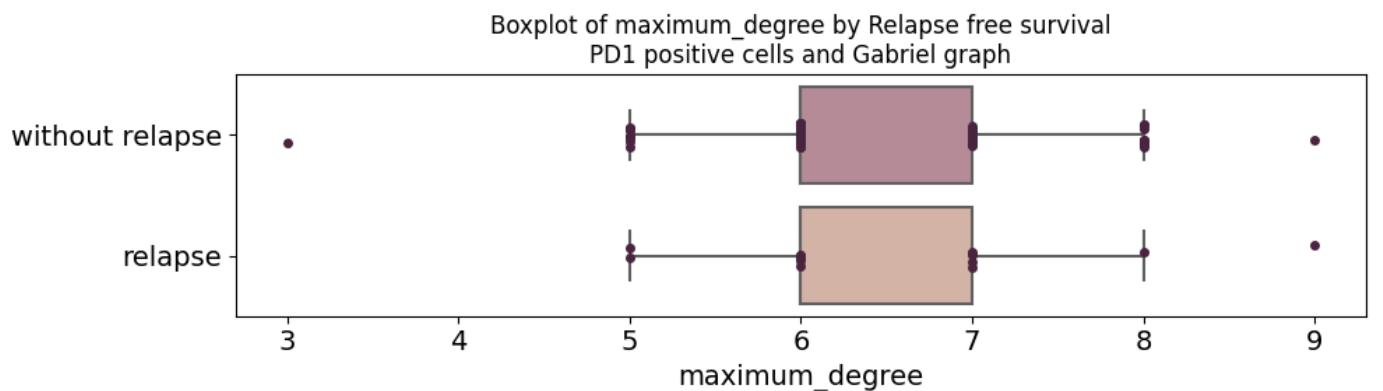


Boxplot of max\_min\_weight\_ratio by Relapse free survival  
PD1 positive cells and Gabriel graph

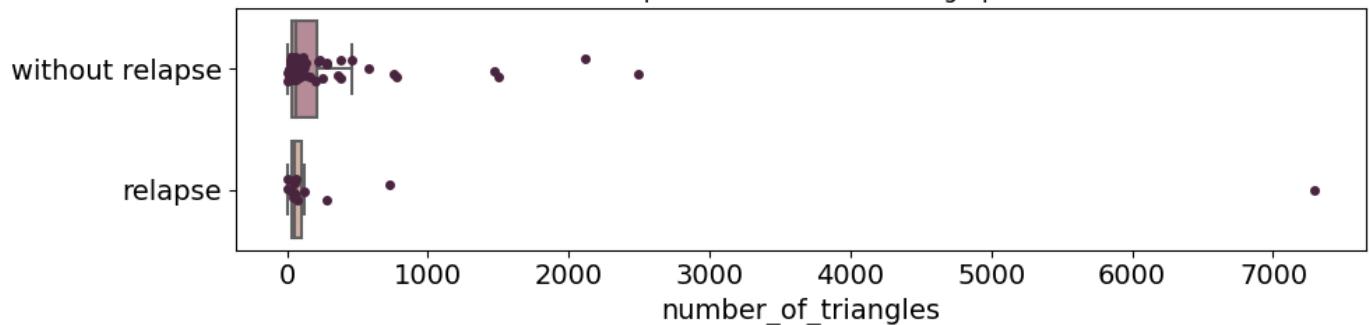


Boxplot of max\_weight by Relapse free survival  
PD1 positive cells and Gabriel graph

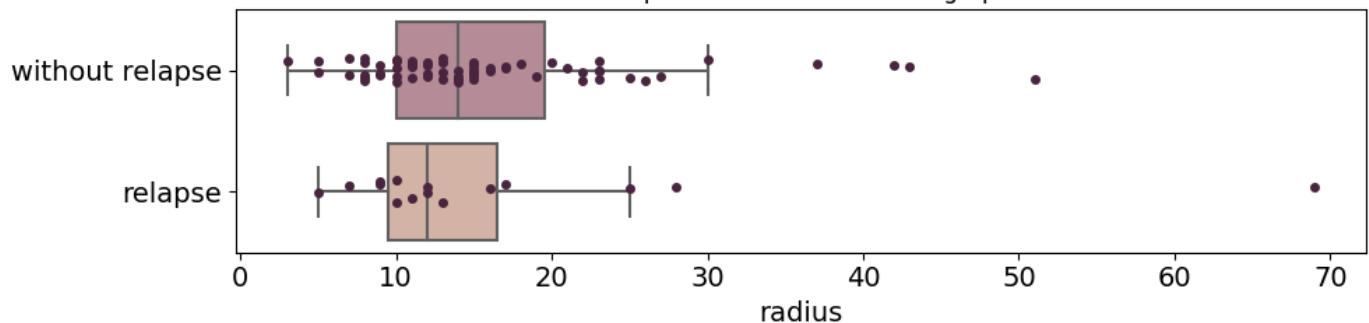




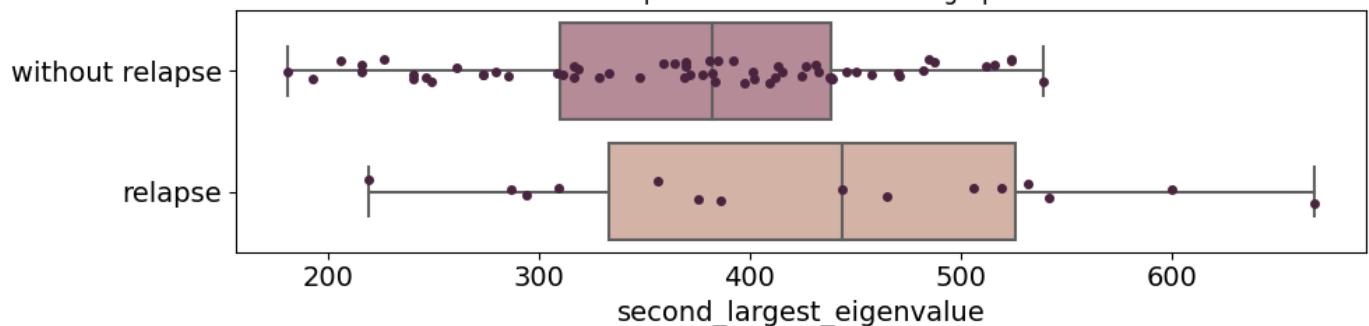
Boxplot of number\_of\_triangles by Relapse free survival  
PD1 positive cells and Gabriel graph



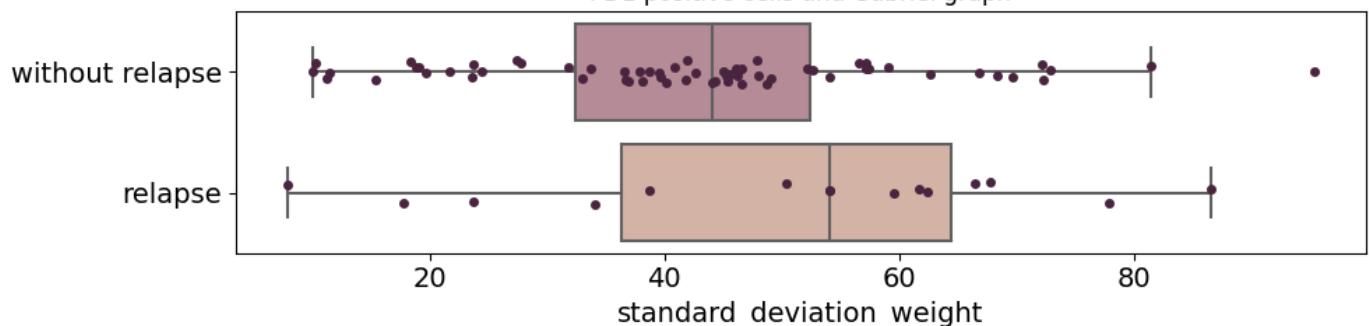
Boxplot of radius by Relapse free survival  
PD1 positive cells and Gabriel graph



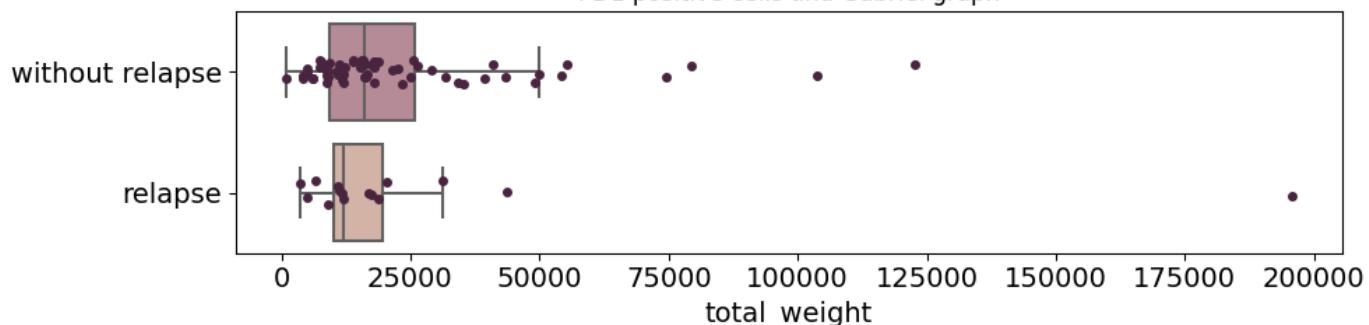
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
PD1 positive cells and Gabriel graph



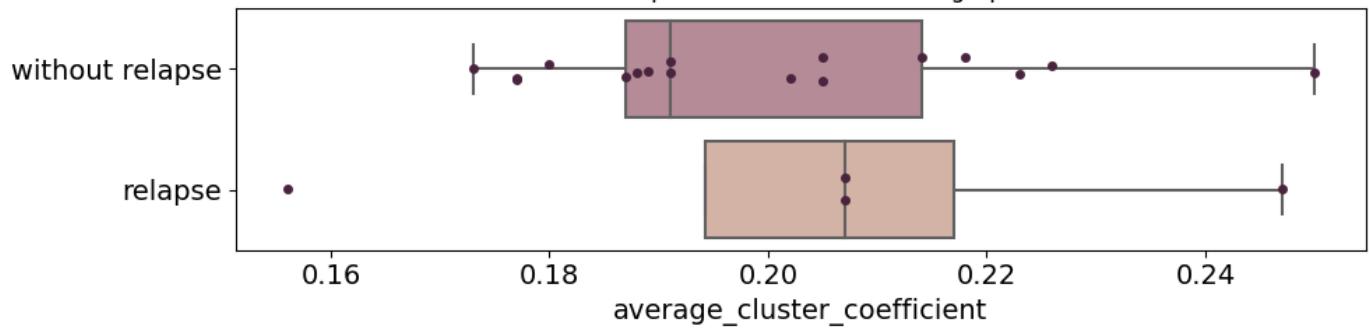
Boxplot of standard\_deviation\_weight by Relapse free survival  
PD1 positive cells and Gabriel graph



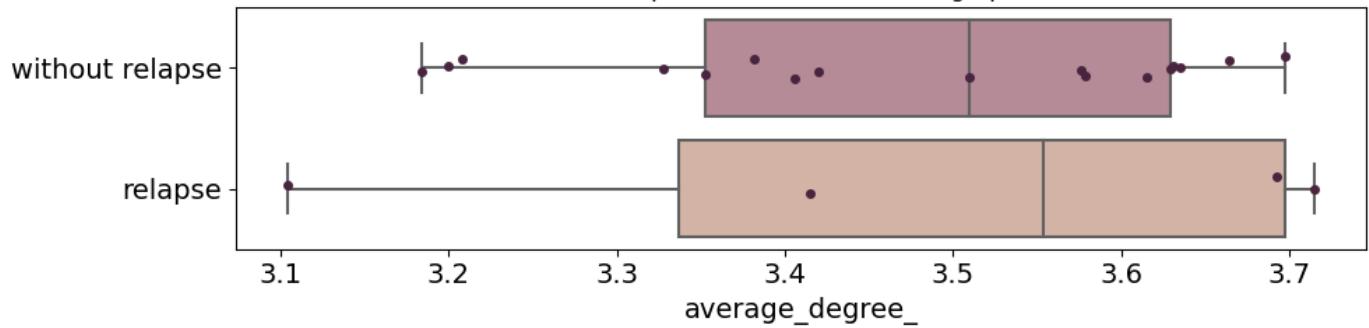
Boxplot of total\_weight by Relapse free survival  
PD1 positive cells and Gabriel graph



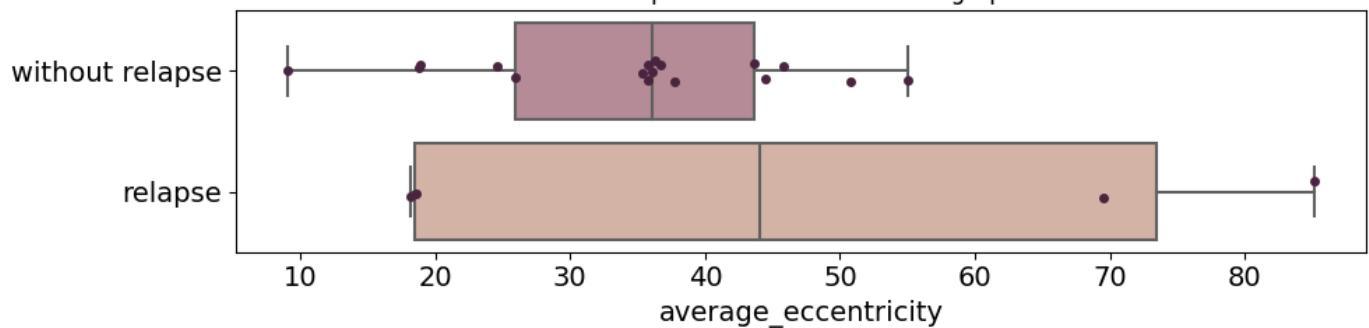
Boxplot of average\_cluster\_coefficient by Relapse free survival  
PDL1 positive cells and Gabriel graph



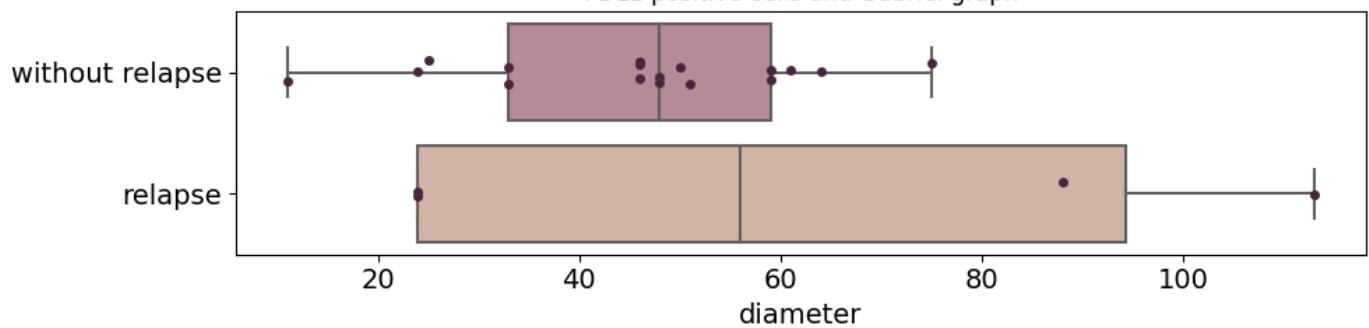
Boxplot of average\_degree\_ by Relapse free survival  
PDL1 positive cells and Gabriel graph



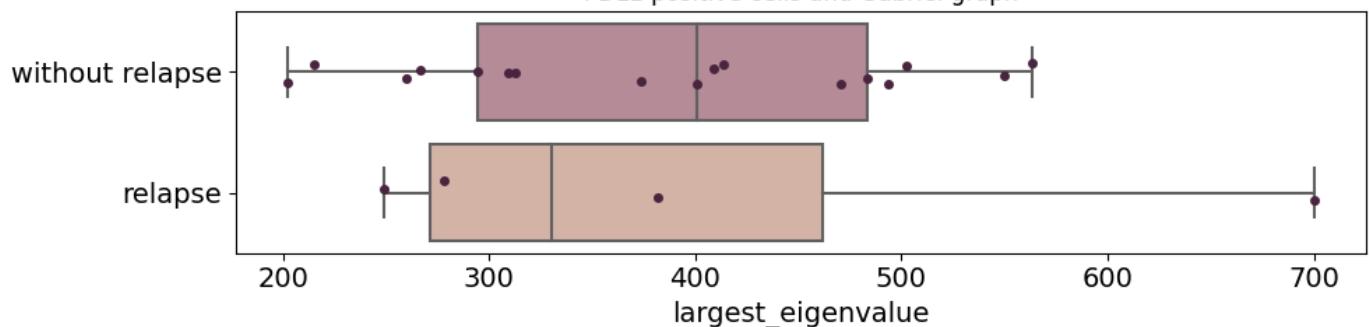
Boxplot of average\_eccentricity by Relapse free survival  
PDL1 positive cells and Gabriel graph



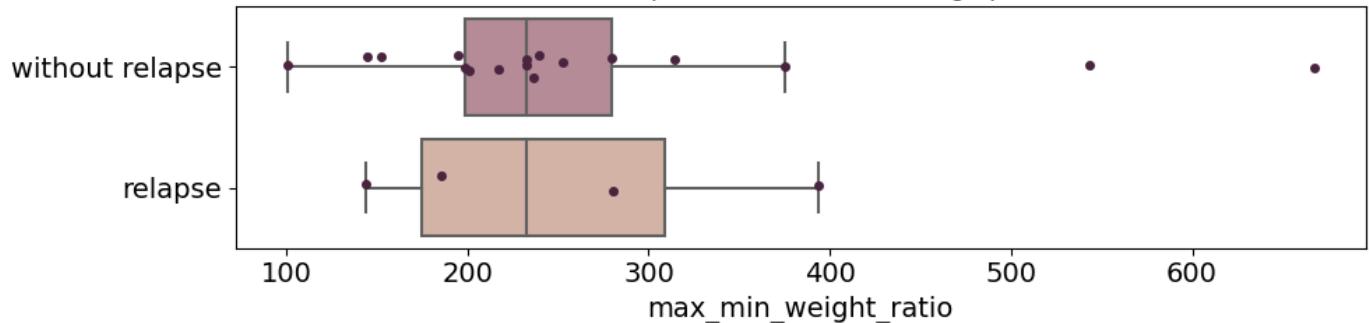
Boxplot of diameter by Relapse free survival  
PDL1 positive cells and Gabriel graph



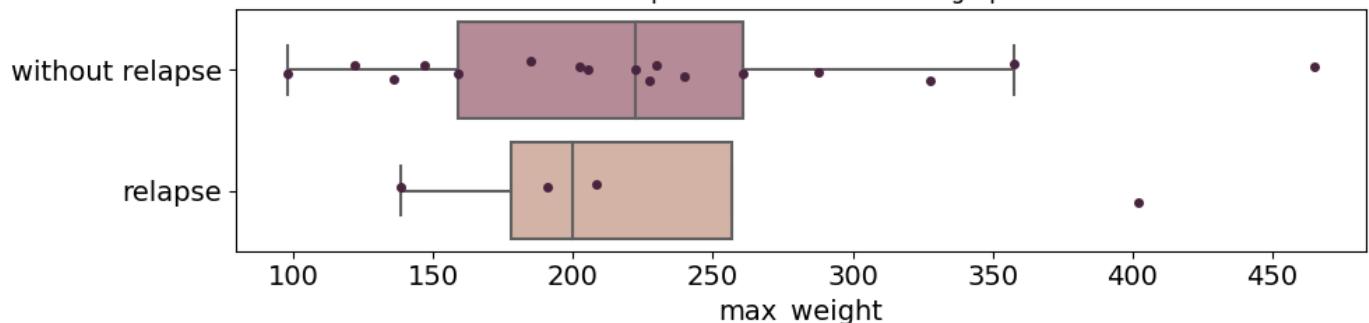
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PDL1 positive cells and Gabriel graph



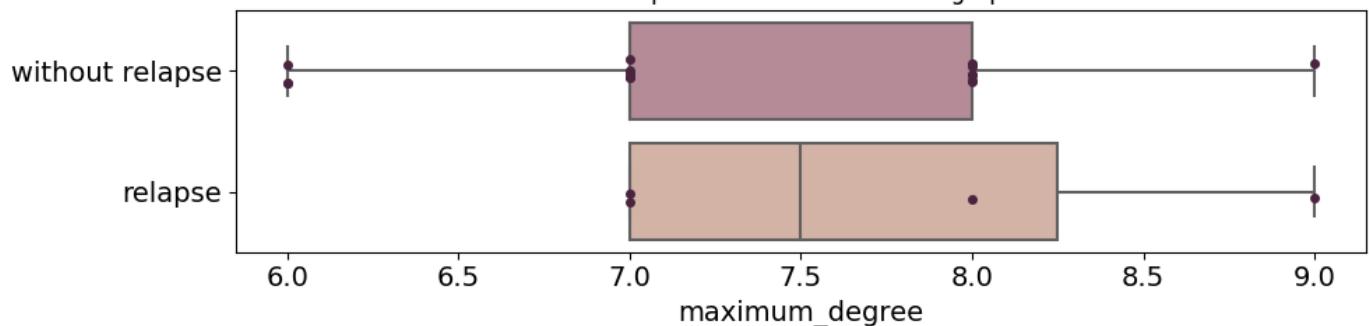
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
PDL1 positive cells and Gabriel graph



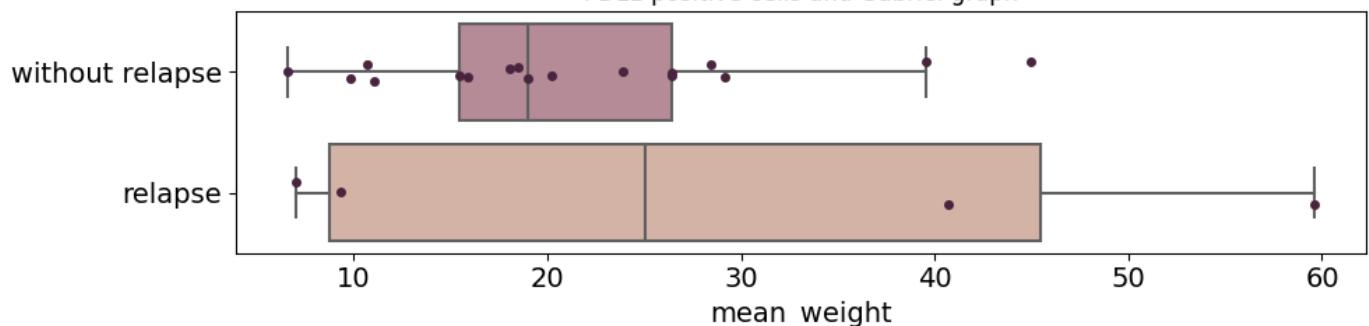
Boxplot of max\_weight by Relapse free survival  
PDL1 positive cells and Gabriel graph



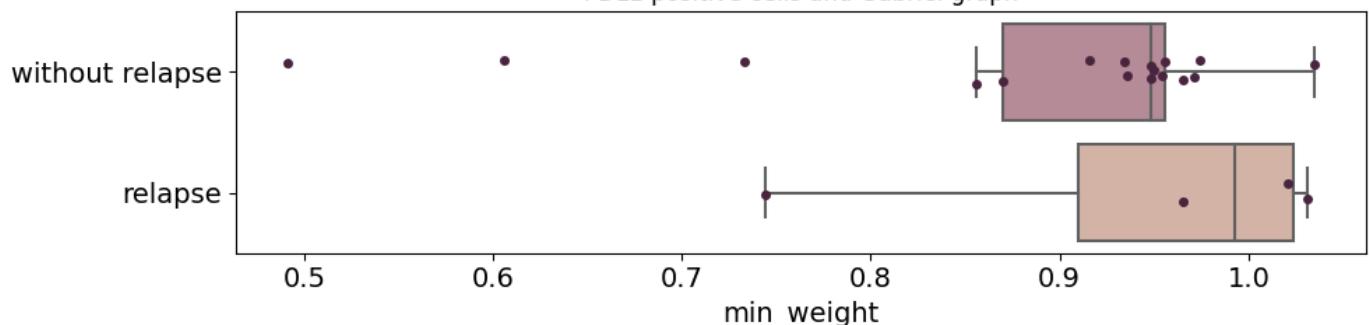
Boxplot of maximum\_degree by Relapse free survival  
PDL1 positive cells and Gabriel graph



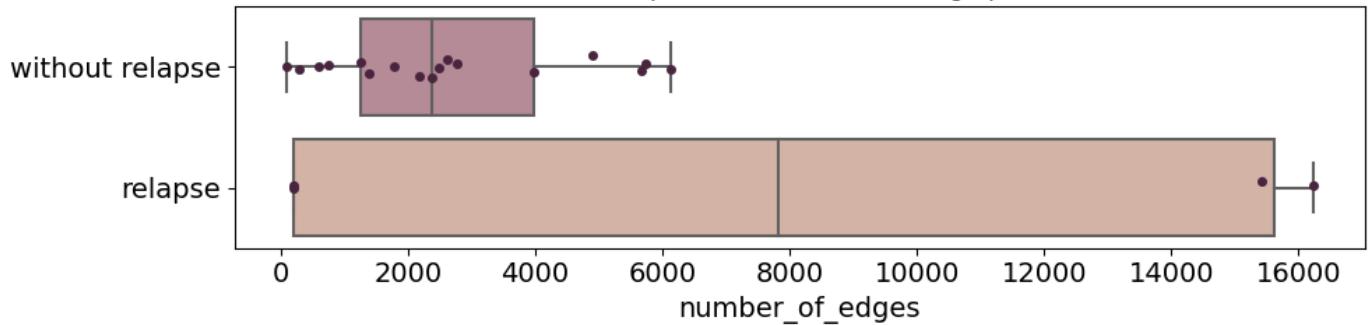
Boxplot of mean\_weight by Relapse free survival  
PDL1 positive cells and Gabriel graph



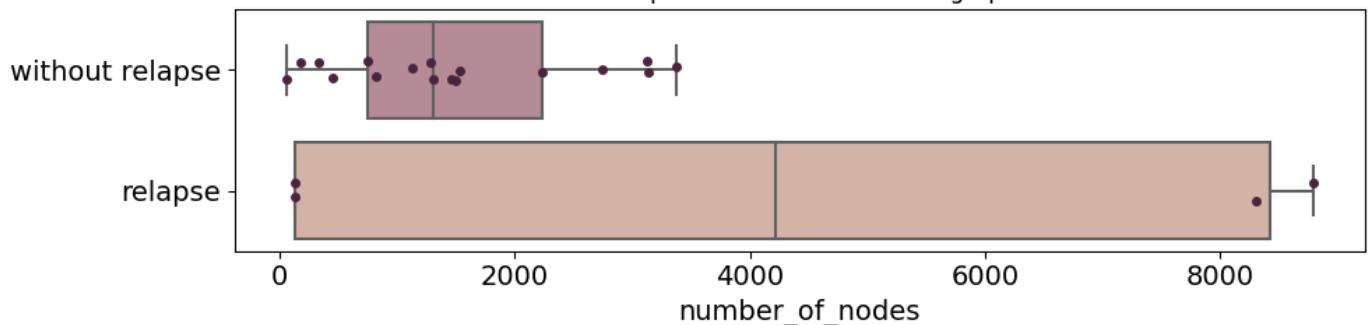
Boxplot of min\_weight by Relapse free survival  
PDL1 positive cells and Gabriel graph



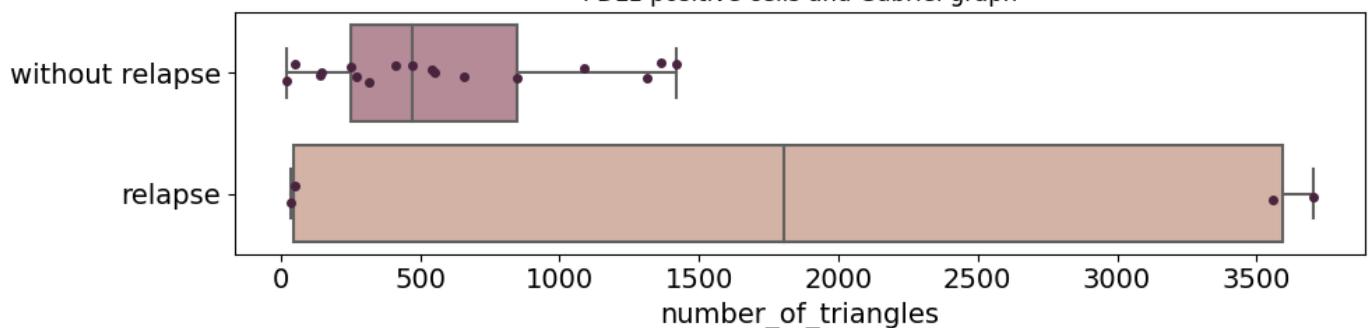
Boxplot of number\_of\_edges by Relapse free survival  
PDL1 positive cells and Gabriel graph



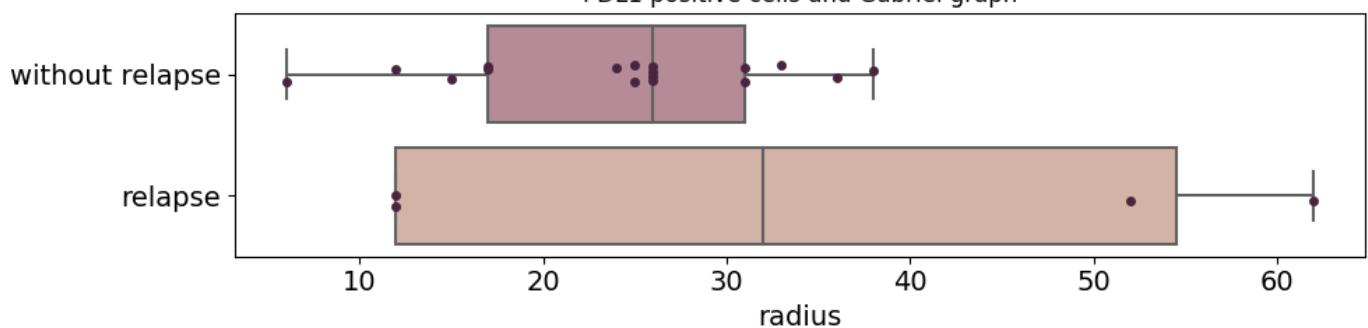
Boxplot of number\_of\_nodes by Relapse free survival  
PDL1 positive cells and Gabriel graph



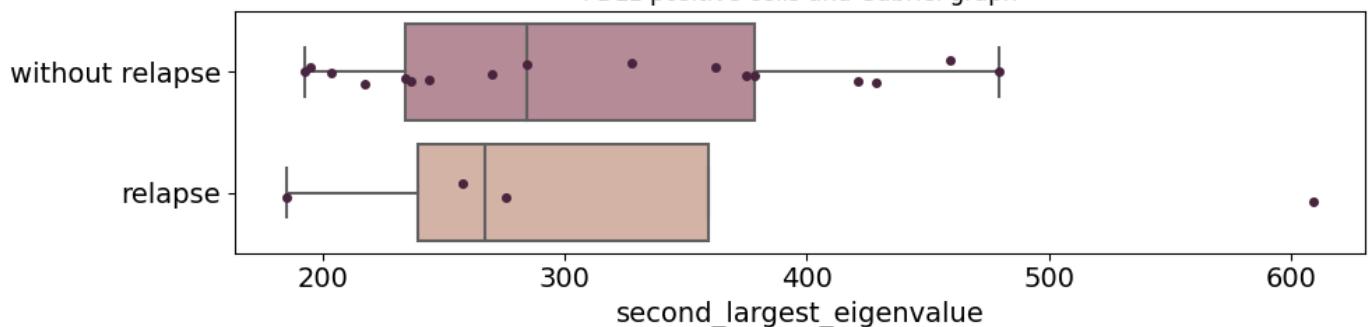
Boxplot of number\_of\_triangles by Relapse free survival  
PDL1 positive cells and Gabriel graph



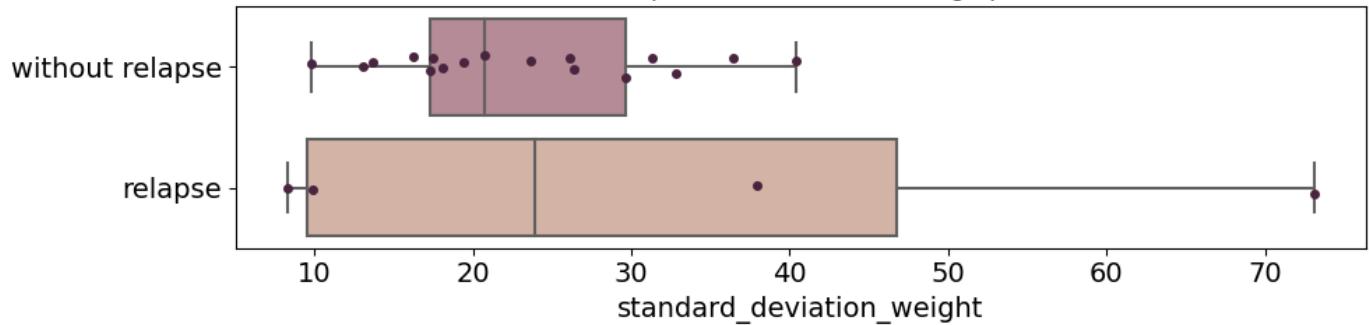
Boxplot of radius by Relapse free survival  
PDL1 positive cells and Gabriel graph



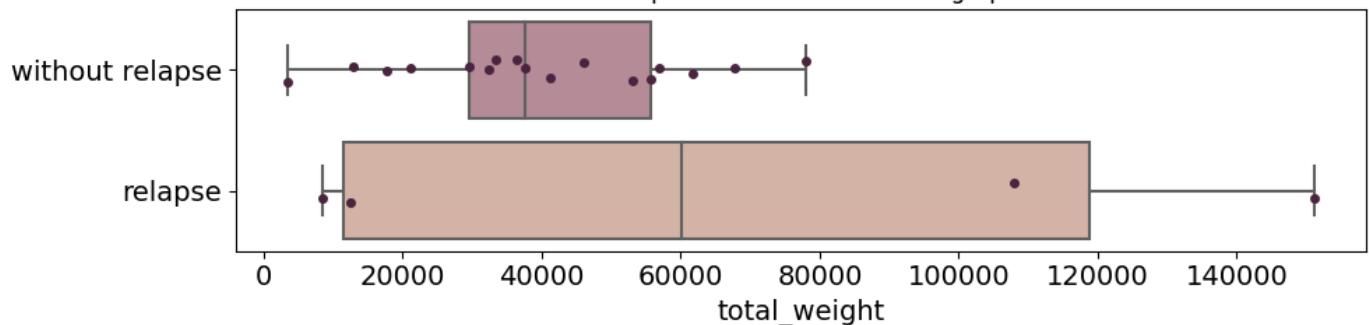
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
PDL1 positive cells and Gabriel graph



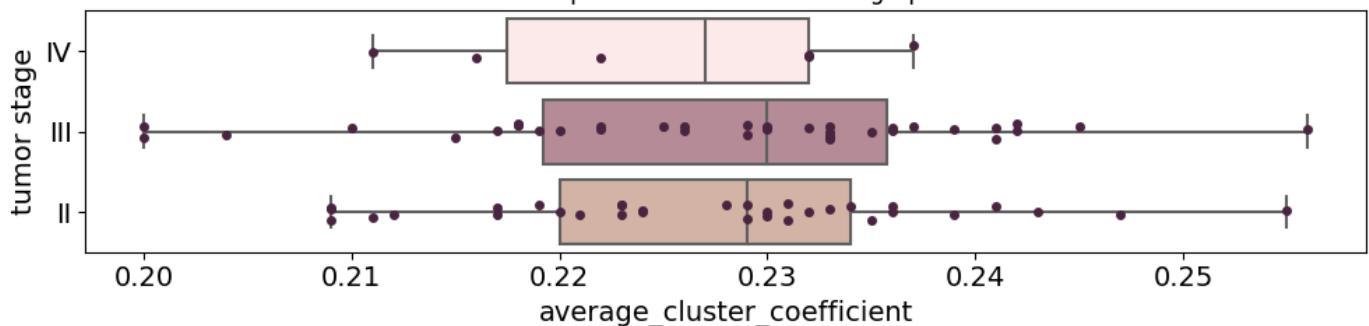
Boxplot of standard\_deviation\_weight by Relapse free survival  
PDL1 positive cells and Gabriel graph



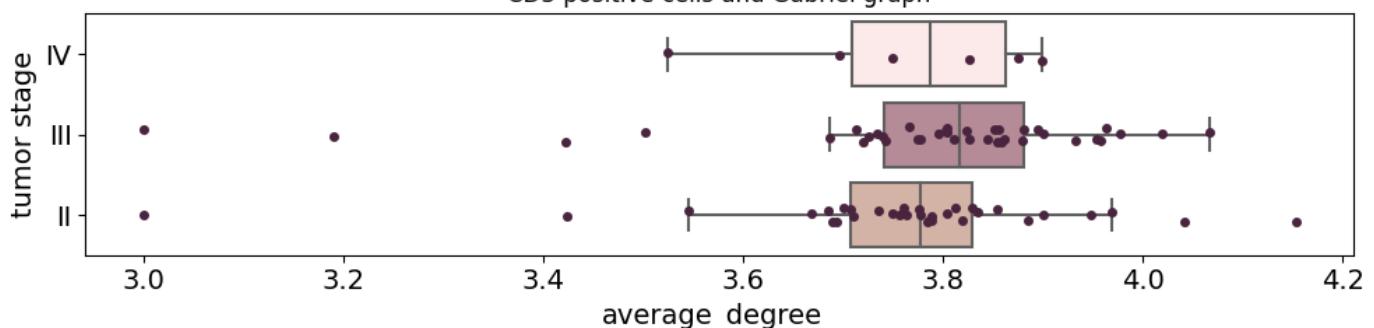
Boxplot of total\_weight by Relapse free survival  
PDL1 positive cells and Gabriel graph



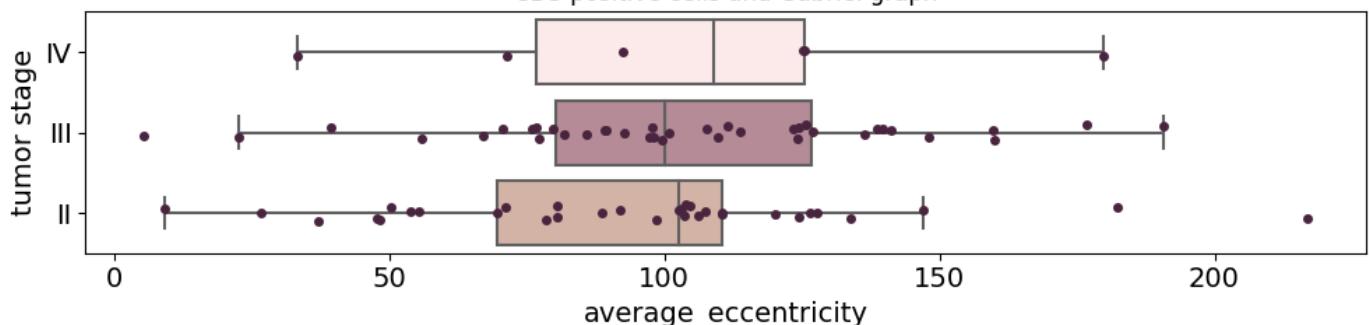
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD3 positive cells and Gabriel graph

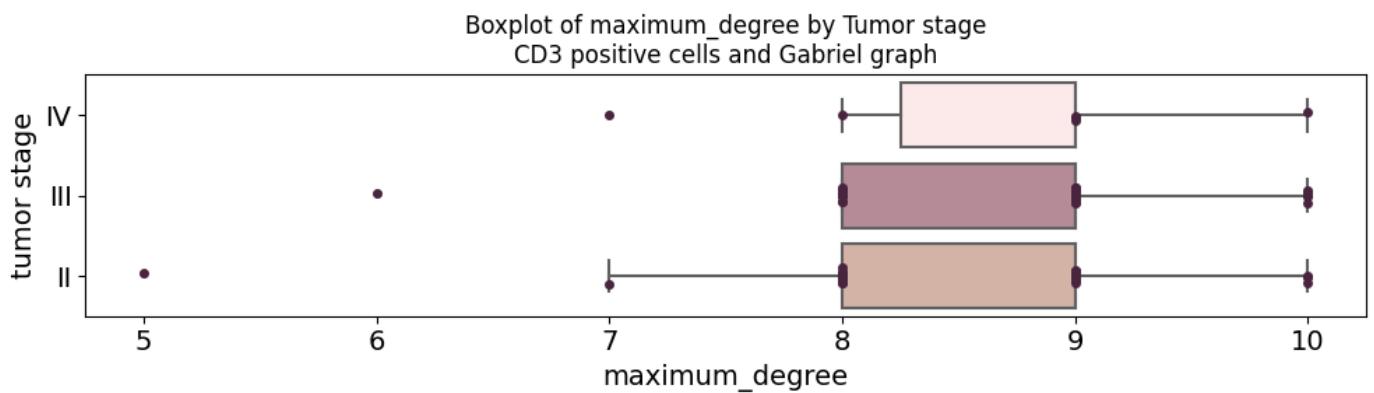
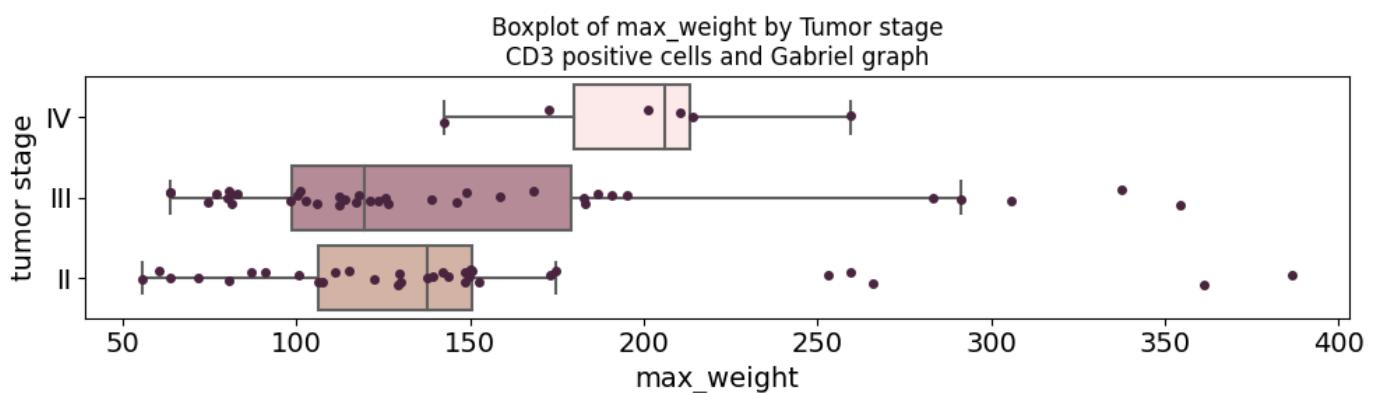
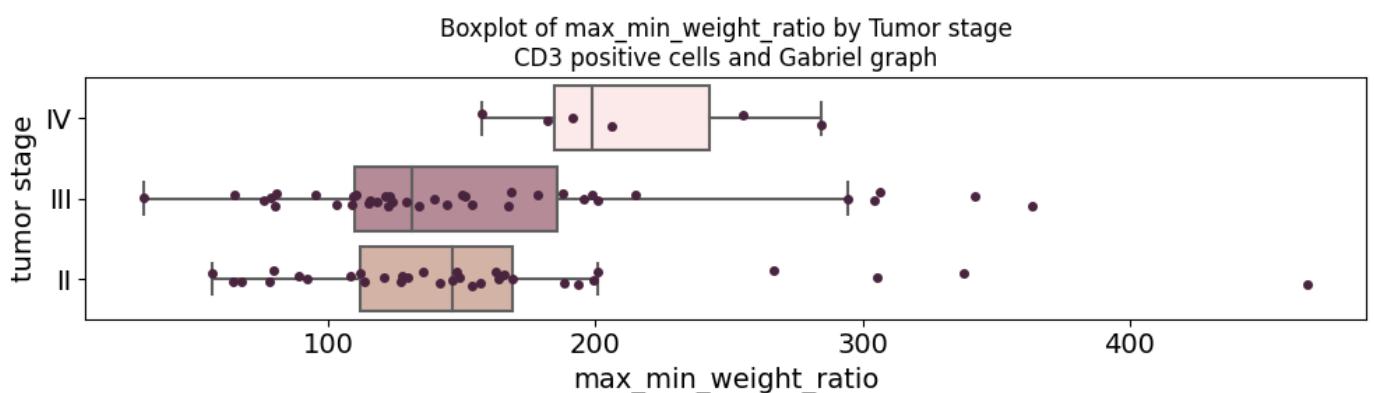
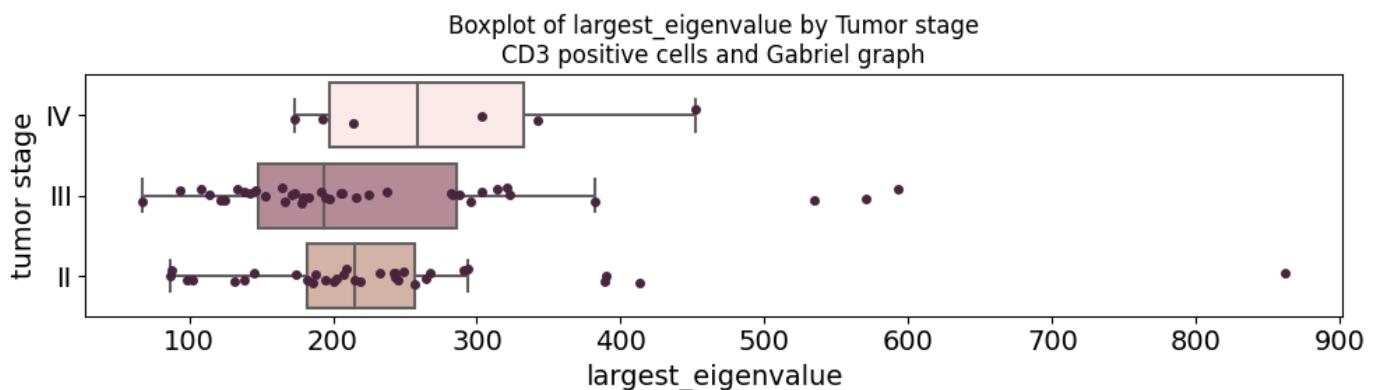
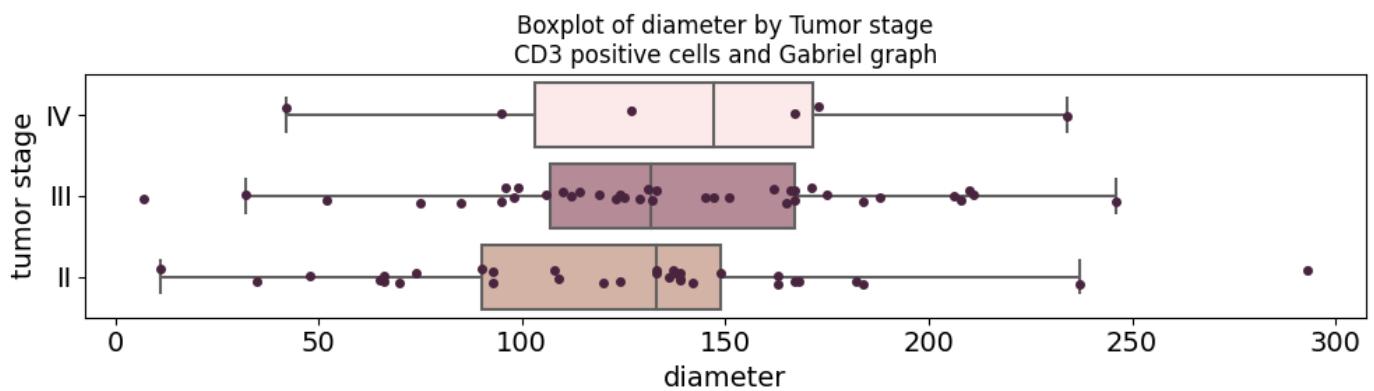


Boxplot of average\_degree\_ by Tumor stage  
CD3 positive cells and Gabriel graph

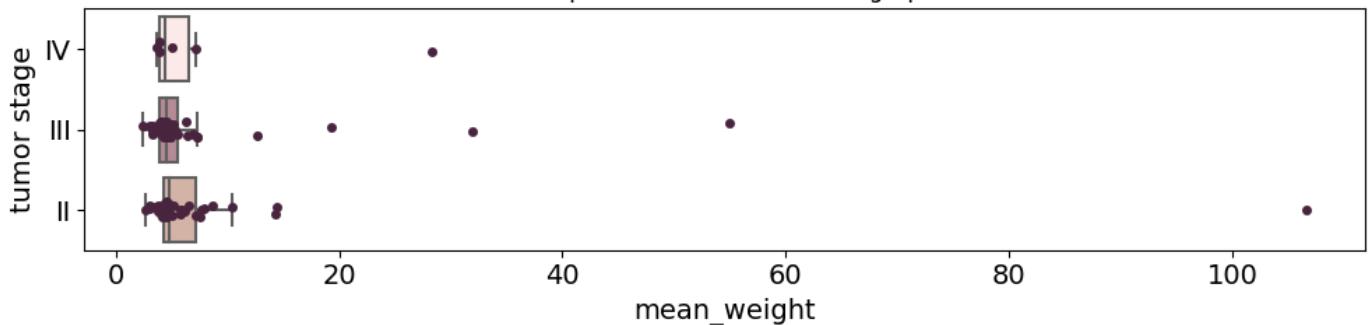


Boxplot of average\_eccentricity by Tumor stage  
CD3 positive cells and Gabriel graph

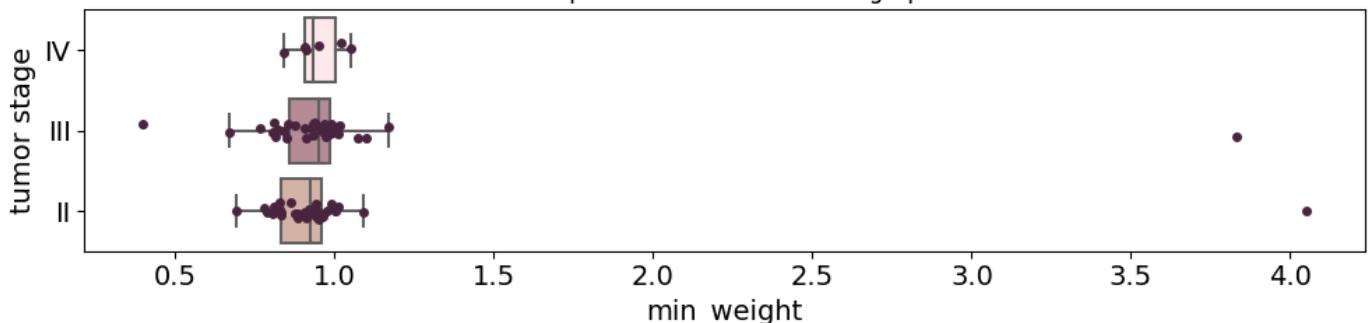




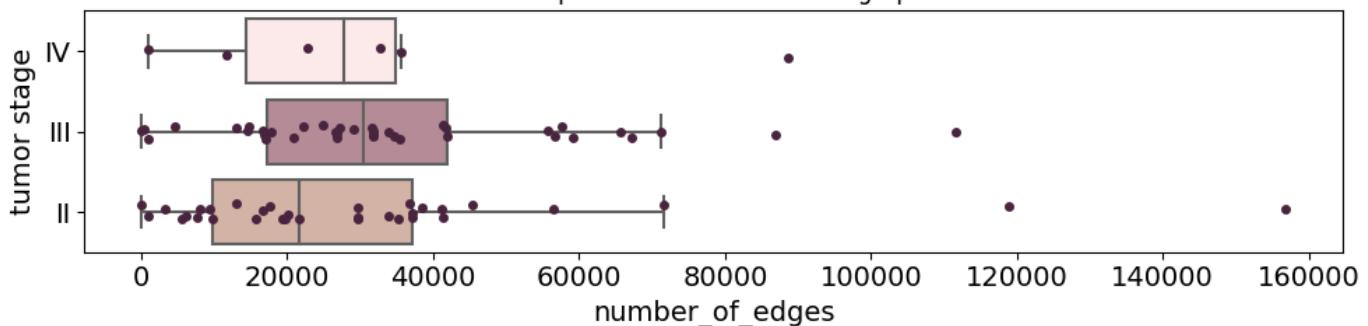
Boxplot of mean\_weight by Tumor stage  
CD3 positive cells and Gabriel graph



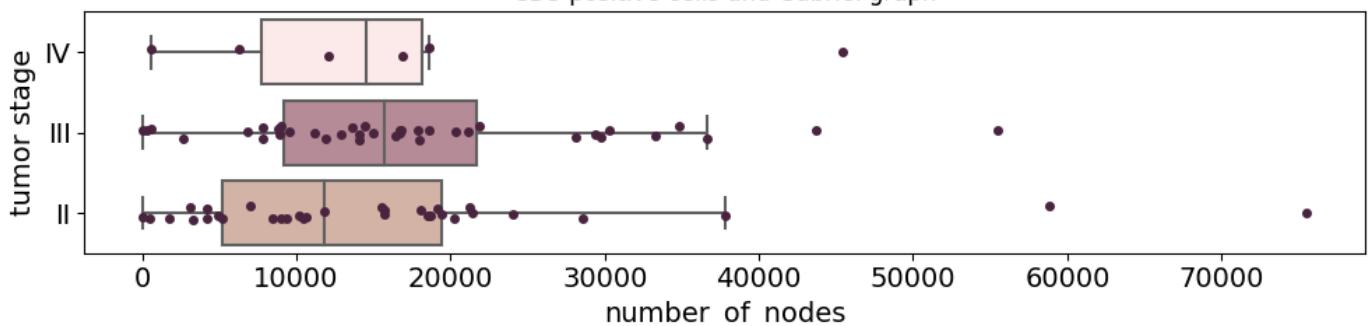
Boxplot of min\_weight by Tumor stage  
CD3 positive cells and Gabriel graph



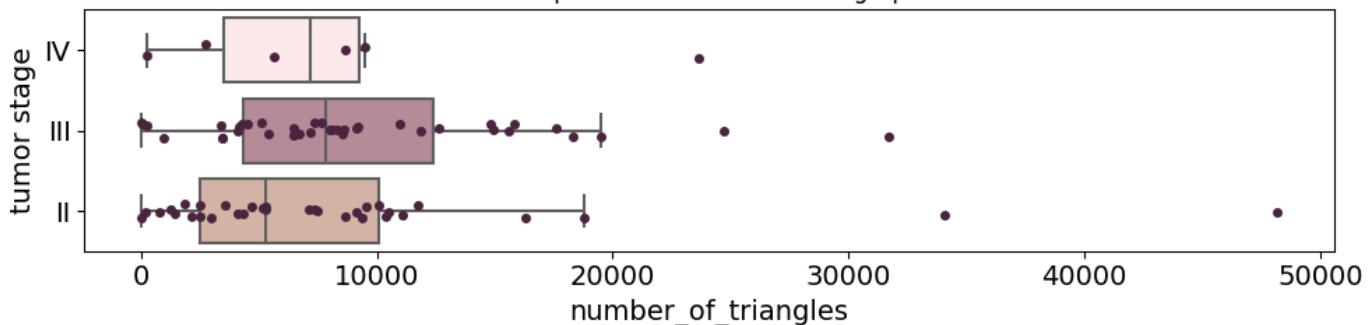
Boxplot of number\_of\_edges by Tumor stage  
CD3 positive cells and Gabriel graph

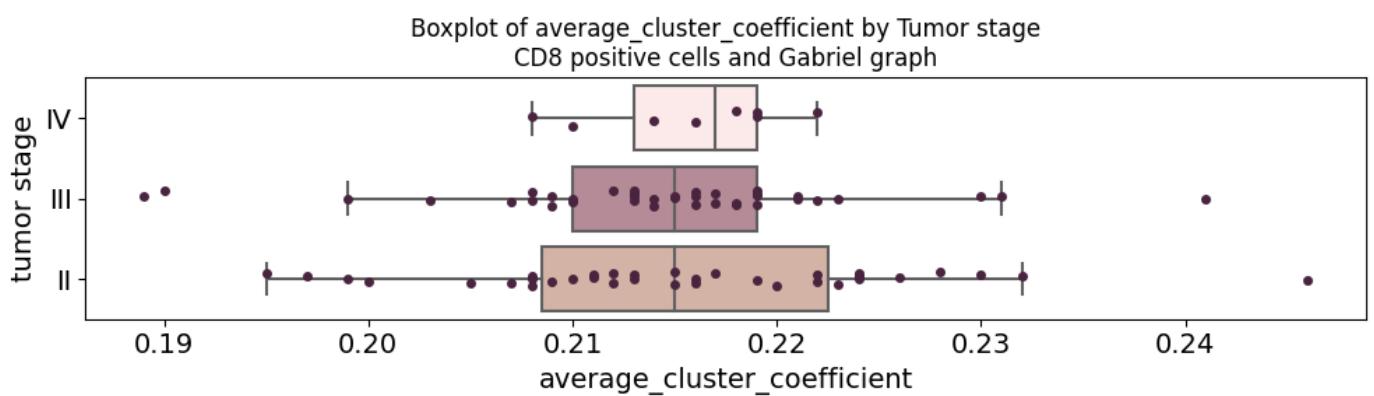
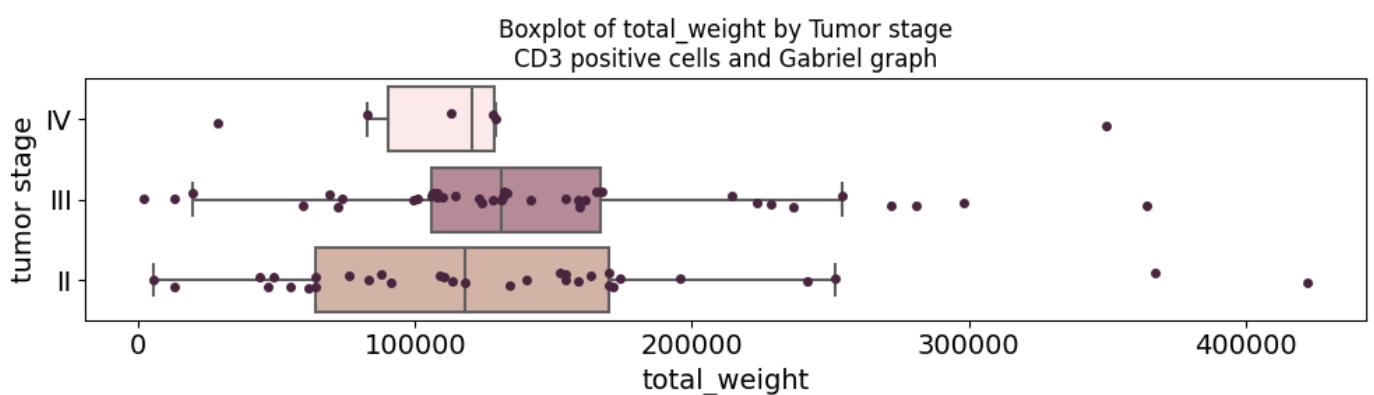
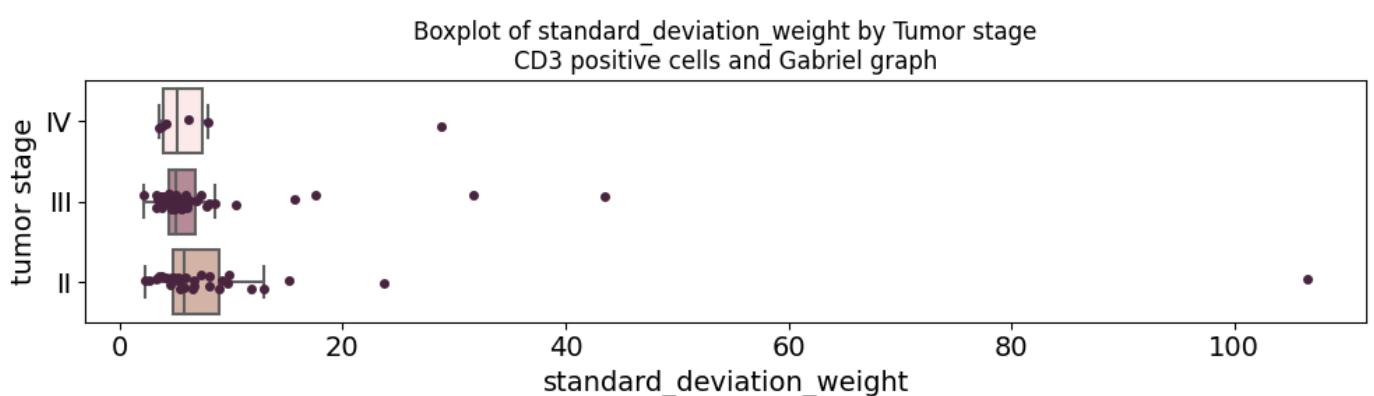
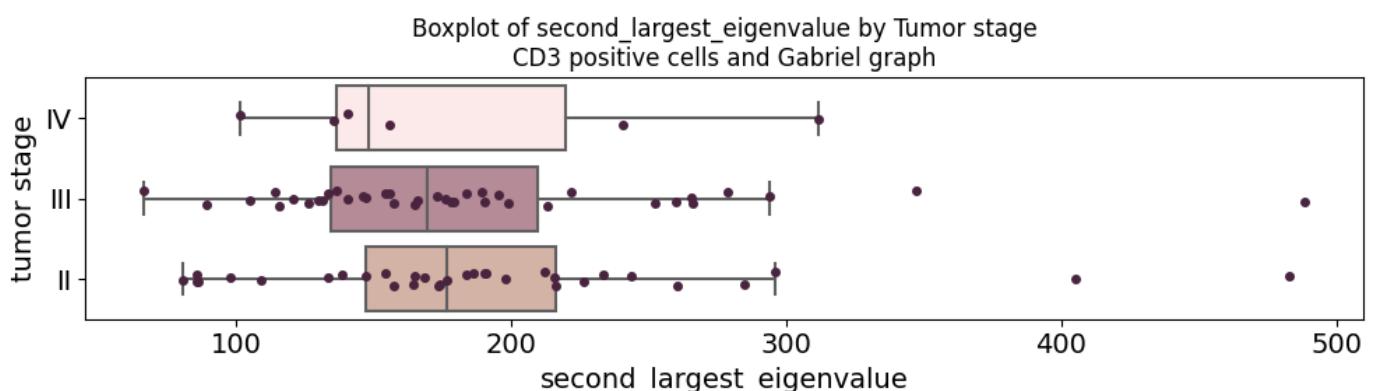
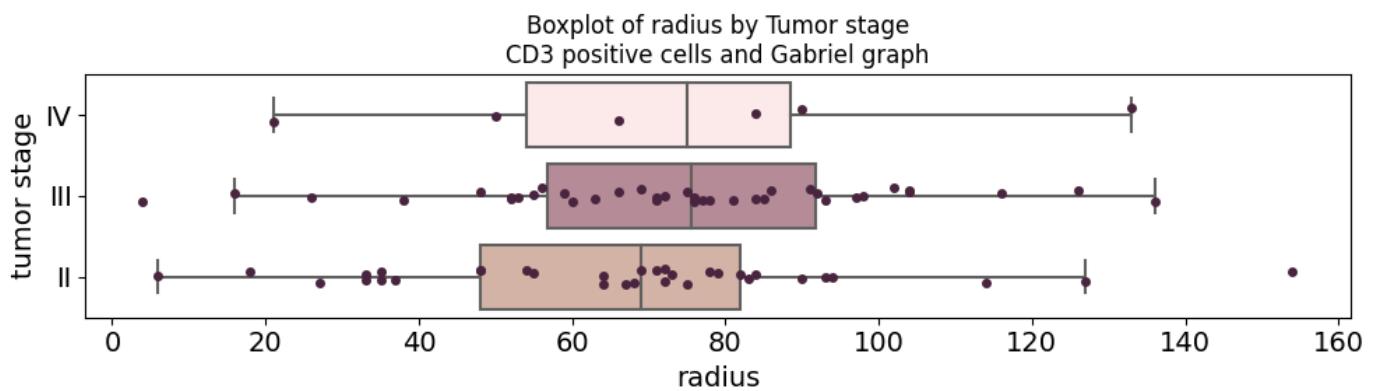


Boxplot of number\_of\_nodes by Tumor stage  
CD3 positive cells and Gabriel graph

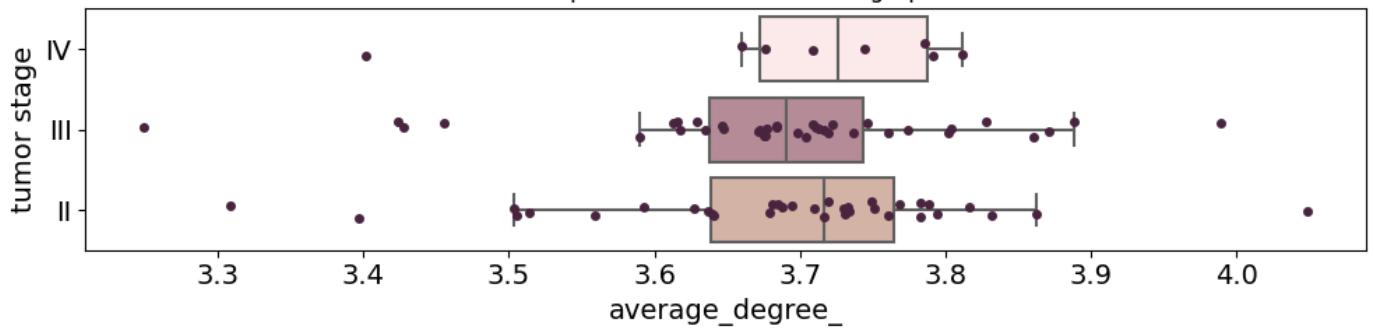


Boxplot of number\_of\_triangles by Tumor stage  
CD3 positive cells and Gabriel graph

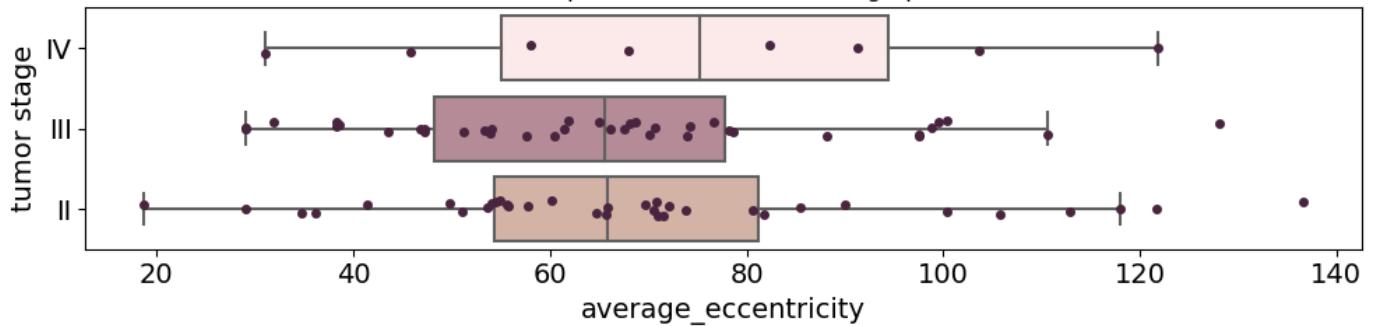




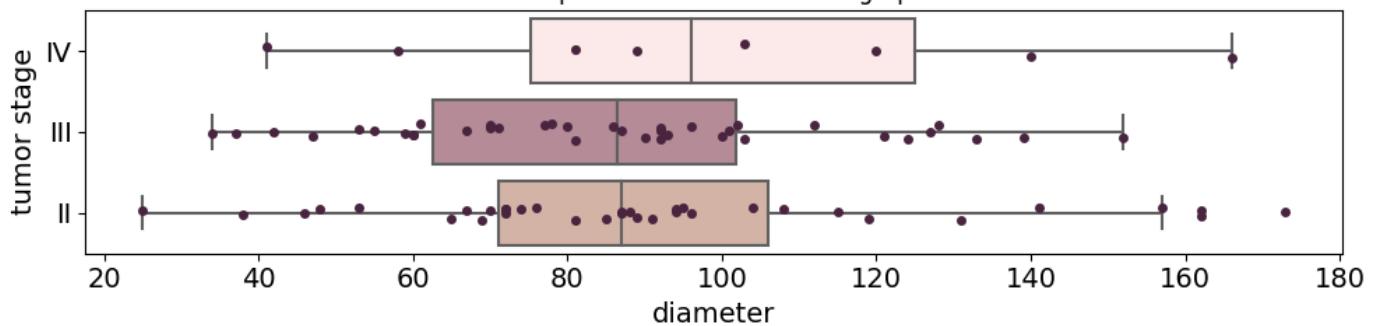
Boxplot of average\_degree\_ by Tumor stage  
CD8 positive cells and Gabriel graph



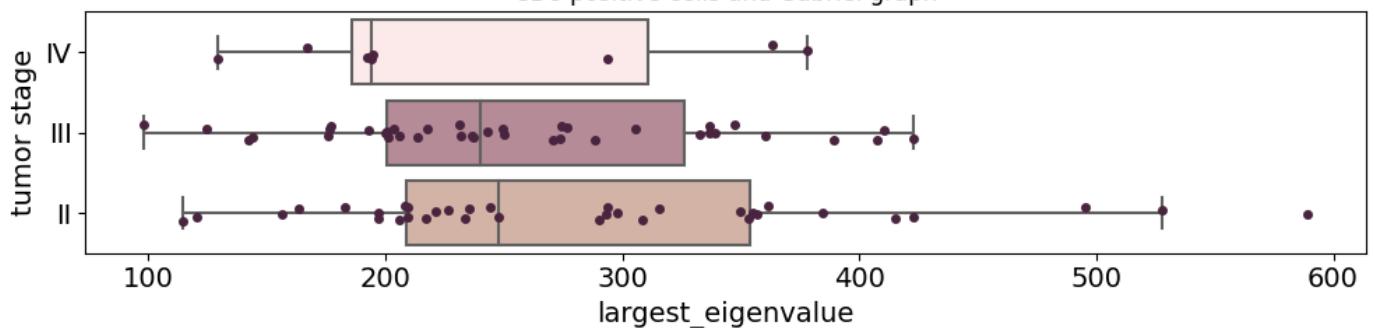
Boxplot of average\_eccentricity by Tumor stage  
CD8 positive cells and Gabriel graph



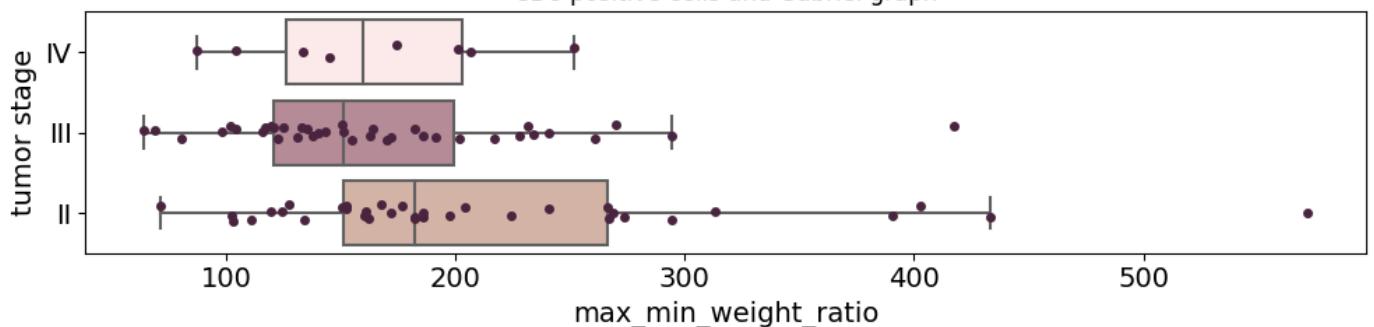
Boxplot of diameter by Tumor stage  
CD8 positive cells and Gabriel graph



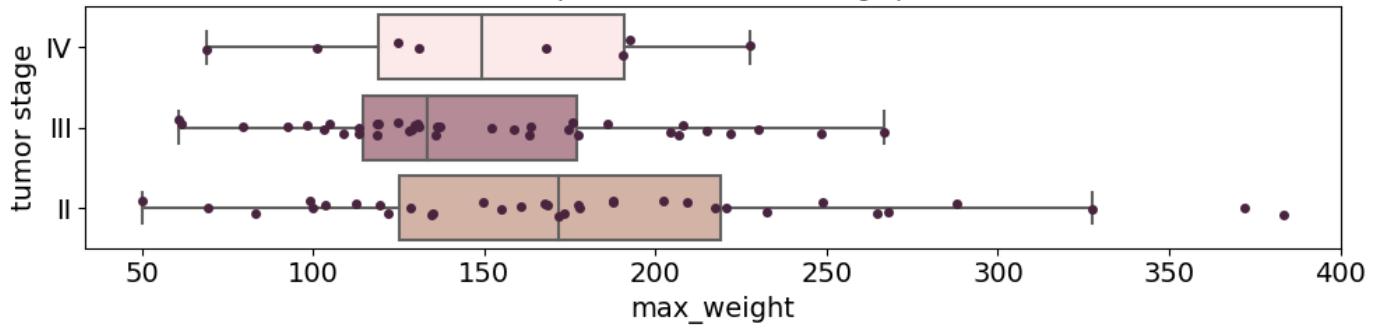
Boxplot of largest\_eigenvalue by Tumor stage  
CD8 positive cells and Gabriel graph



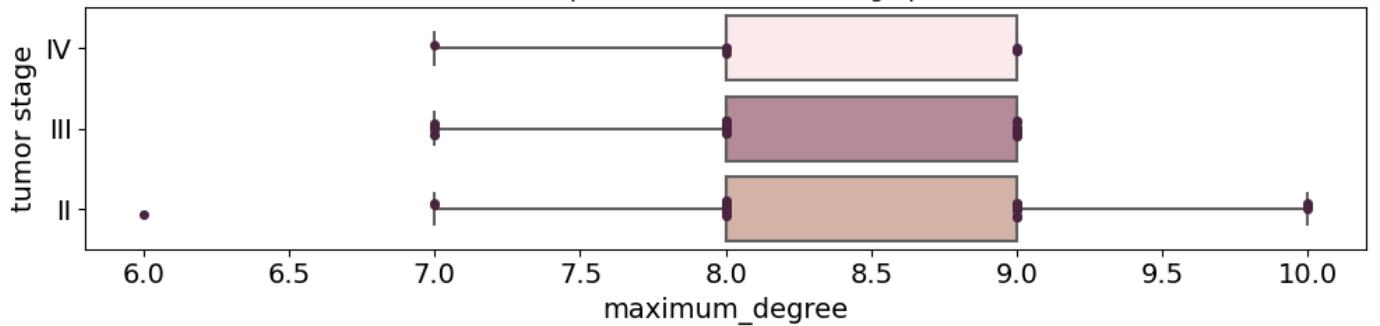
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CD8 positive cells and Gabriel graph



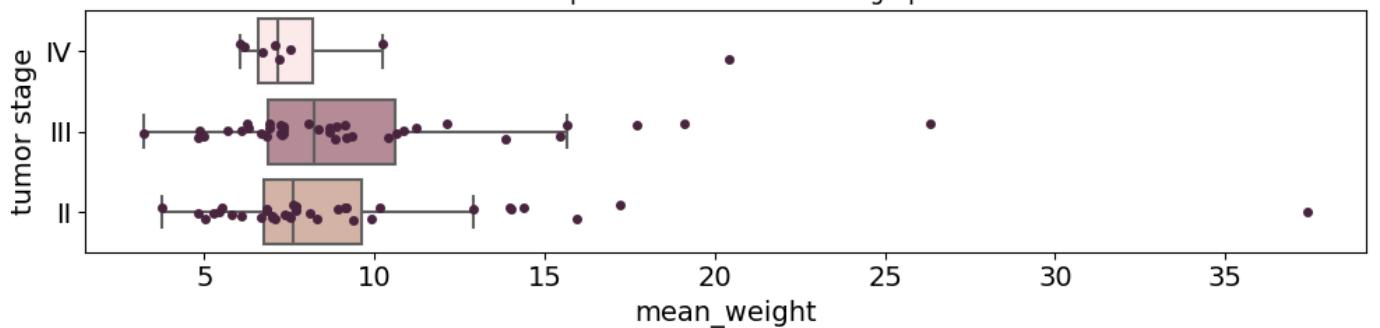
Boxplot of max\_weight by Tumor stage  
CD8 positive cells and Gabriel graph



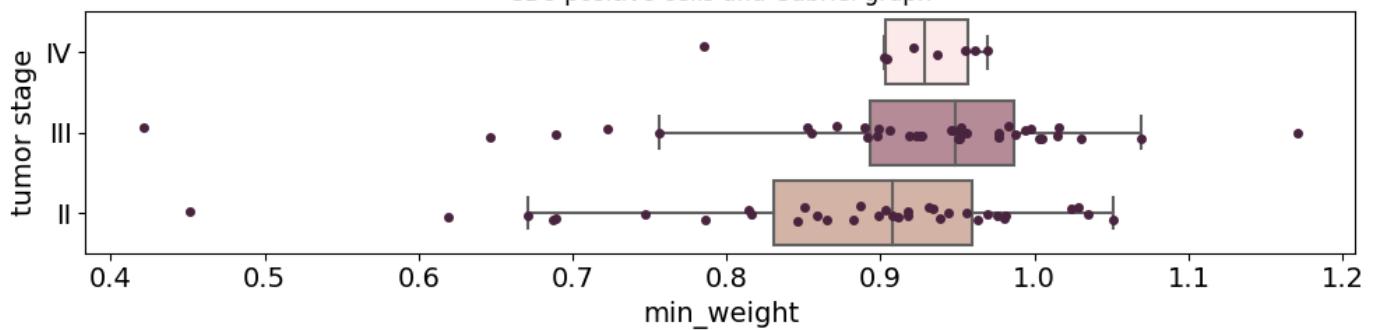
Boxplot of maximum\_degree by Tumor stage  
CD8 positive cells and Gabriel graph



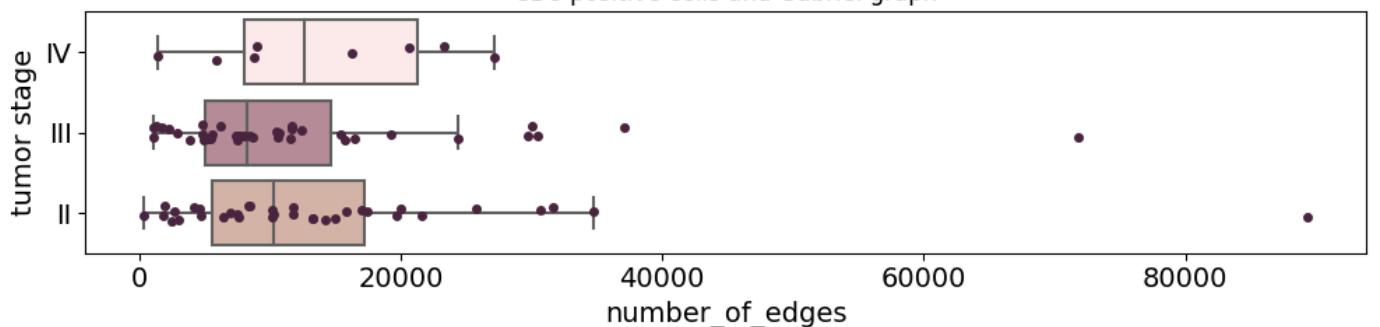
Boxplot of mean\_weight by Tumor stage  
CD8 positive cells and Gabriel graph



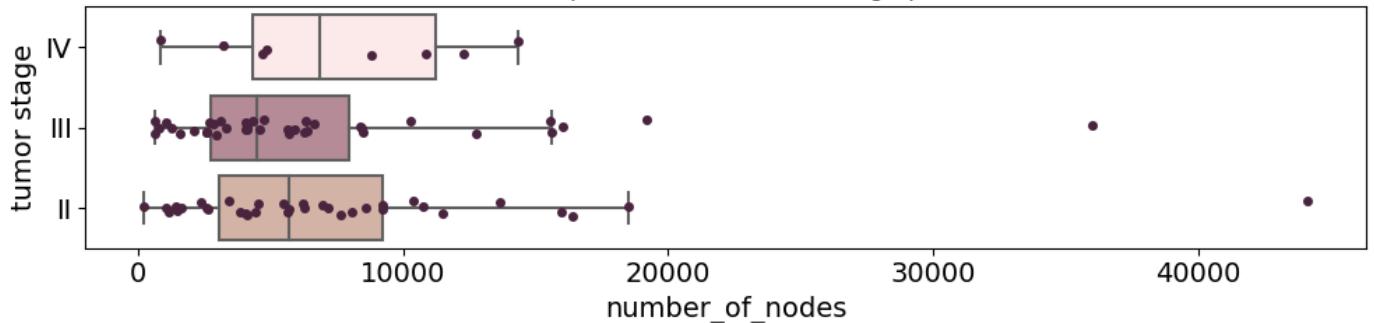
Boxplot of min\_weight by Tumor stage  
CD8 positive cells and Gabriel graph



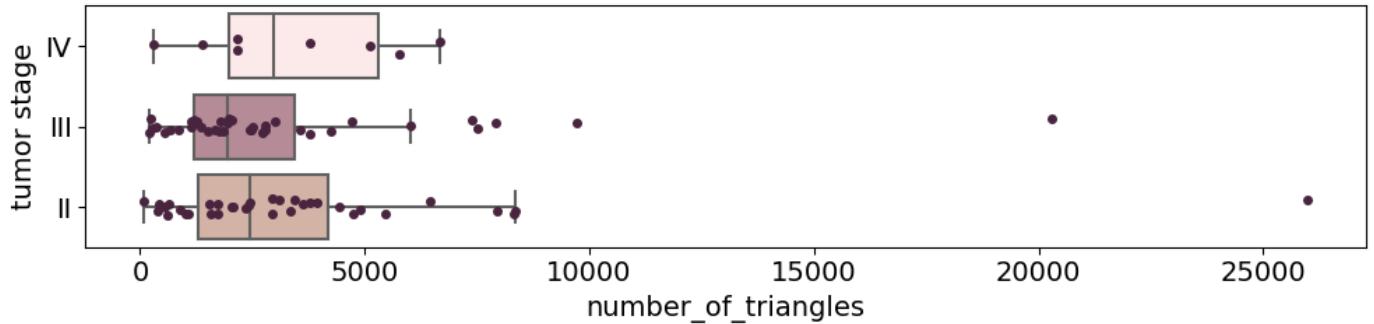
Boxplot of number\_of\_edges by Tumor stage  
CD8 positive cells and Gabriel graph



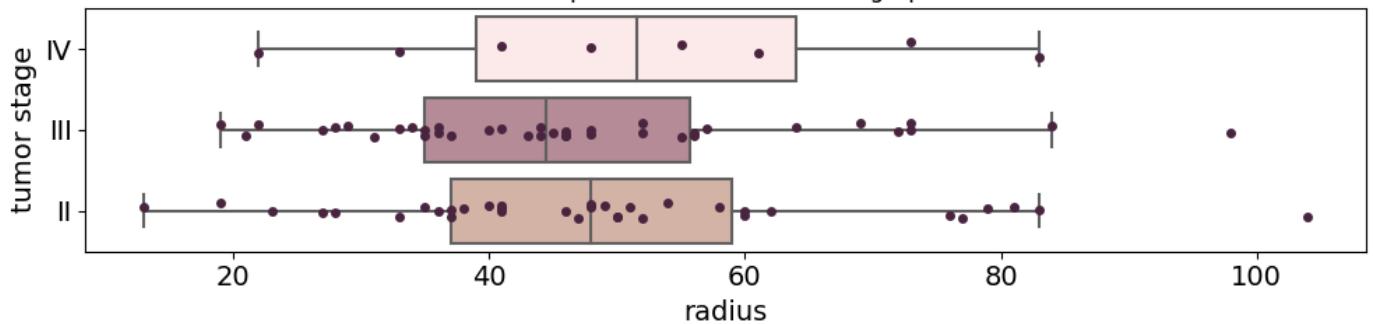
Boxplot of number\_of\_nodes by Tumor stage  
CD8 positive cells and Gabriel graph



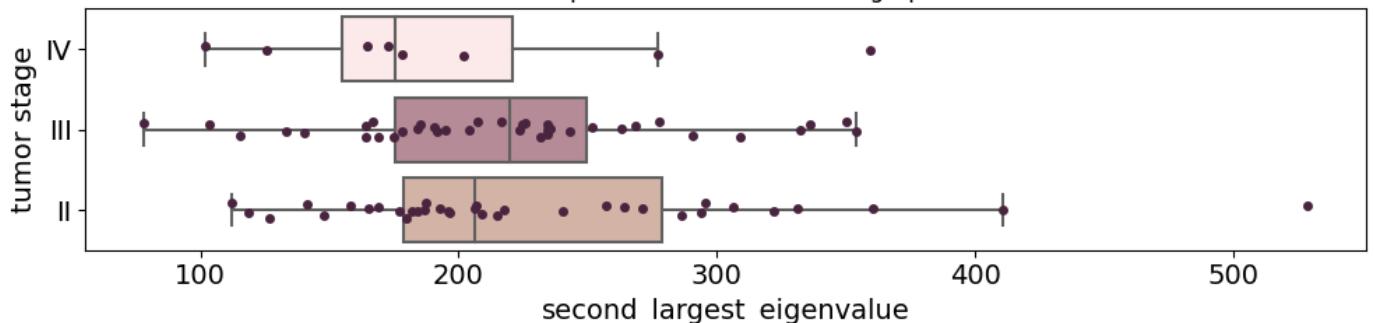
Boxplot of number\_of\_triangles by Tumor stage  
CD8 positive cells and Gabriel graph



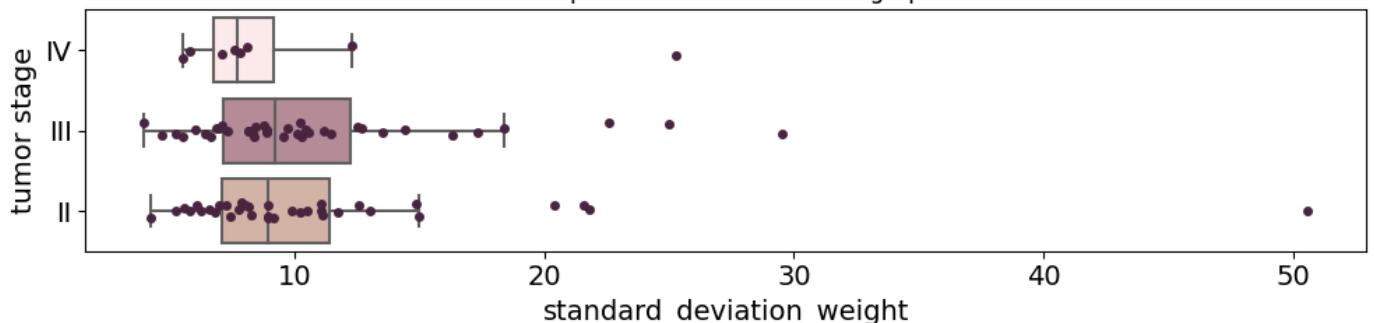
Boxplot of radius by Tumor stage  
CD8 positive cells and Gabriel graph



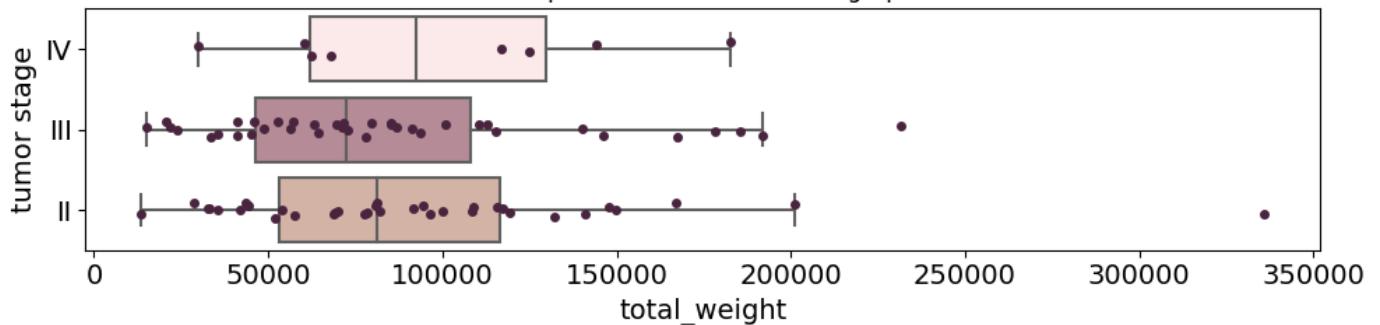
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD8 positive cells and Gabriel graph



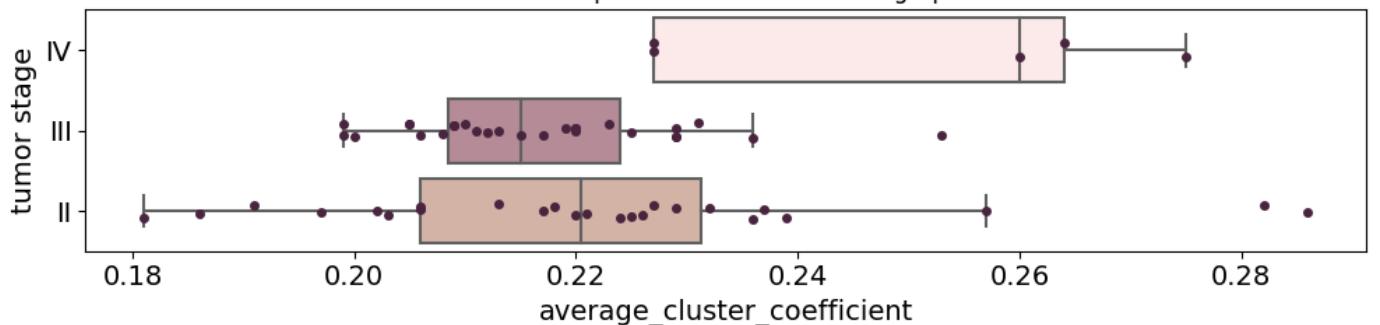
Boxplot of standard\_deviation\_weight by Tumor stage  
CD8 positive cells and Gabriel graph



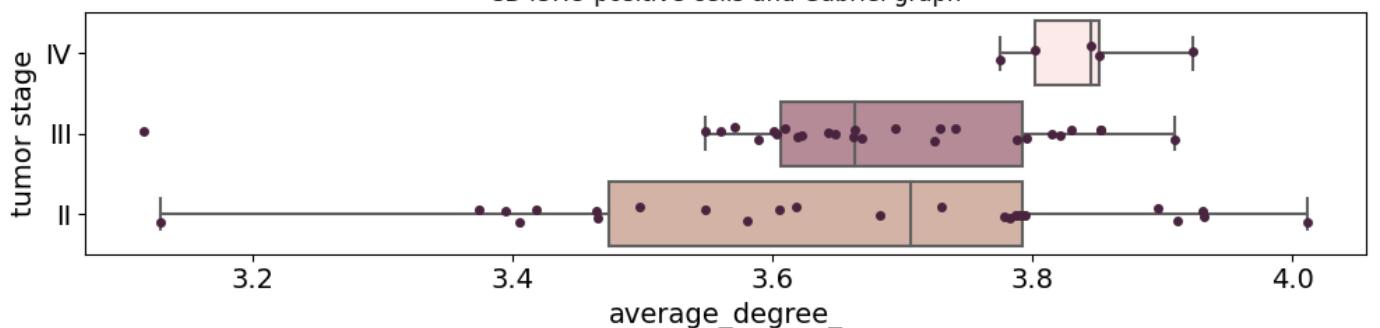
Boxplot of total\_weight by Tumor stage  
CD8 positive cells and Gabriel graph



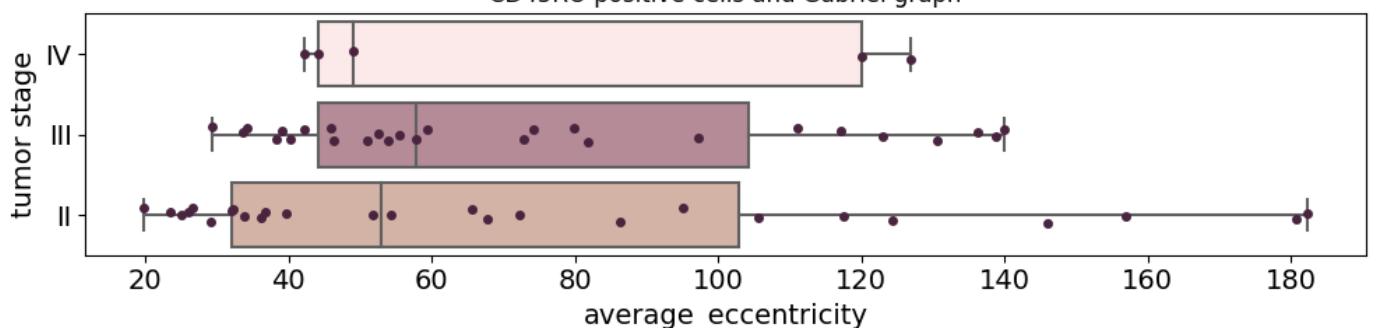
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD45RO positive cells and Gabriel graph



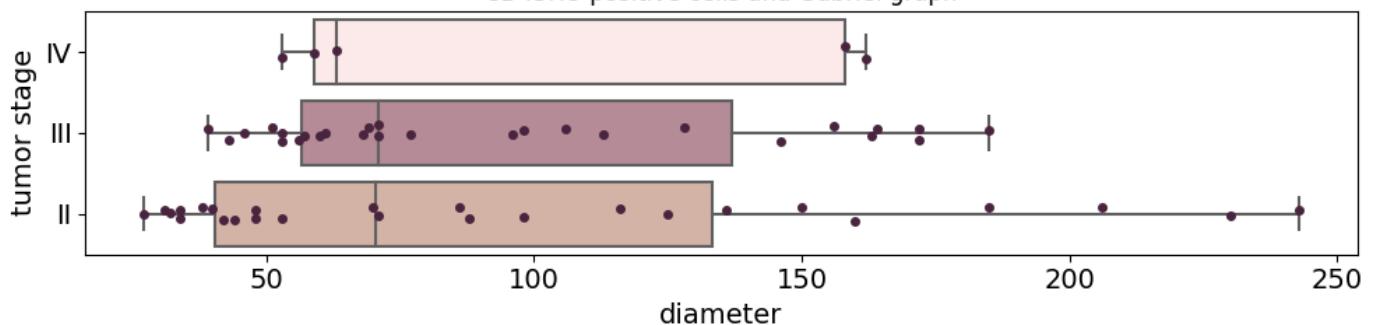
Boxplot of average\_degree\_ by Tumor stage  
CD45RO positive cells and Gabriel graph



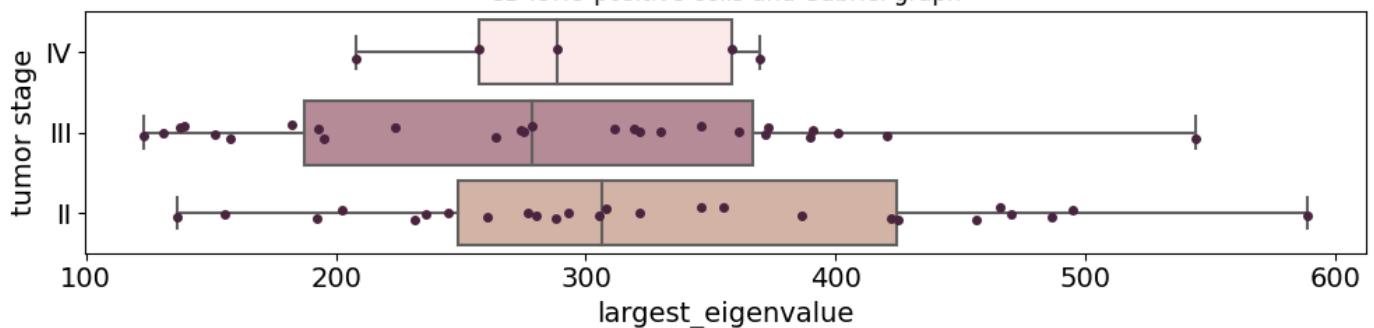
Boxplot of average\_eccentricity by Tumor stage  
CD45RO positive cells and Gabriel graph



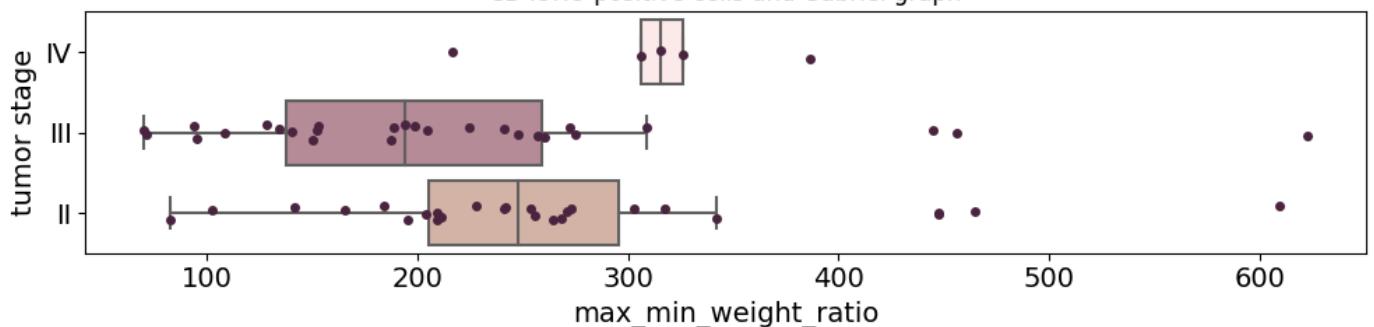
Boxplot of diameter by Tumor stage  
CD45RO positive cells and Gabriel graph



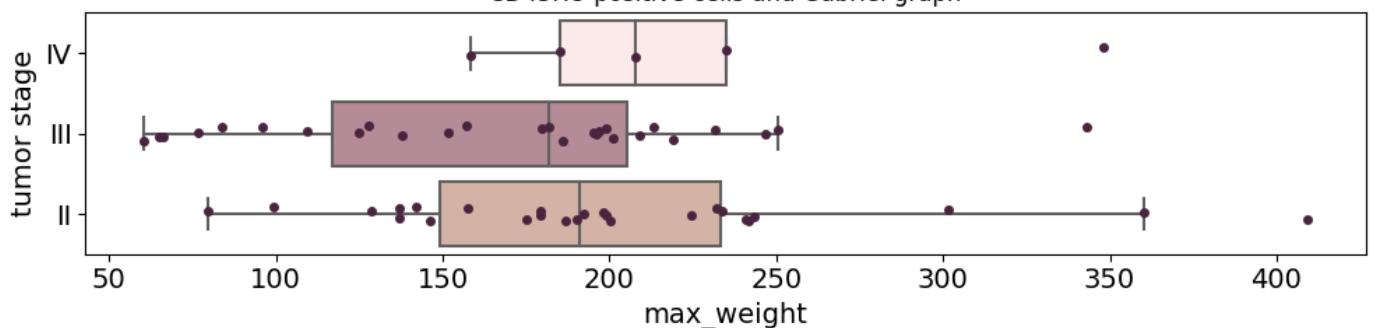
Boxplot of largest\_eigenvalue by Tumor stage  
CD45RO positive cells and Gabriel graph



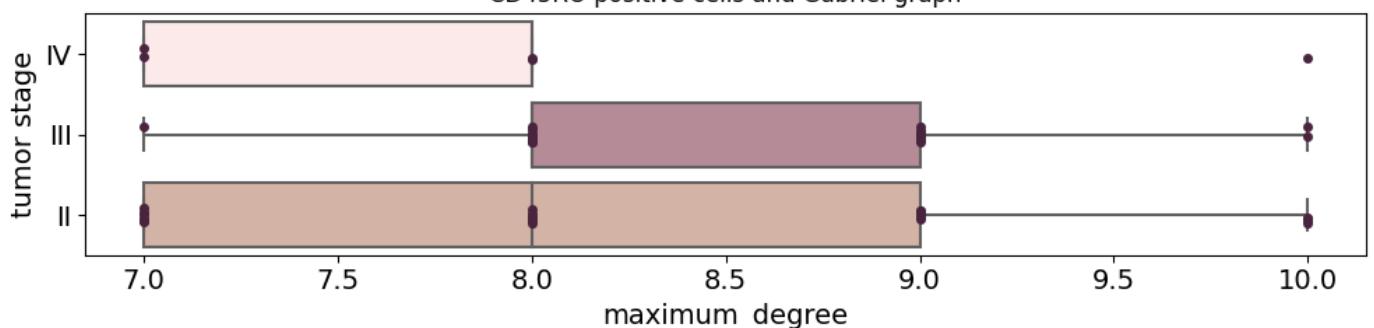
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD45RO positive cells and Gabriel graph



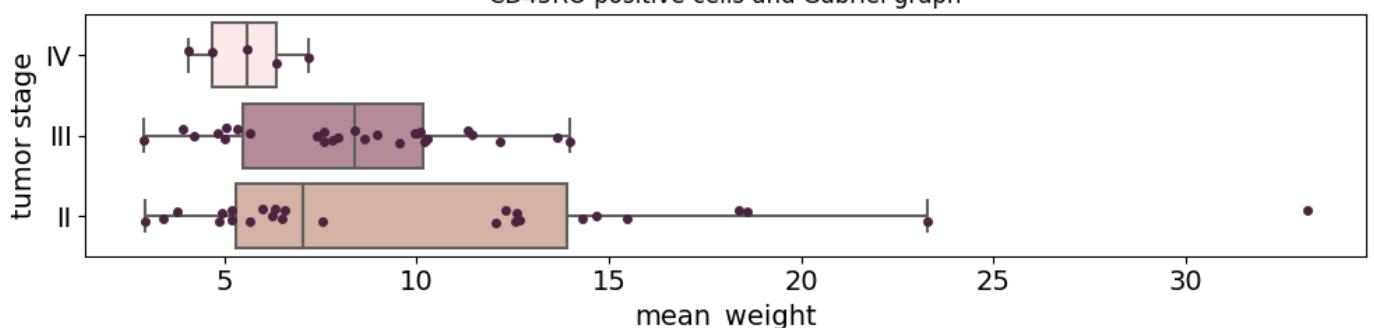
Boxplot of max\_weight by Tumor stage  
CD45RO positive cells and Gabriel graph

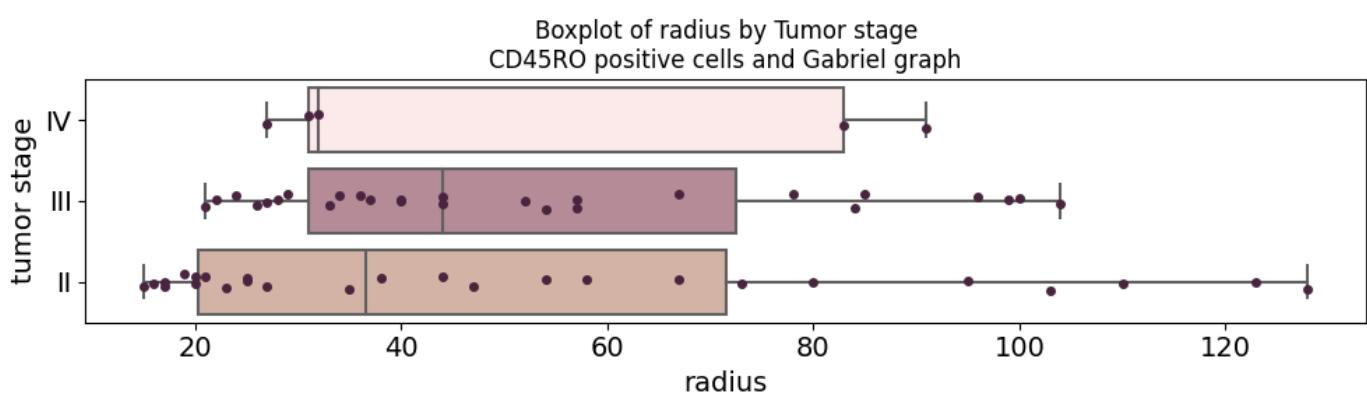
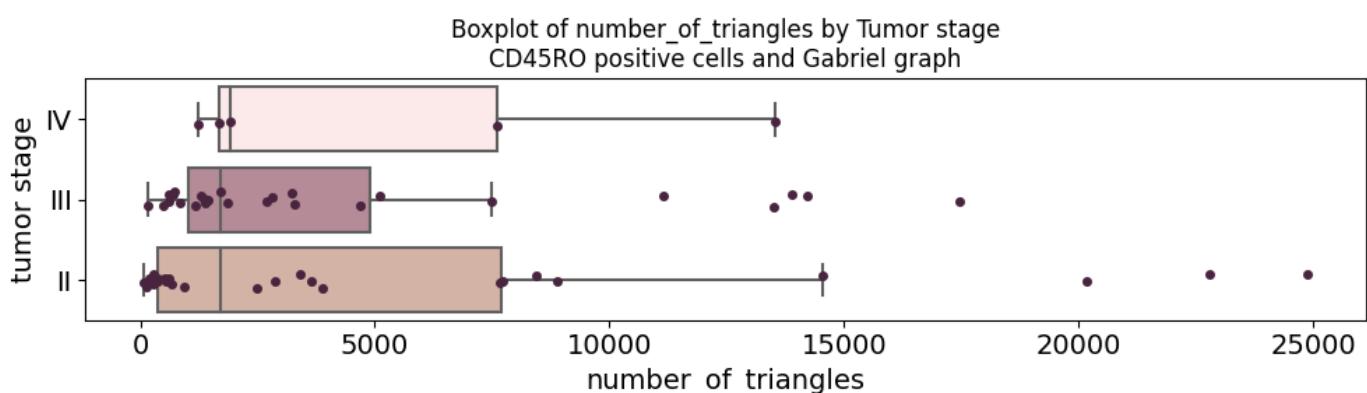
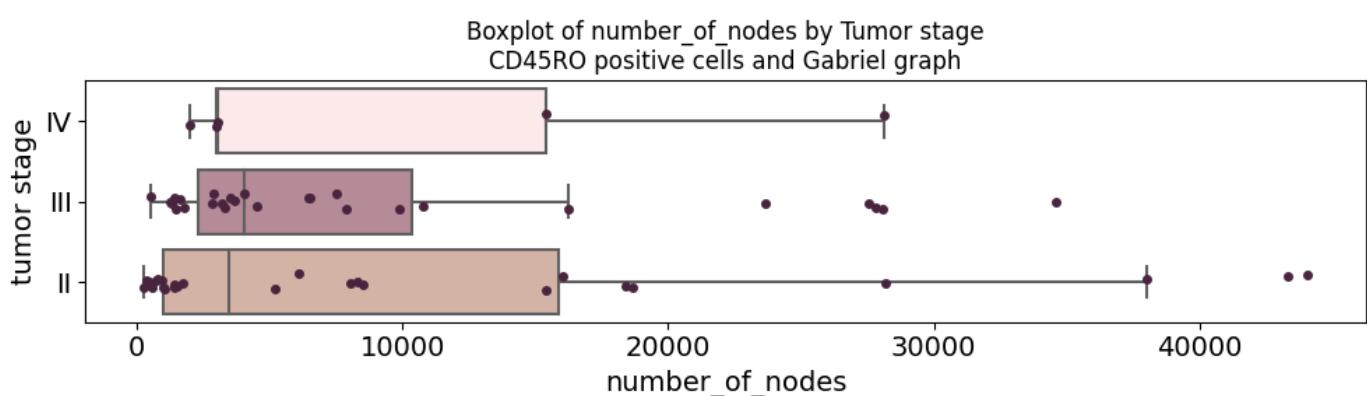
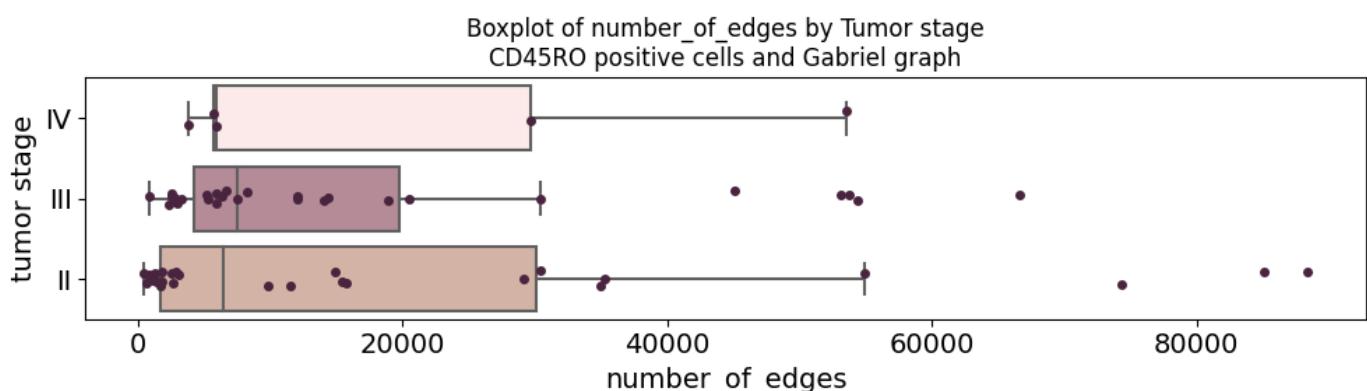
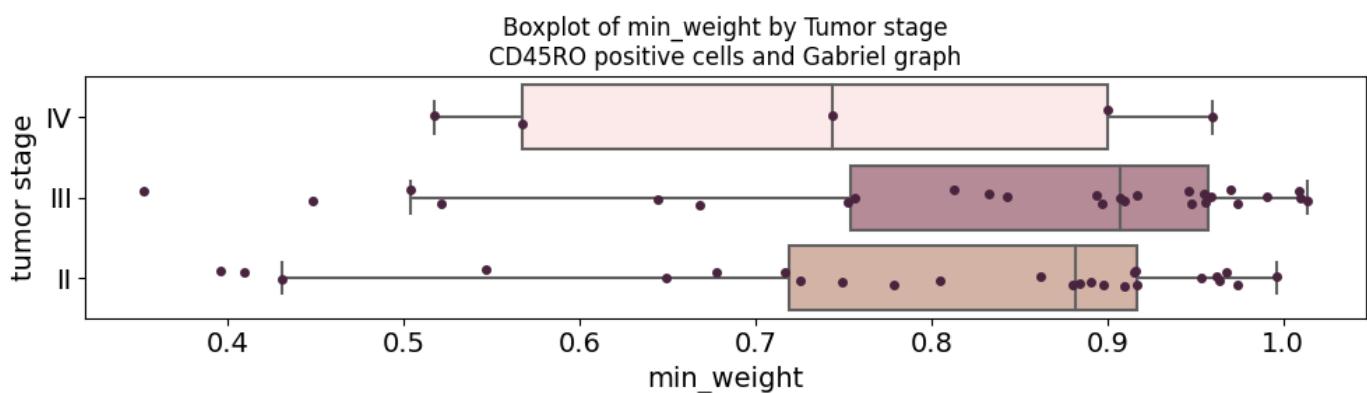


Boxplot of maximum\_degree by Tumor stage  
CD45RO positive cells and Gabriel graph

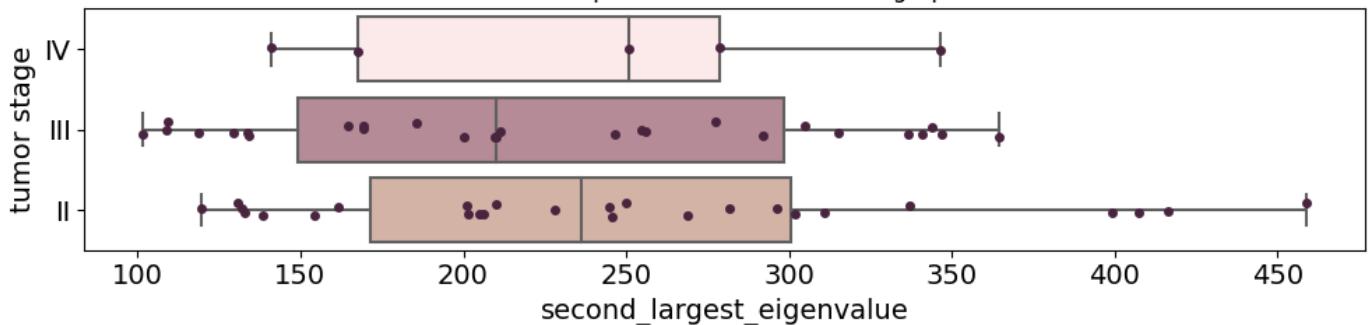


Boxplot of mean\_weight by Tumor stage  
CD45RO positive cells and Gabriel graph

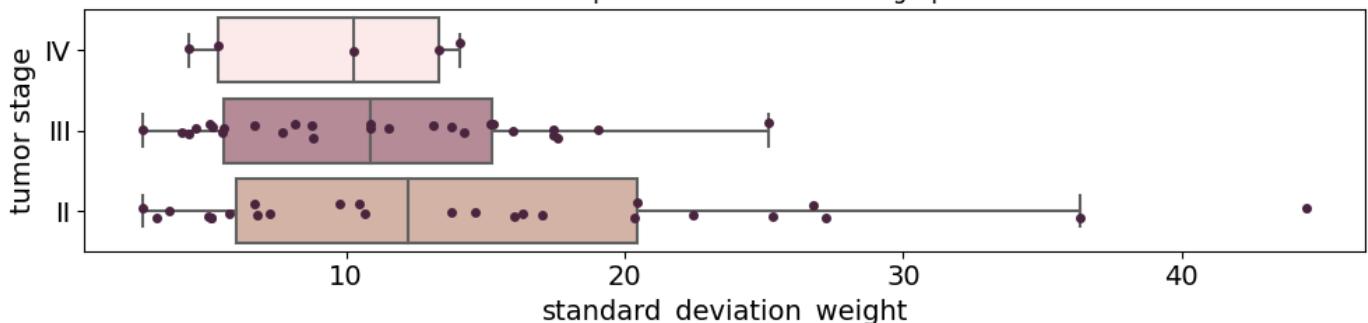




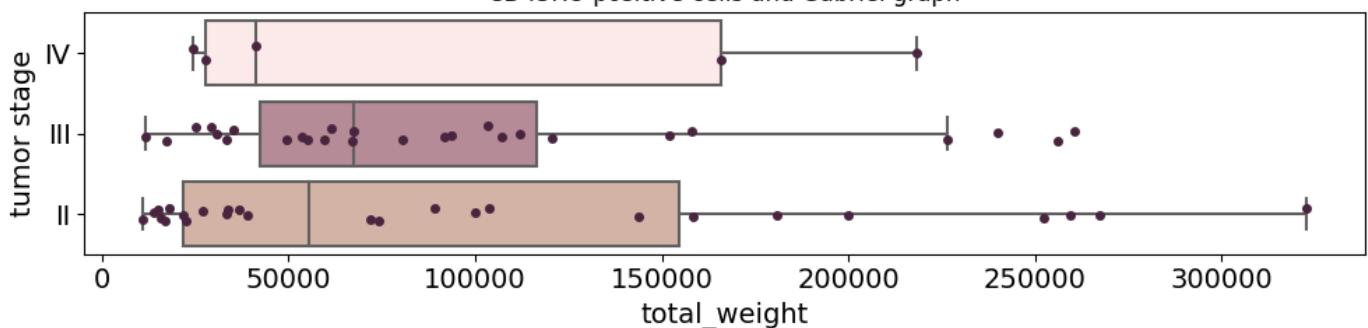
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD45RO positive cells and Gabriel graph



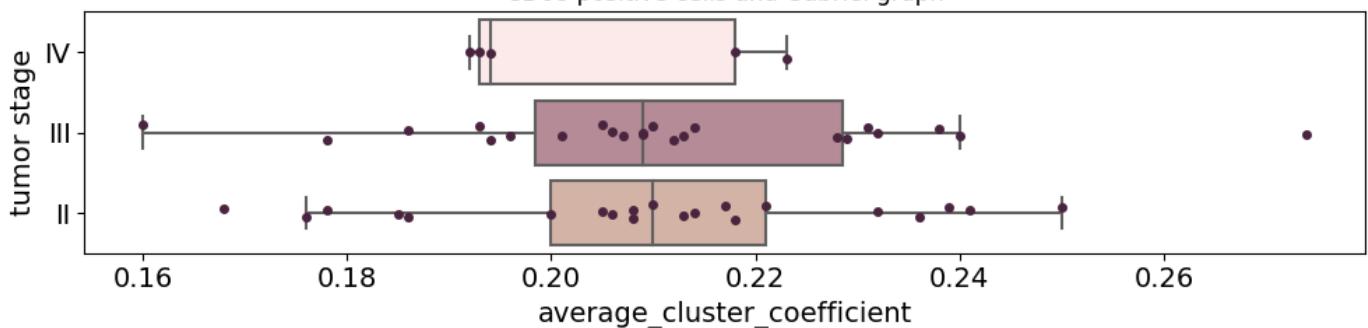
Boxplot of standard\_deviation\_weight by Tumor stage  
CD45RO positive cells and Gabriel graph



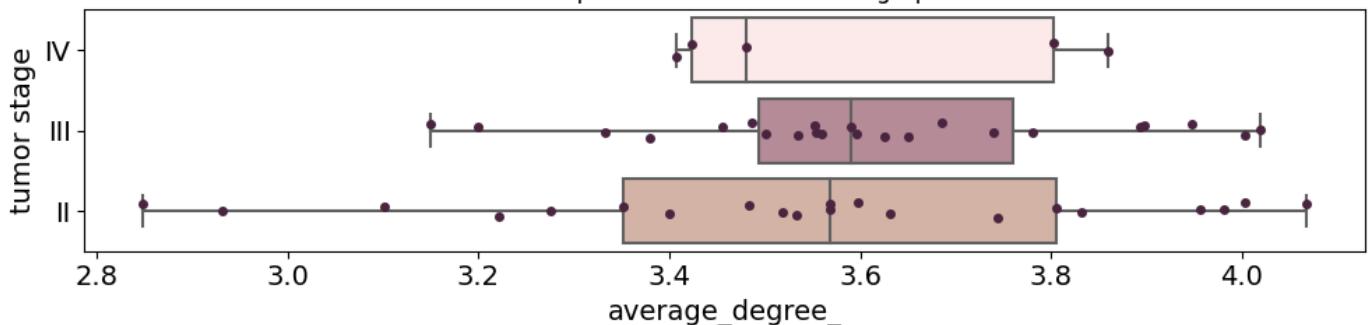
Boxplot of total\_weight by Tumor stage  
CD45RO positive cells and Gabriel graph



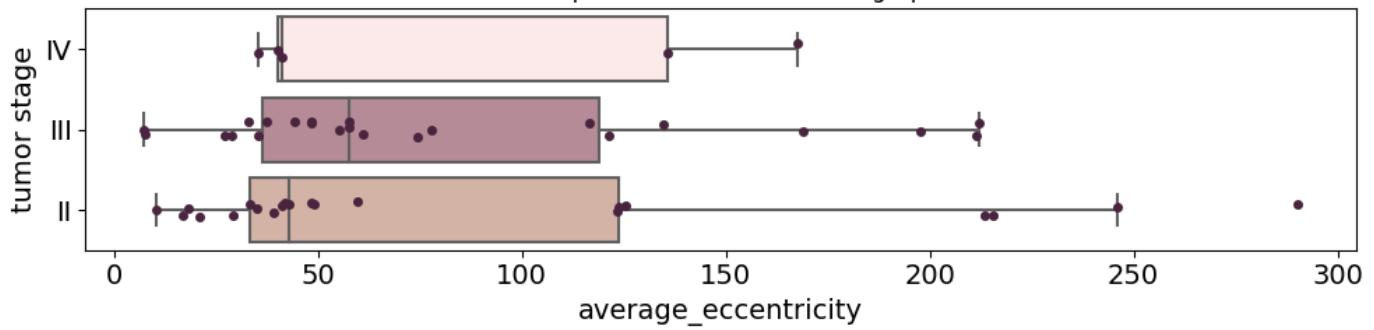
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD68 positive cells and Gabriel graph



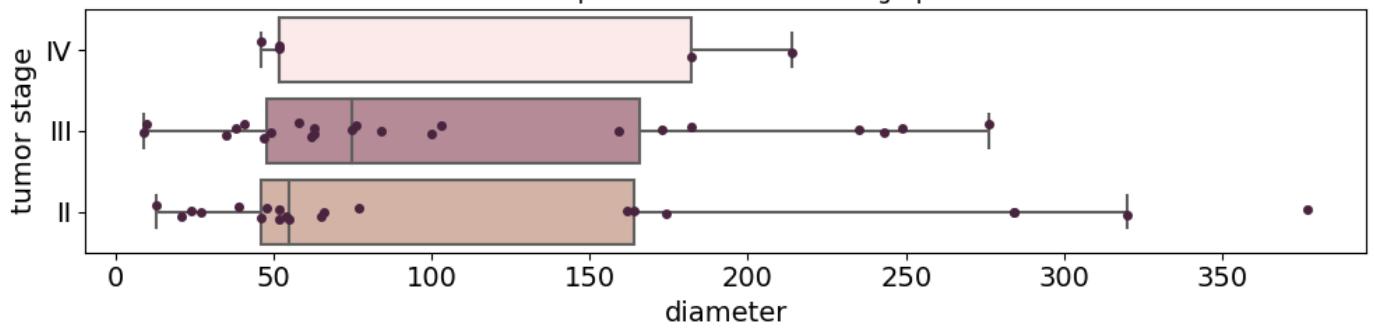
Boxplot of average\_degree\_ by Tumor stage  
CD68 positive cells and Gabriel graph



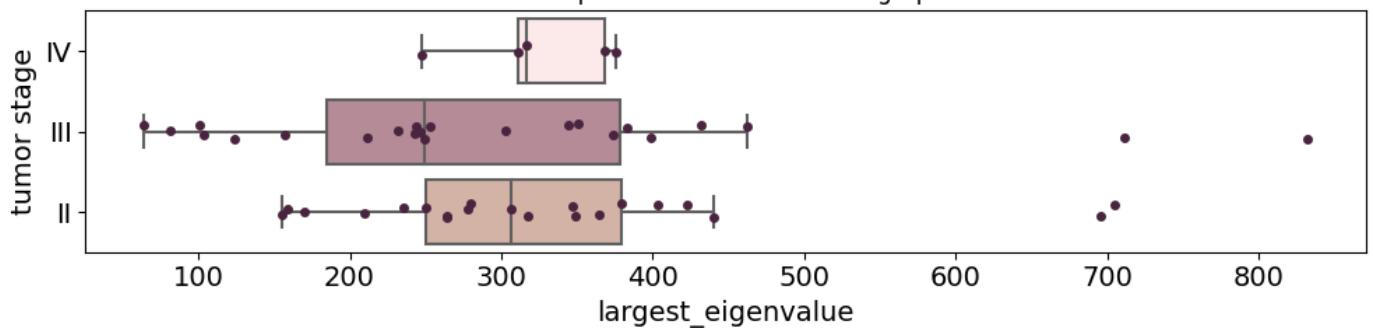
Boxplot of average\_eccentricity by Tumor stage  
CD68 positive cells and Gabriel graph



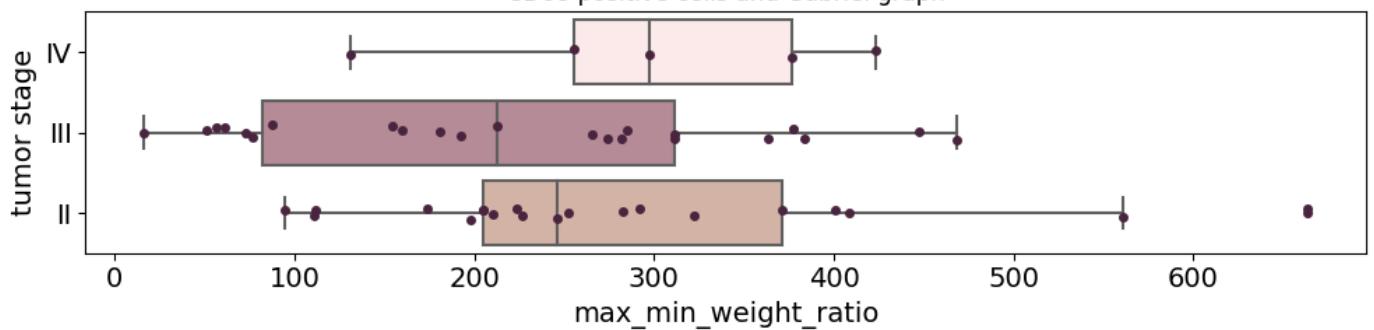
Boxplot of diameter by Tumor stage  
CD68 positive cells and Gabriel graph



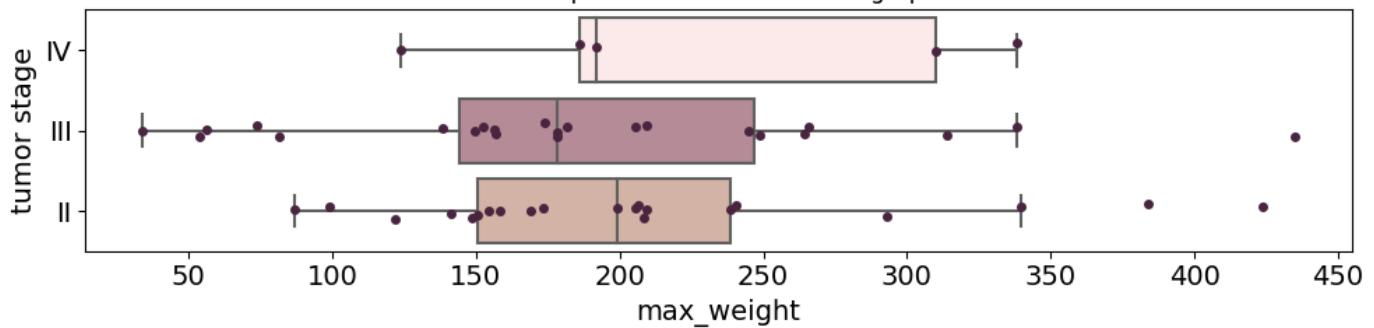
Boxplot of largest\_eigenvalue by Tumor stage  
CD68 positive cells and Gabriel graph



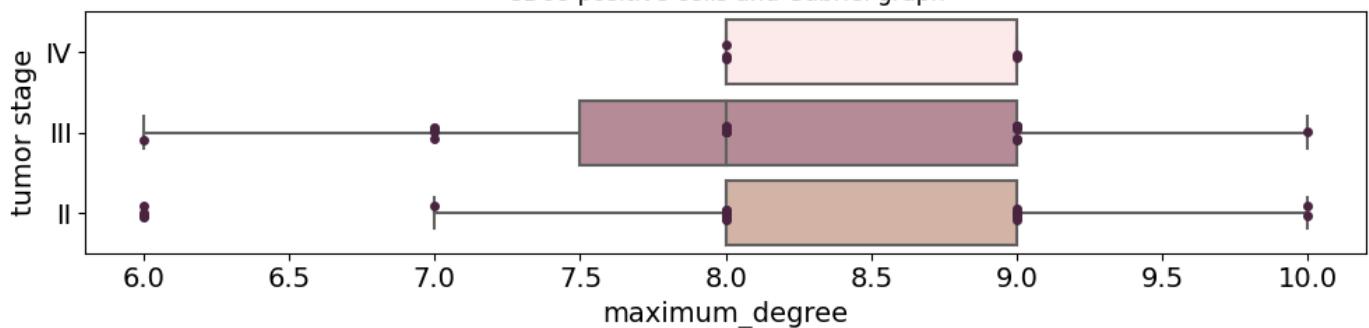
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD68 positive cells and Gabriel graph



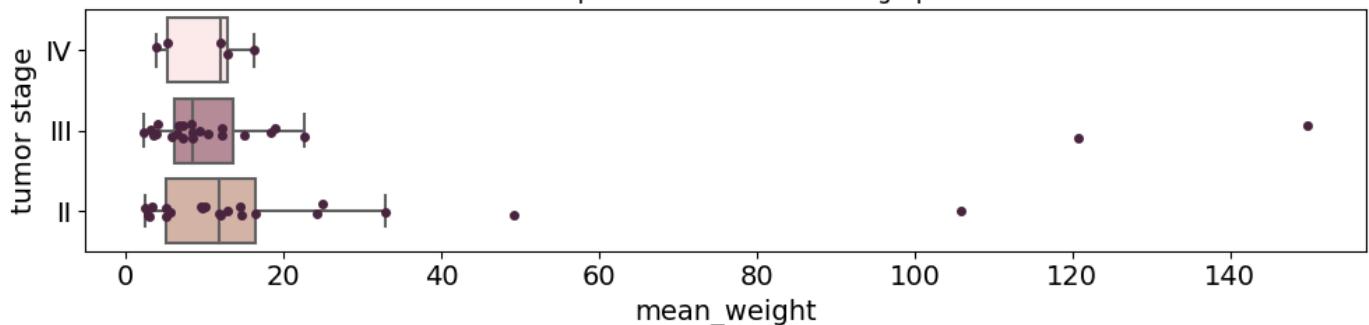
Boxplot of max\_weight by Tumor stage  
CD68 positive cells and Gabriel graph



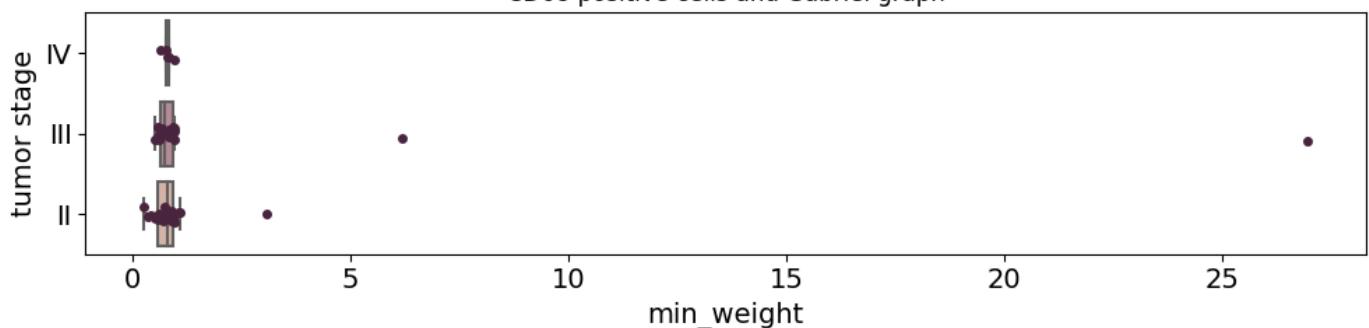
Boxplot of maximum\_degree by Tumor stage  
CD68 positive cells and Gabriel graph



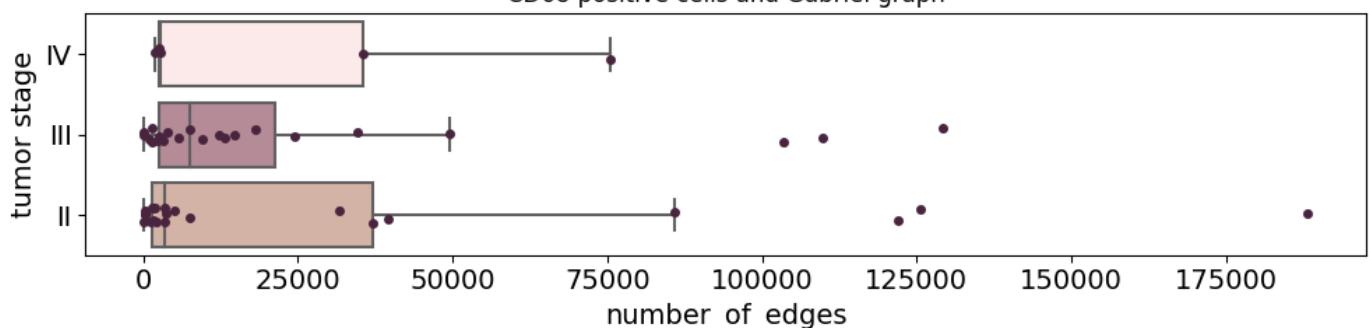
Boxplot of mean\_weight by Tumor stage  
CD68 positive cells and Gabriel graph



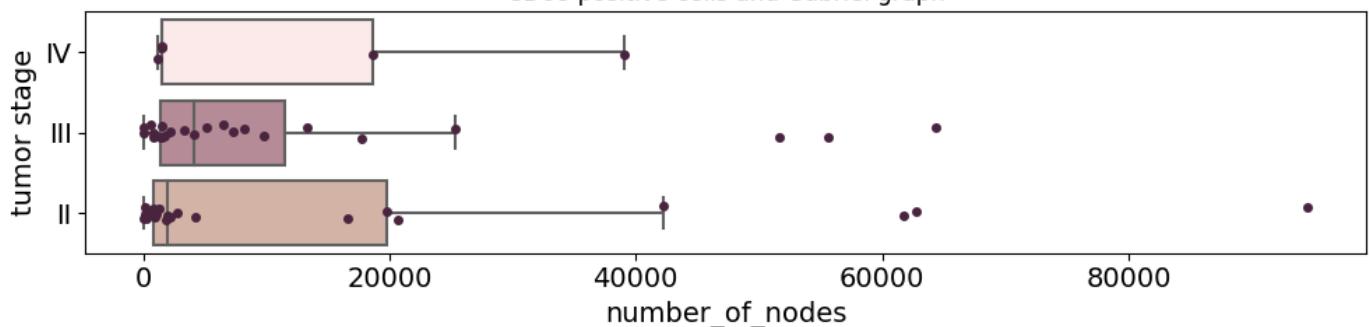
Boxplot of min\_weight by Tumor stage  
CD68 positive cells and Gabriel graph



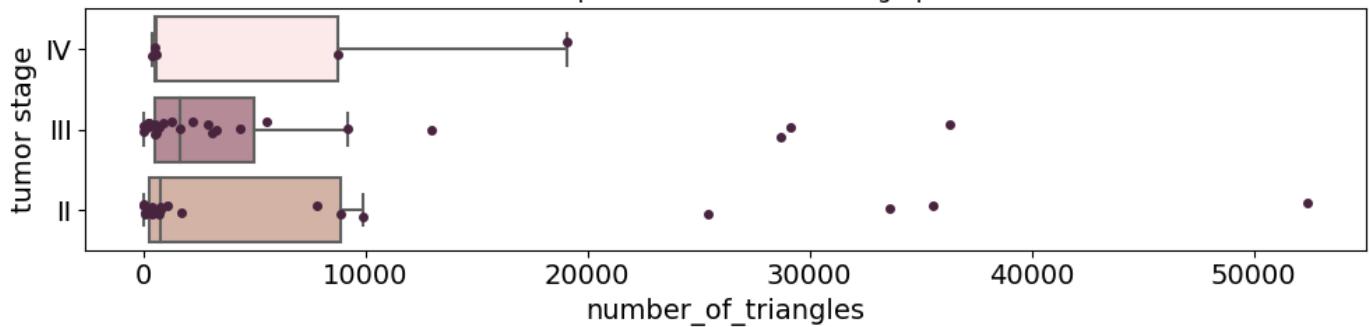
Boxplot of number\_of\_edges by Tumor stage  
CD68 positive cells and Gabriel graph



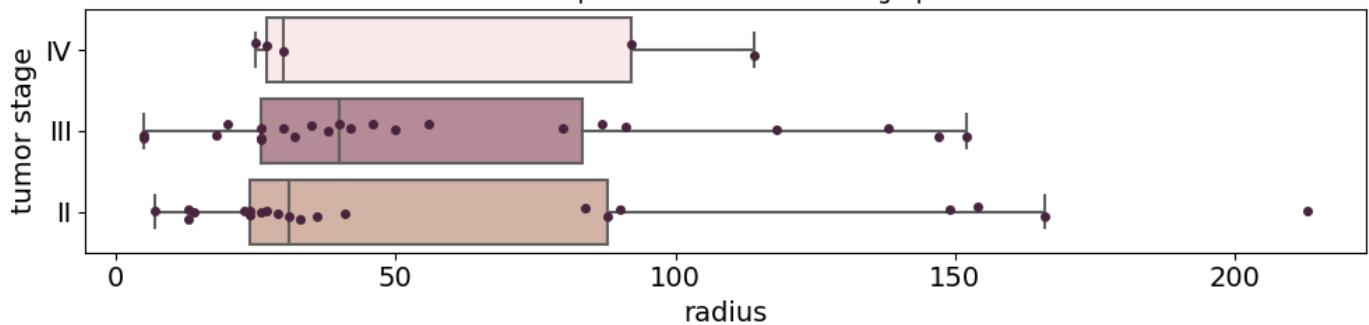
Boxplot of number\_of\_nodes by Tumor stage  
CD68 positive cells and Gabriel graph



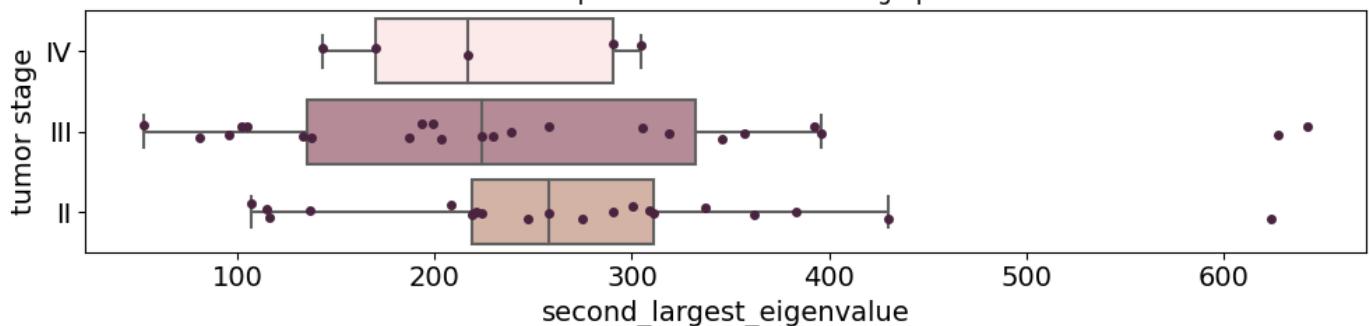
Boxplot of number\_of\_triangles by Tumor stage  
CD68 positive cells and Gabriel graph



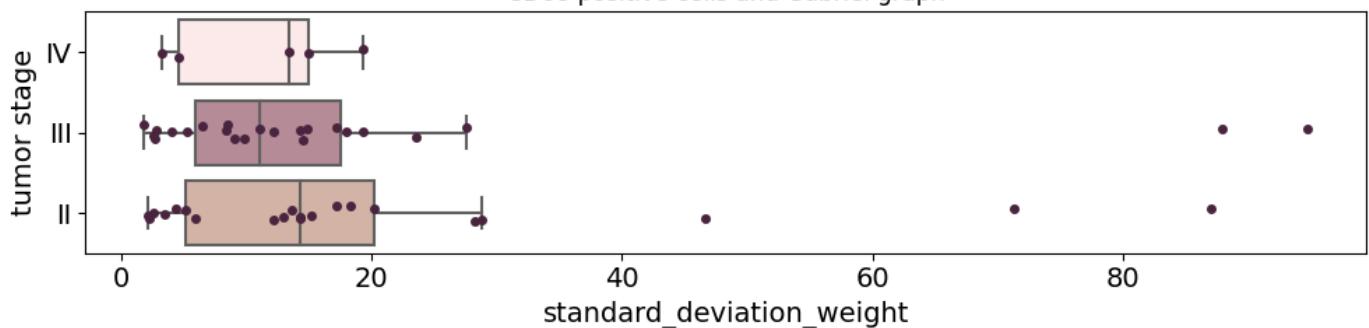
Boxplot of radius by Tumor stage  
CD68 positive cells and Gabriel graph



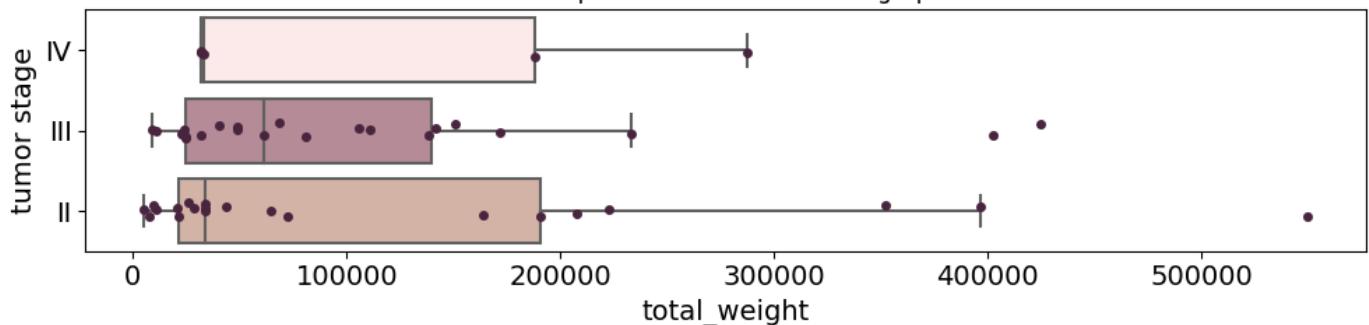
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD68 positive cells and Gabriel graph



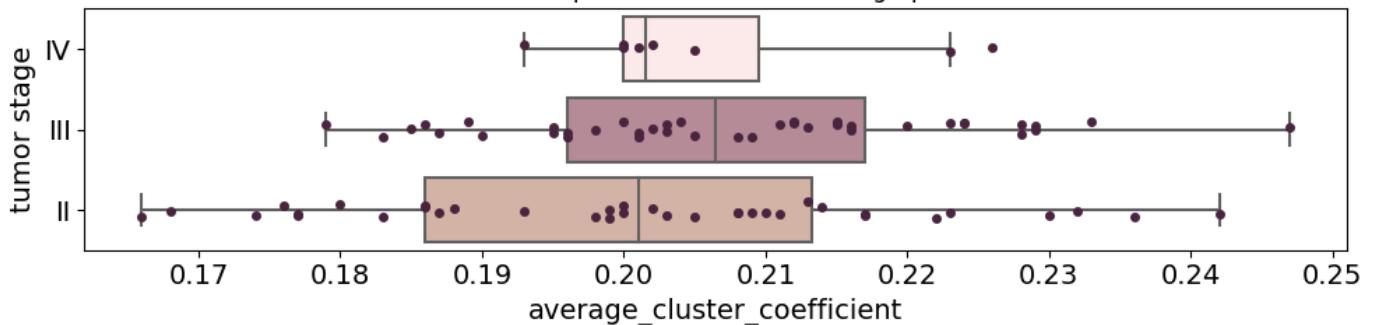
Boxplot of standard\_deviation\_weight by Tumor stage  
CD68 positive cells and Gabriel graph



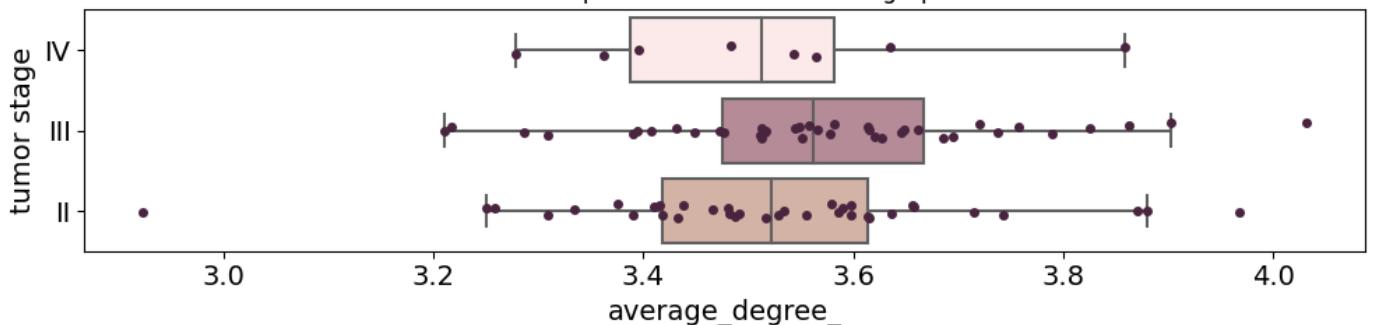
Boxplot of total\_weight by Tumor stage  
CD68 positive cells and Gabriel graph



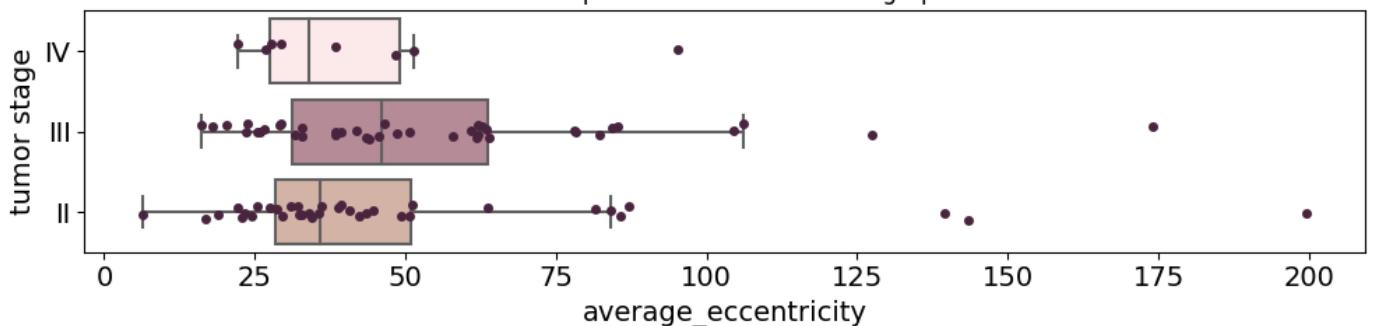
Boxplot of average\_cluster\_coefficient by Tumor stage  
FOXP3 positive cells and Gabriel graph



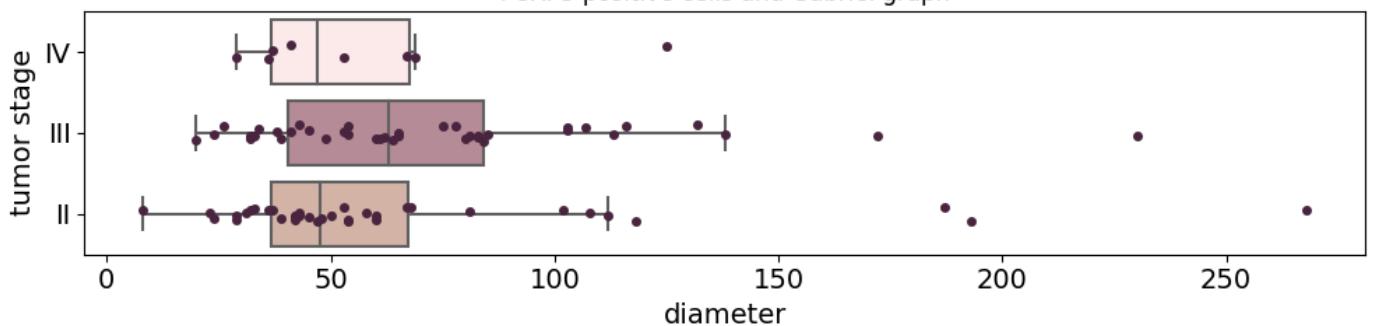
Boxplot of average\_degree\_ by Tumor stage  
FOXP3 positive cells and Gabriel graph



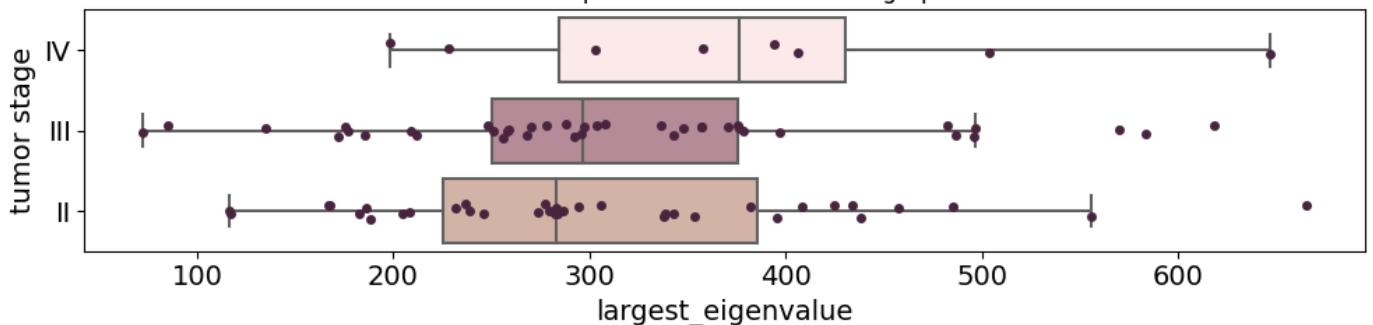
Boxplot of average\_eccentricity by Tumor stage  
FOXP3 positive cells and Gabriel graph



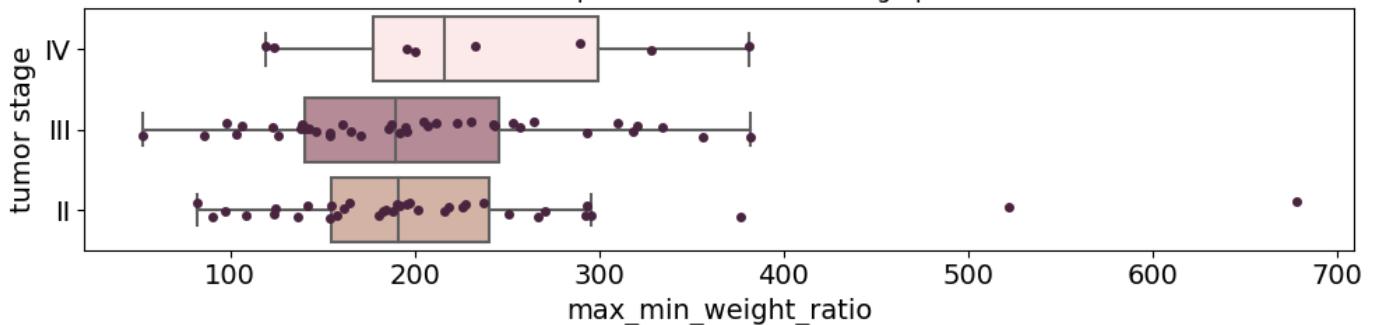
Boxplot of diameter by Tumor stage  
FOXP3 positive cells and Gabriel graph



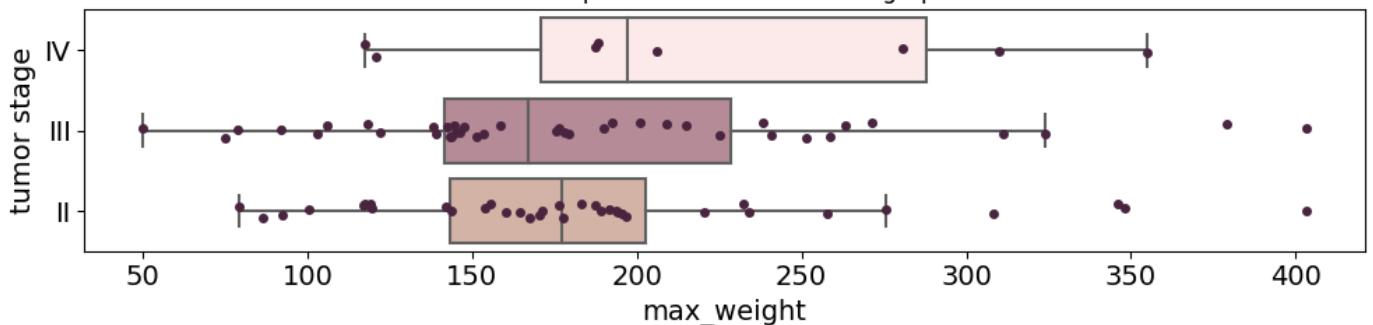
Boxplot of largest\_eigenvalue by Tumor stage  
FOXP3 positive cells and Gabriel graph



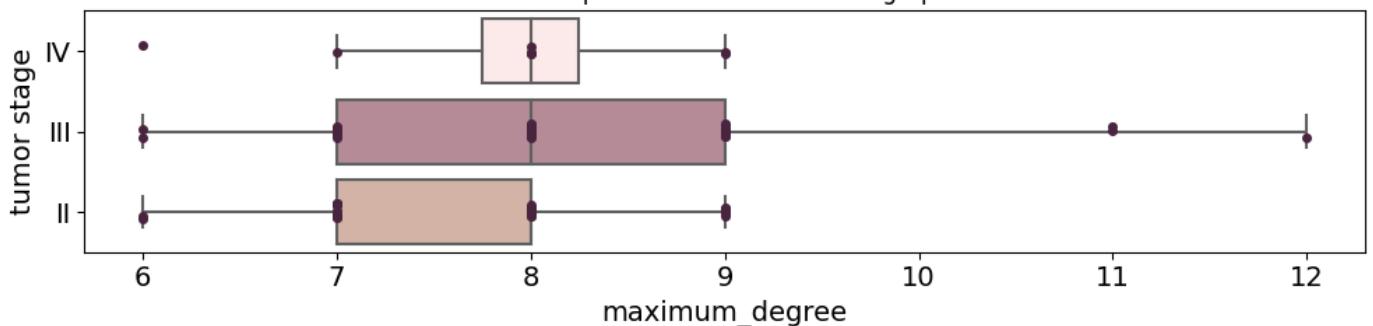
Boxplot of max\_min\_weight\_ratio by Tumor stage  
FOXP3 positive cells and Gabriel graph



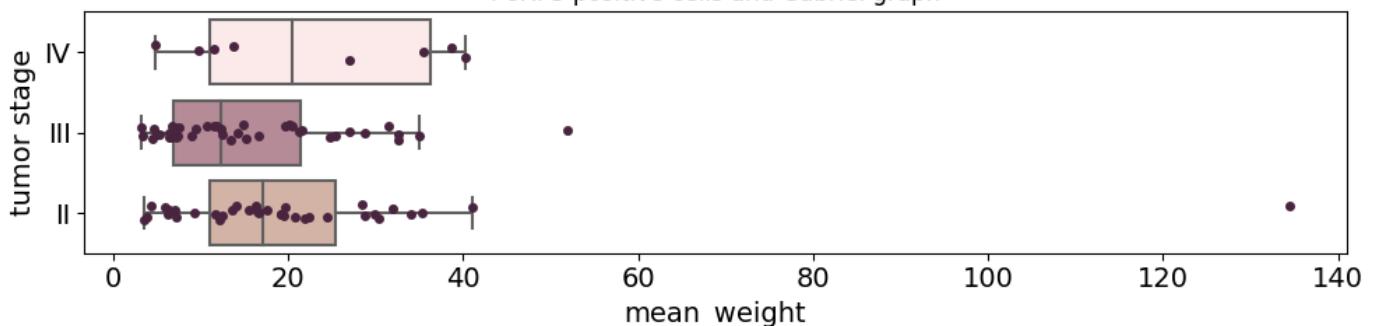
Boxplot of max\_weight by Tumor stage  
FOXP3 positive cells and Gabriel graph



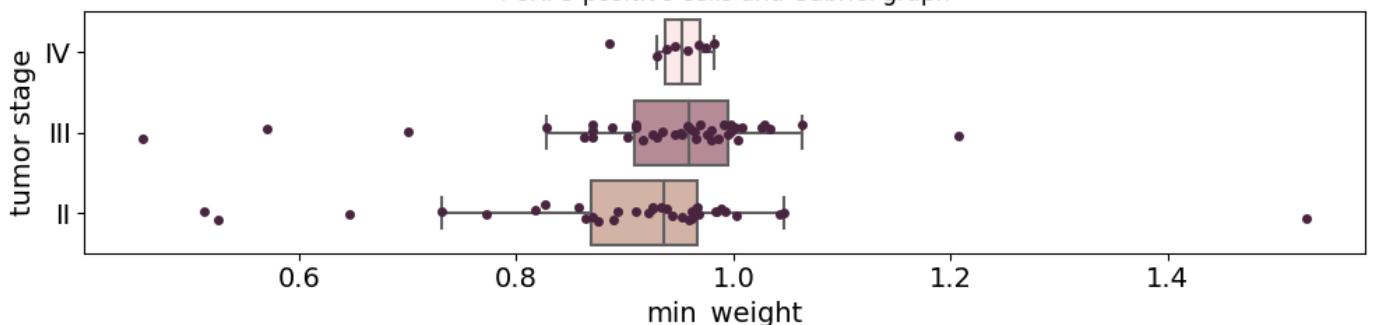
Boxplot of maximum\_degree by Tumor stage  
FOXP3 positive cells and Gabriel graph



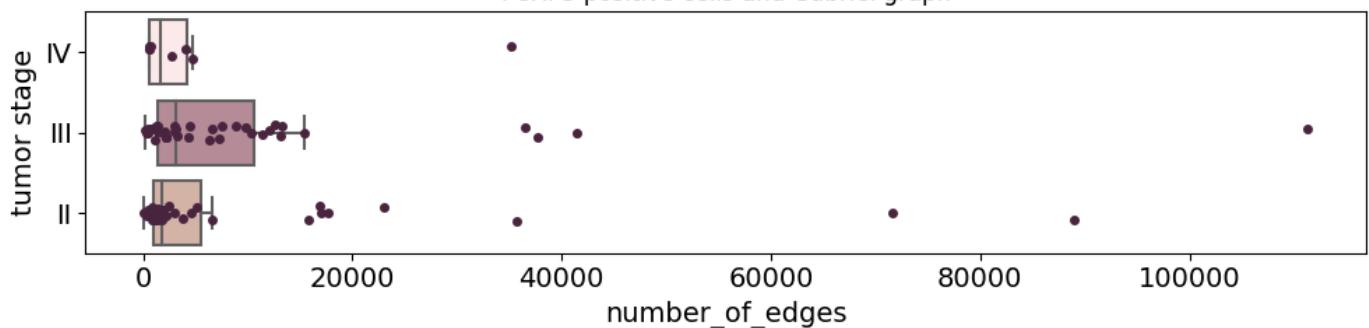
Boxplot of mean\_weight by Tumor stage  
FOXP3 positive cells and Gabriel graph



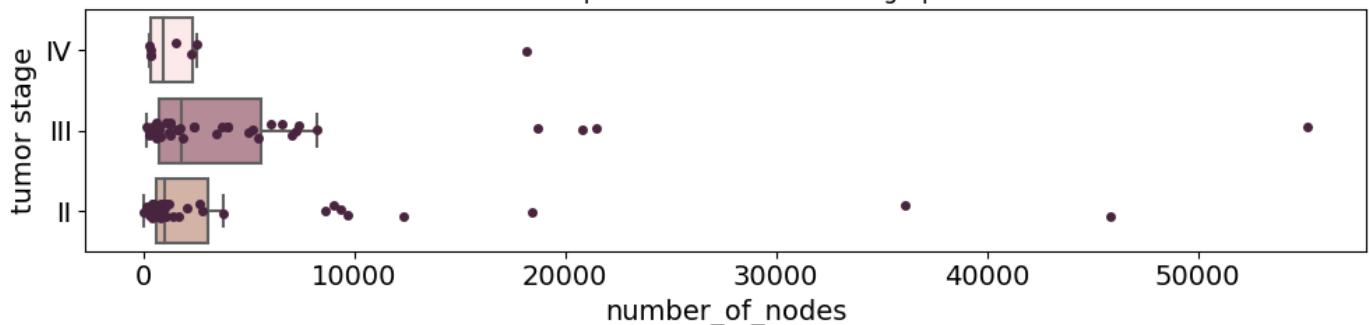
Boxplot of min\_weight by Tumor stage  
FOXP3 positive cells and Gabriel graph



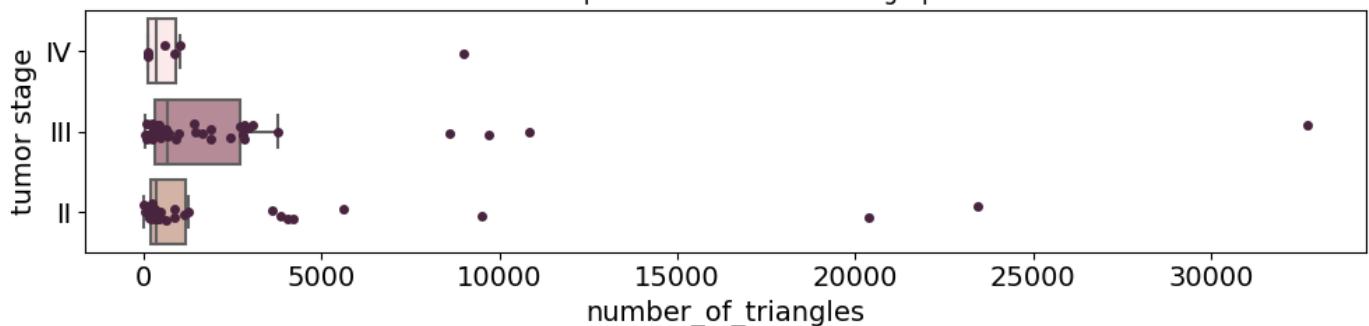
Boxplot of number\_of\_edges by Tumor stage  
FOXP3 positive cells and Gabriel graph



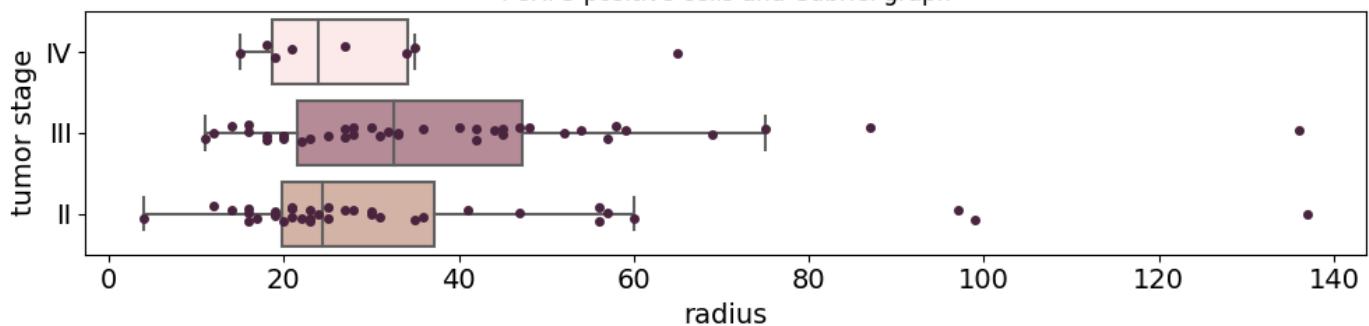
Boxplot of number\_of\_nodes by Tumor stage  
FOXP3 positive cells and Gabriel graph



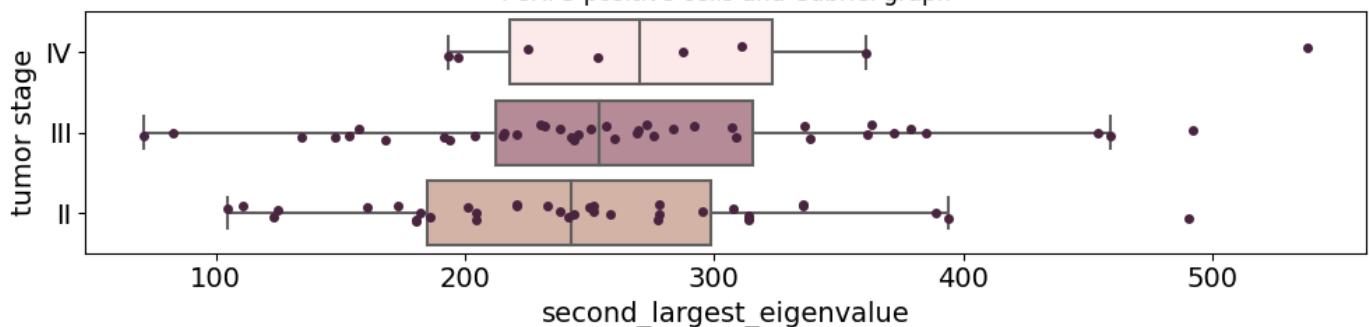
Boxplot of number\_of\_triangles by Tumor stage  
FOXP3 positive cells and Gabriel graph



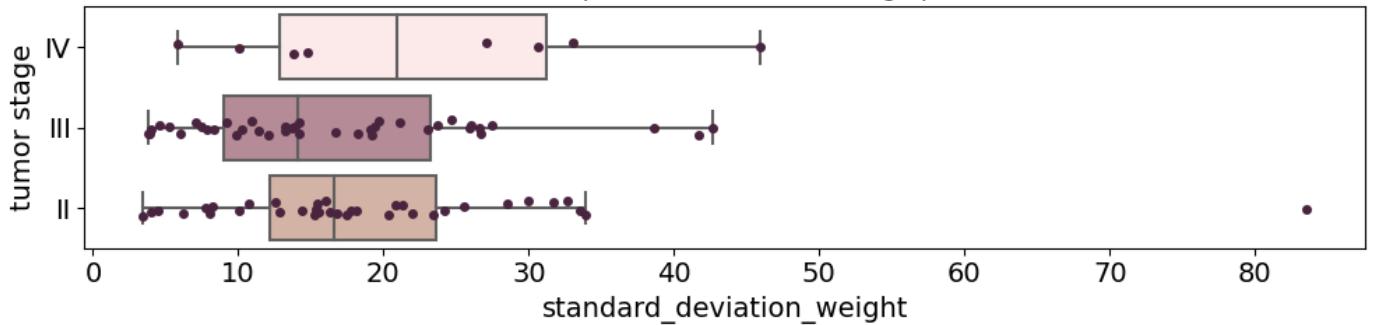
Boxplot of radius by Tumor stage  
FOXP3 positive cells and Gabriel graph



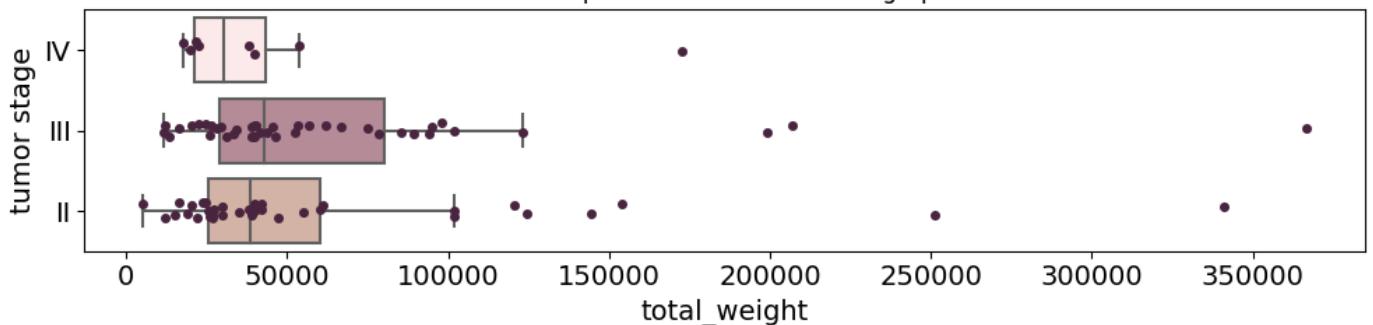
Boxplot of second\_largest\_eigenvalue by Tumor stage  
FOXP3 positive cells and Gabriel graph



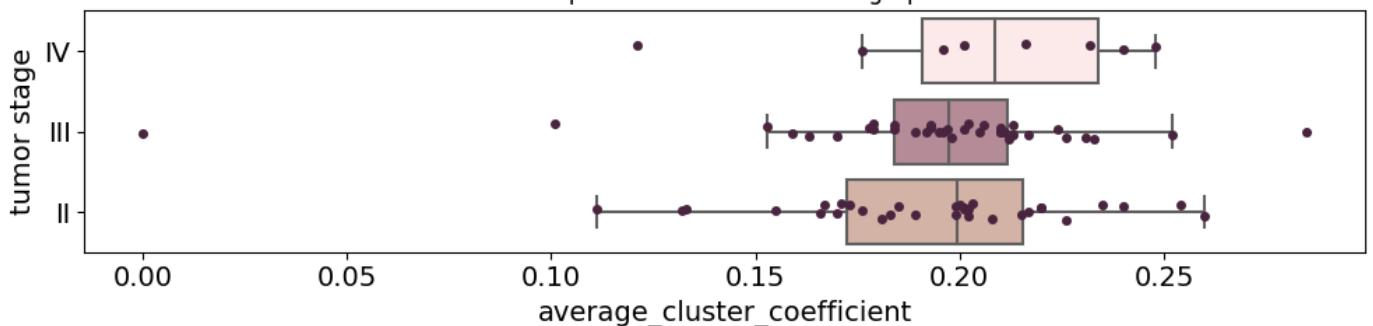
Boxplot of standard\_development\_weight by Tumor stage  
FOXP3 positive cells and Gabriel graph



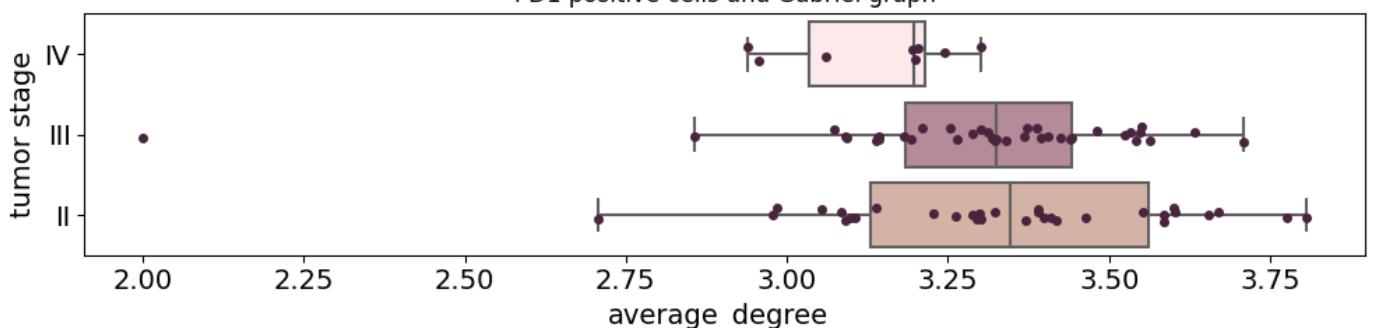
Boxplot of total\_weight by Tumor stage  
FOXP3 positive cells and Gabriel graph



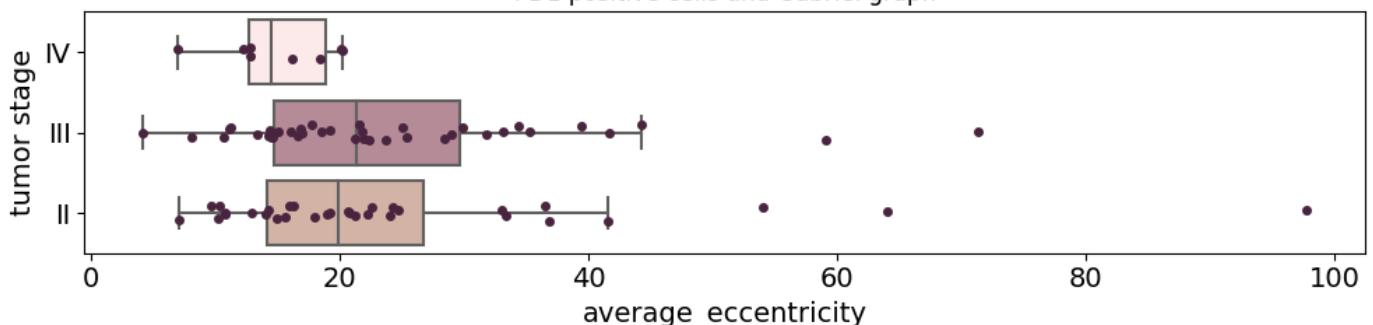
Boxplot of average\_cluster\_coefficient by Tumor stage  
PD1 positive cells and Gabriel graph



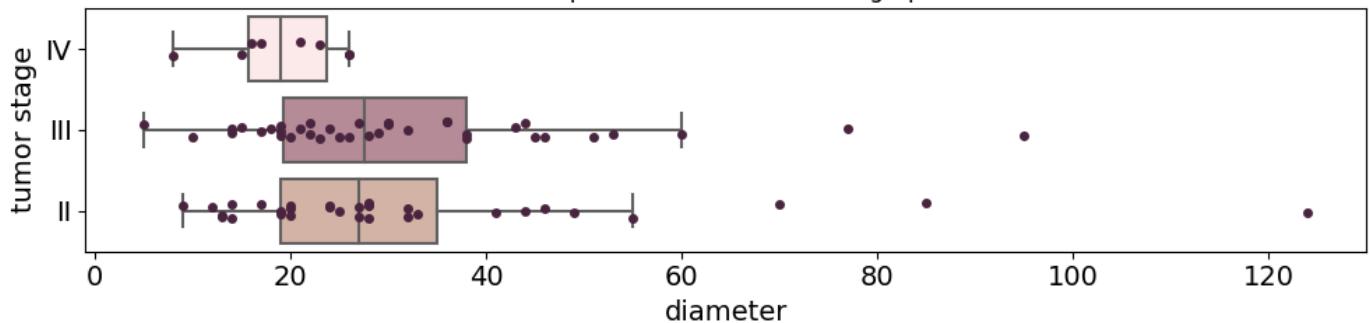
Boxplot of average\_degree\_ by Tumor stage  
PD1 positive cells and Gabriel graph



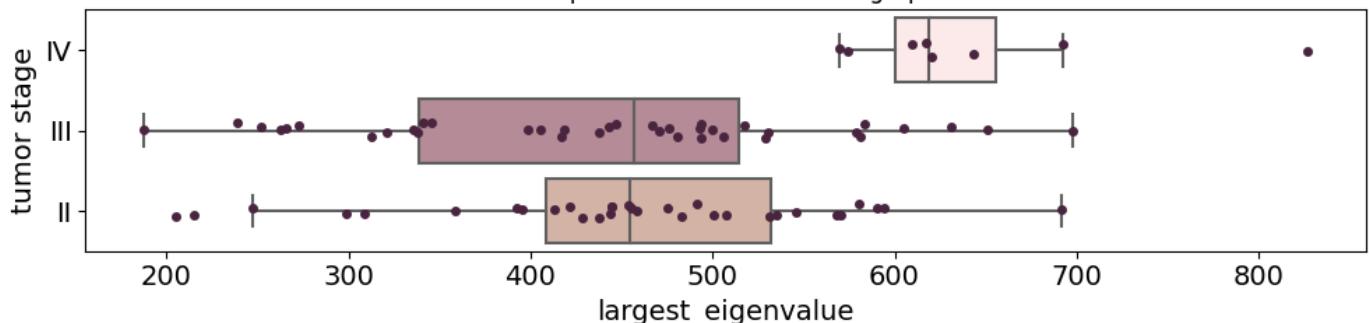
Boxplot of average\_eccentricity by Tumor stage  
PD1 positive cells and Gabriel graph



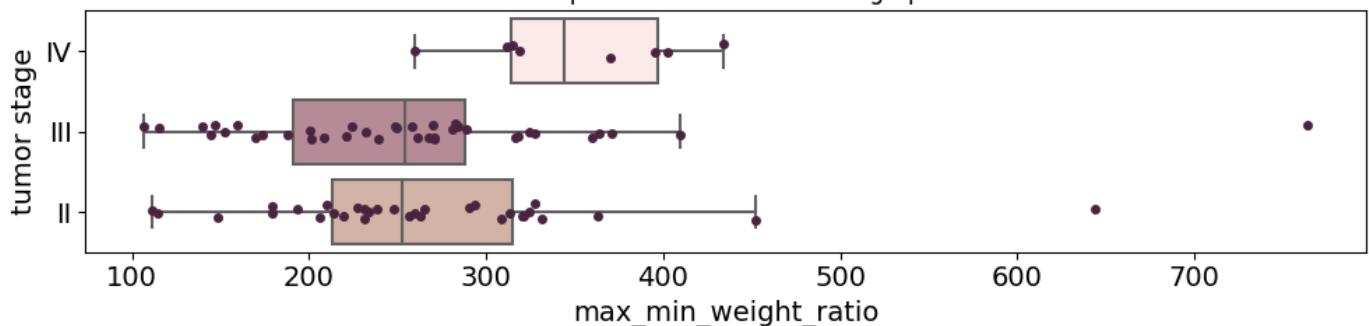
Boxplot of diameter by Tumor stage  
PD1 positive cells and Gabriel graph



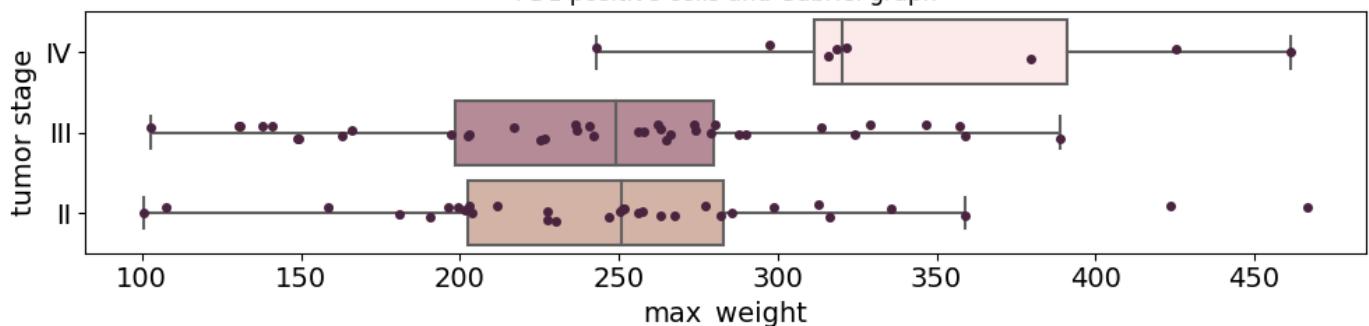
Boxplot of largest\_eigenvalue by Tumor stage  
PD1 positive cells and Gabriel graph



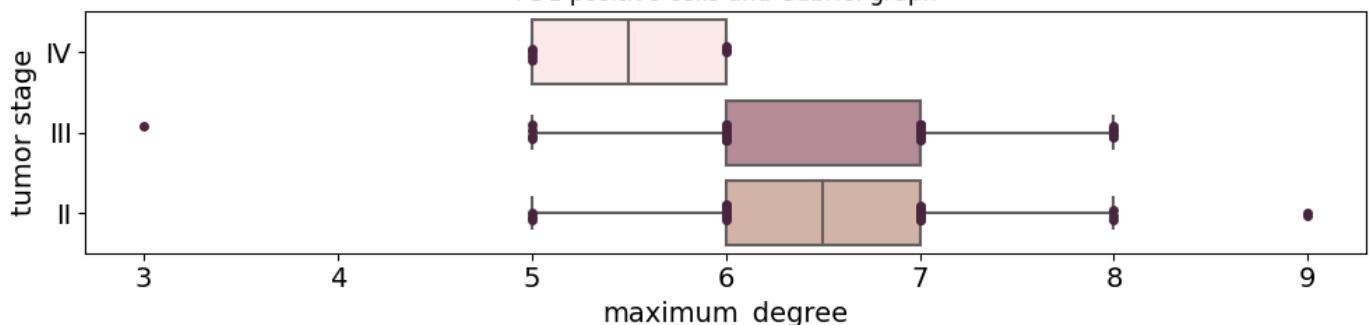
Boxplot of max\_min\_weight\_ratio by Tumor stage  
PD1 positive cells and Gabriel graph



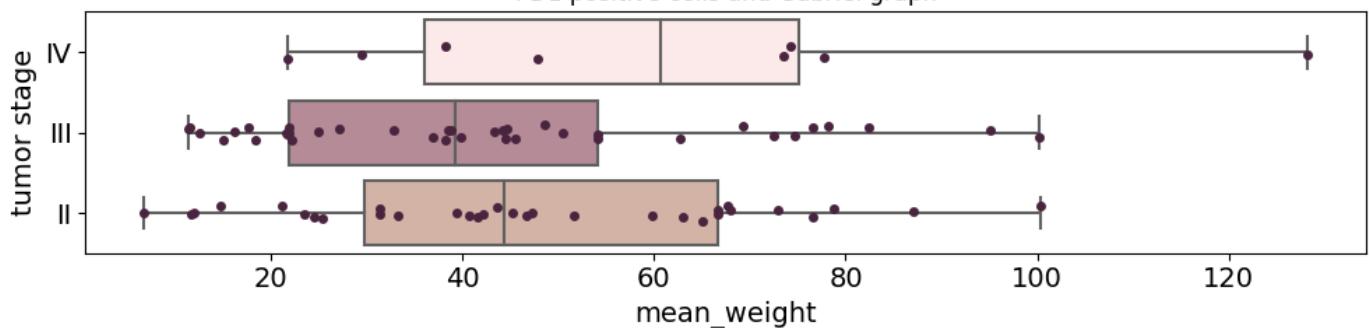
Boxplot of max\_weight by Tumor stage  
PD1 positive cells and Gabriel graph



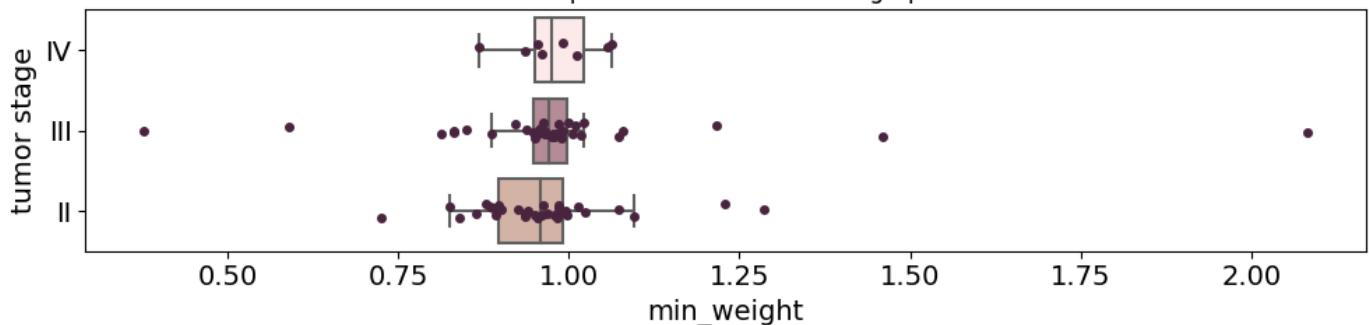
Boxplot of maximum\_degree by Tumor stage  
PD1 positive cells and Gabriel graph



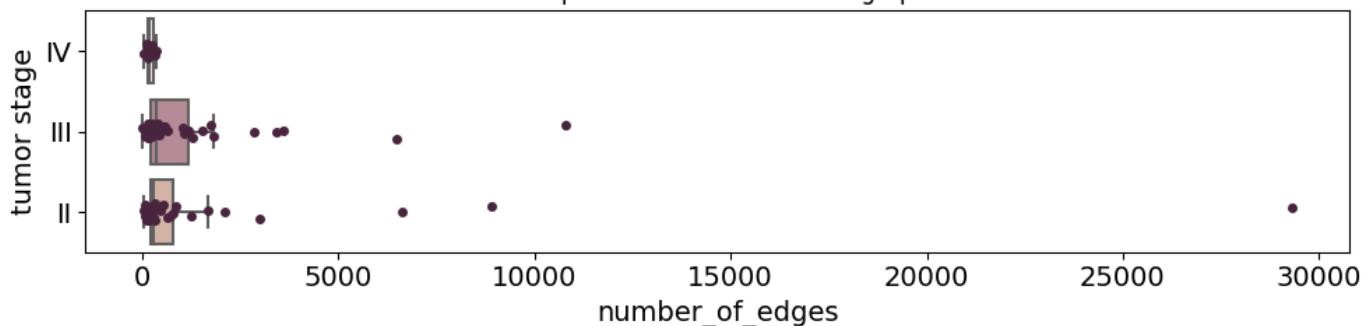
Boxplot of mean\_weight by Tumor stage  
PD1 positive cells and Gabriel graph



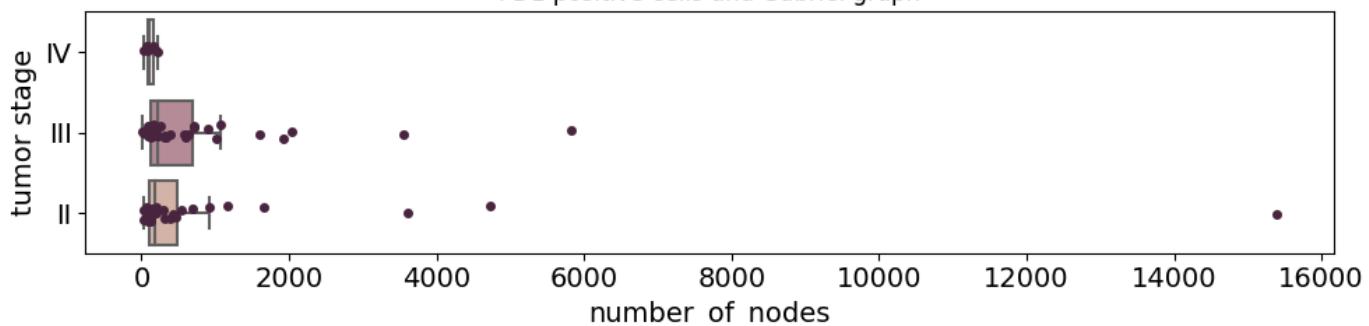
Boxplot of min\_weight by Tumor stage  
PD1 positive cells and Gabriel graph



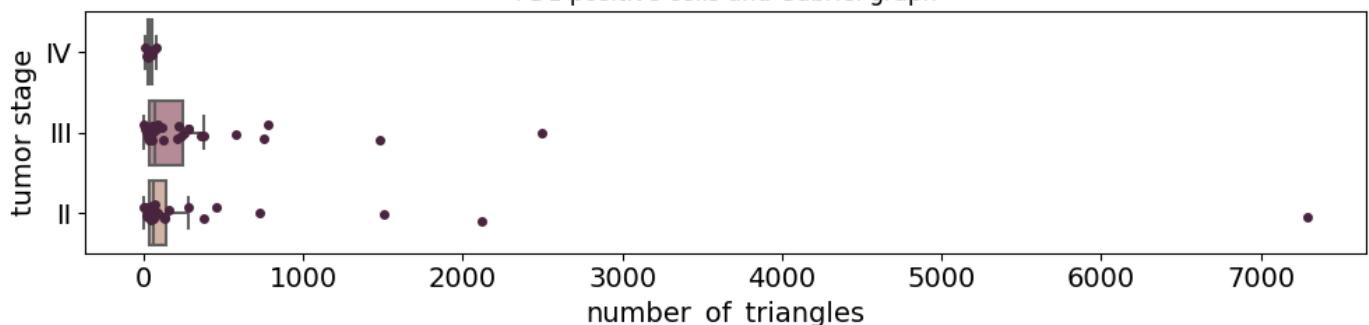
Boxplot of number\_of\_edges by Tumor stage  
PD1 positive cells and Gabriel graph



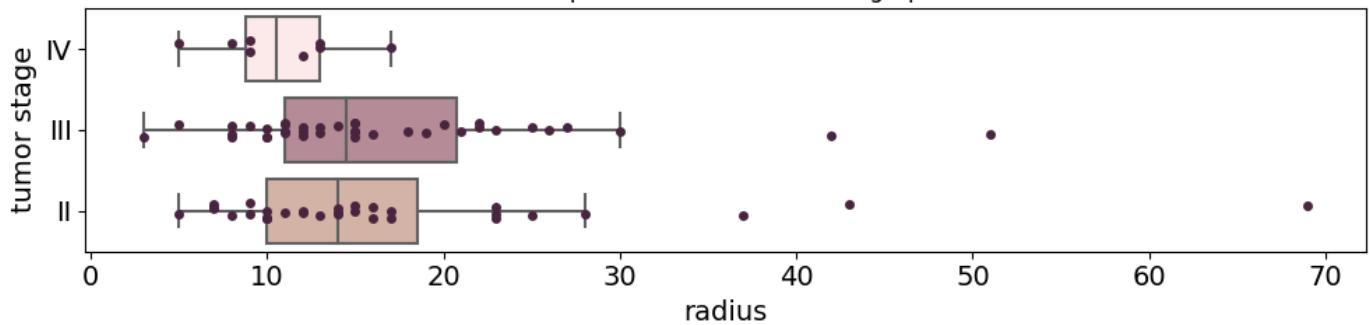
Boxplot of number\_of\_nodes by Tumor stage  
PD1 positive cells and Gabriel graph



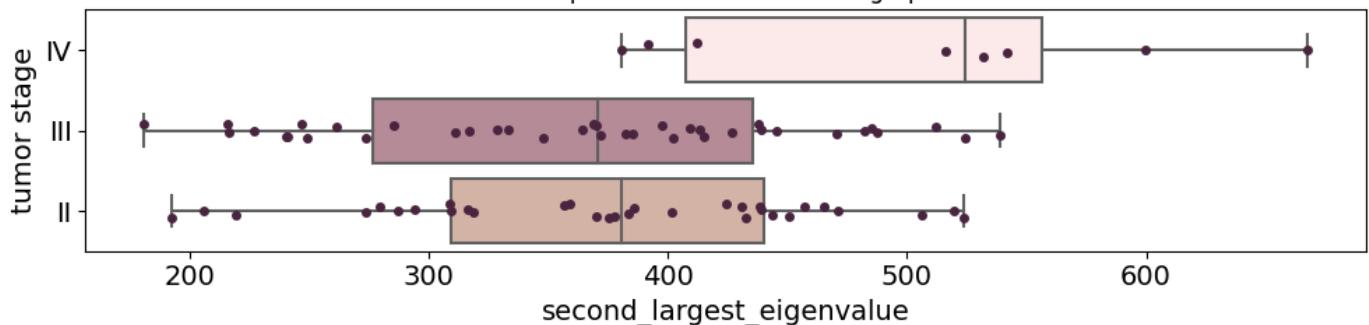
Boxplot of number\_of\_triangles by Tumor stage  
PD1 positive cells and Gabriel graph



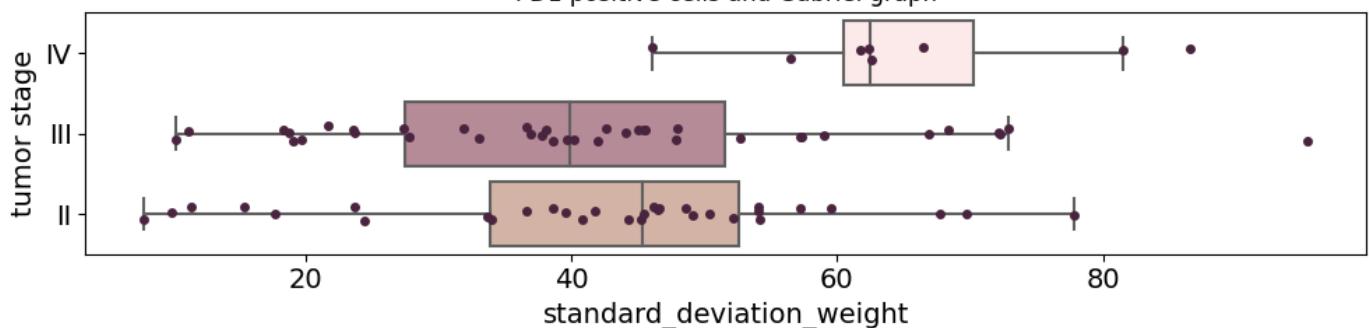
Boxplot of radius by Tumor stage  
PD1 positive cells and Gabriel graph



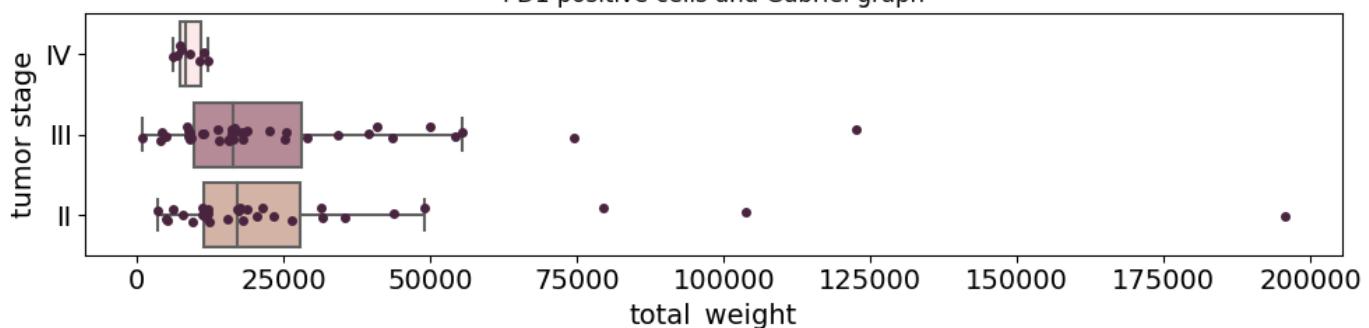
Boxplot of second\_largest\_eigenvalue by Tumor stage  
PD1 positive cells and Gabriel graph



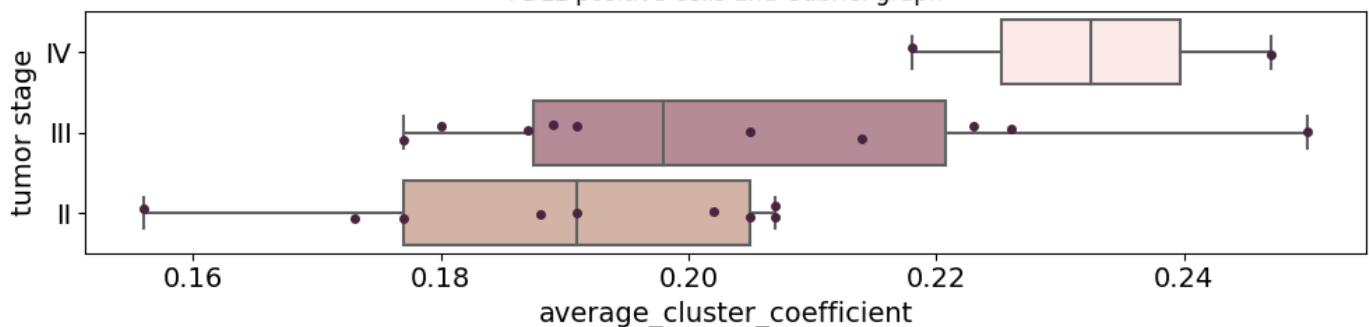
Boxplot of standard\_deviation\_weight by Tumor stage  
PD1 positive cells and Gabriel graph

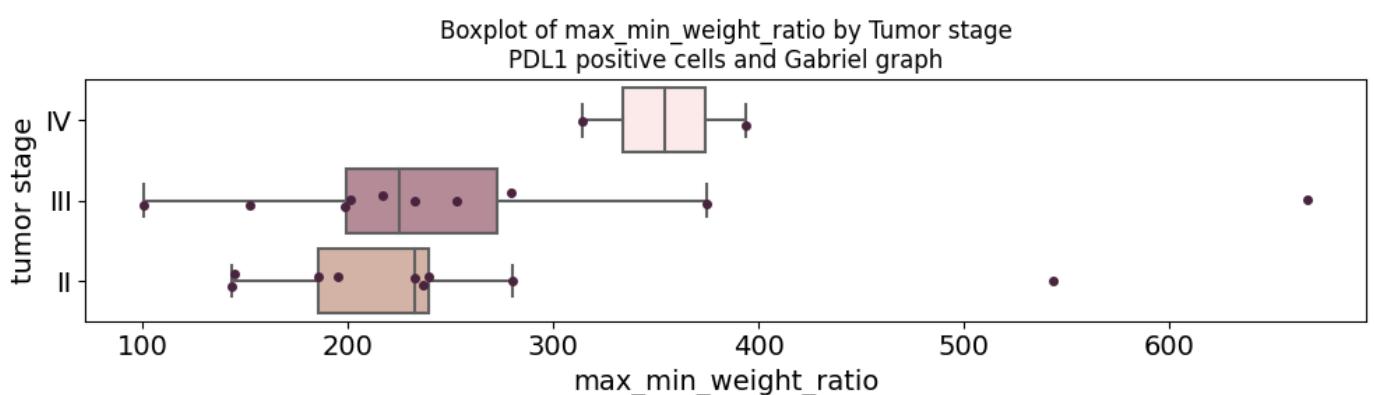
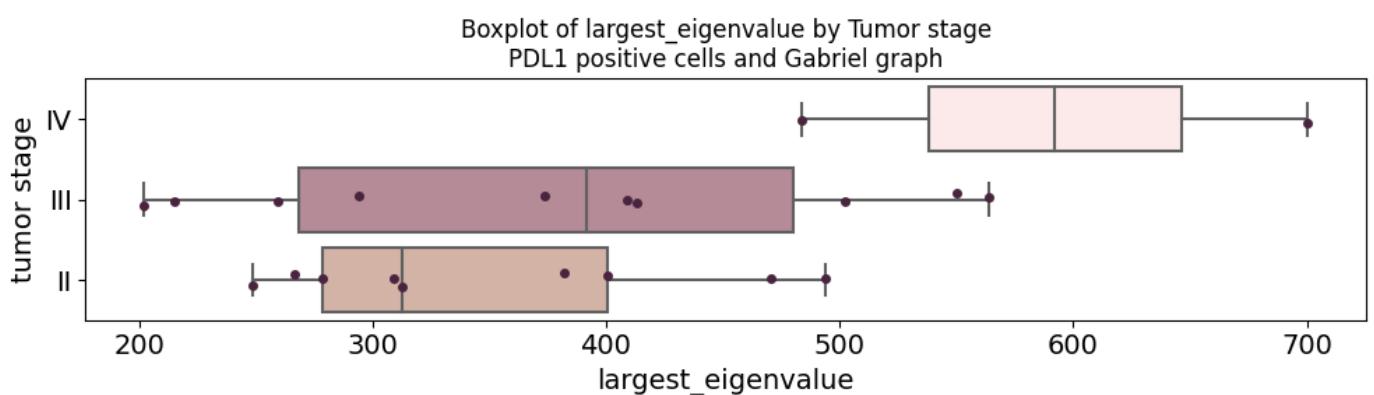
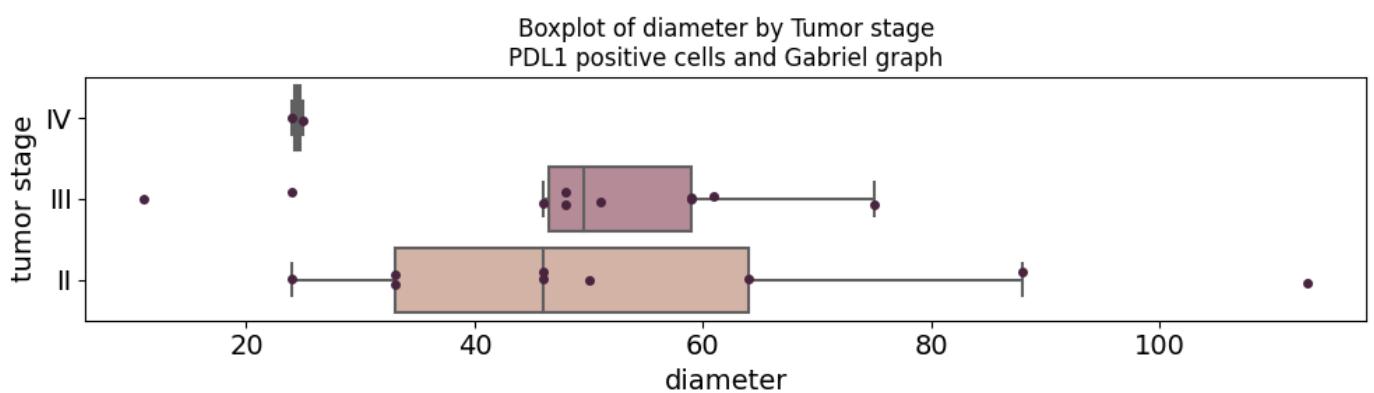
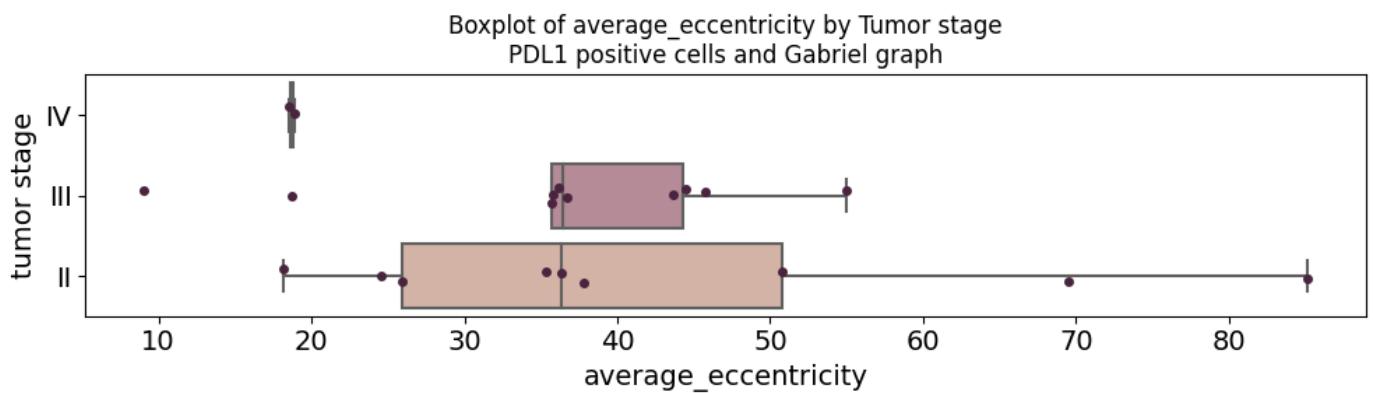
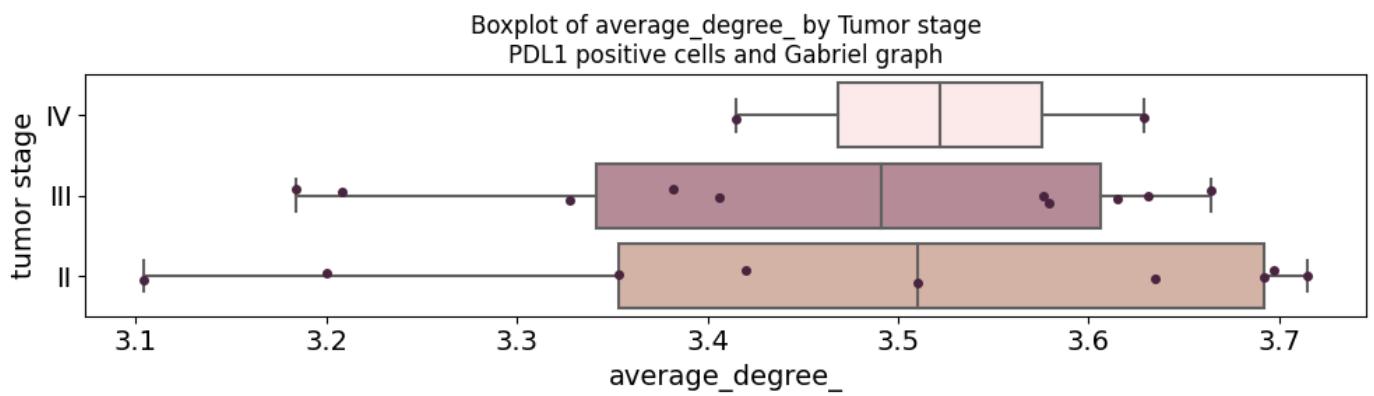


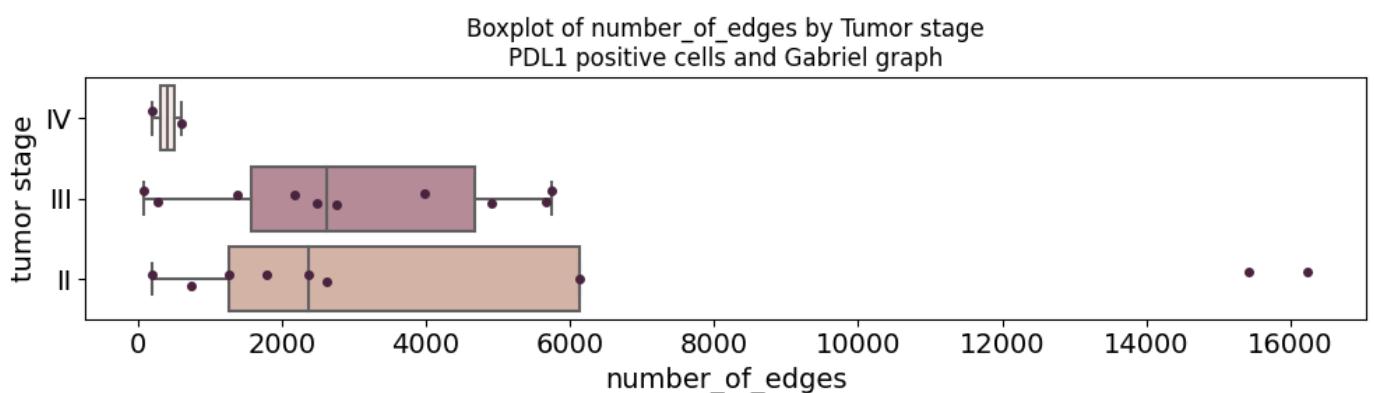
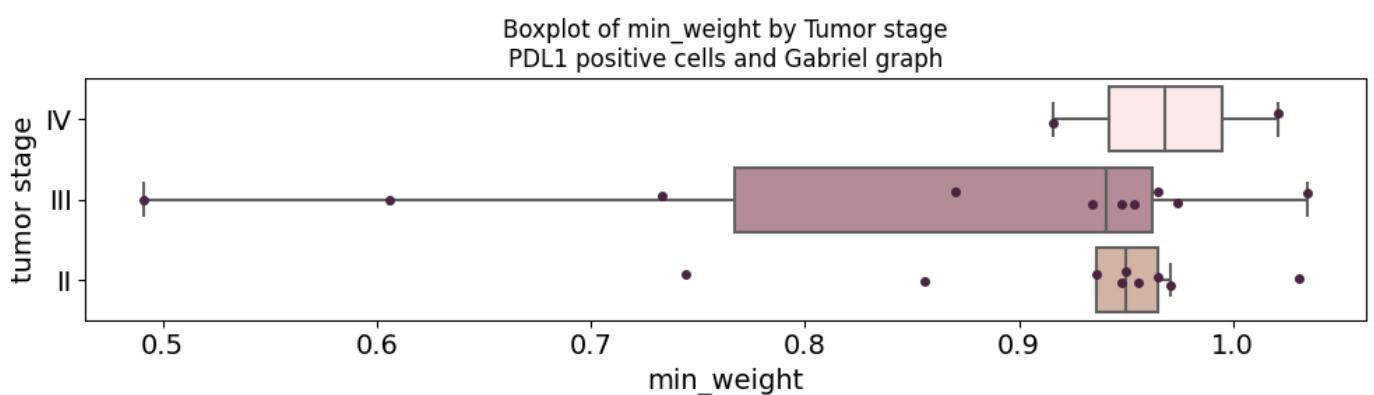
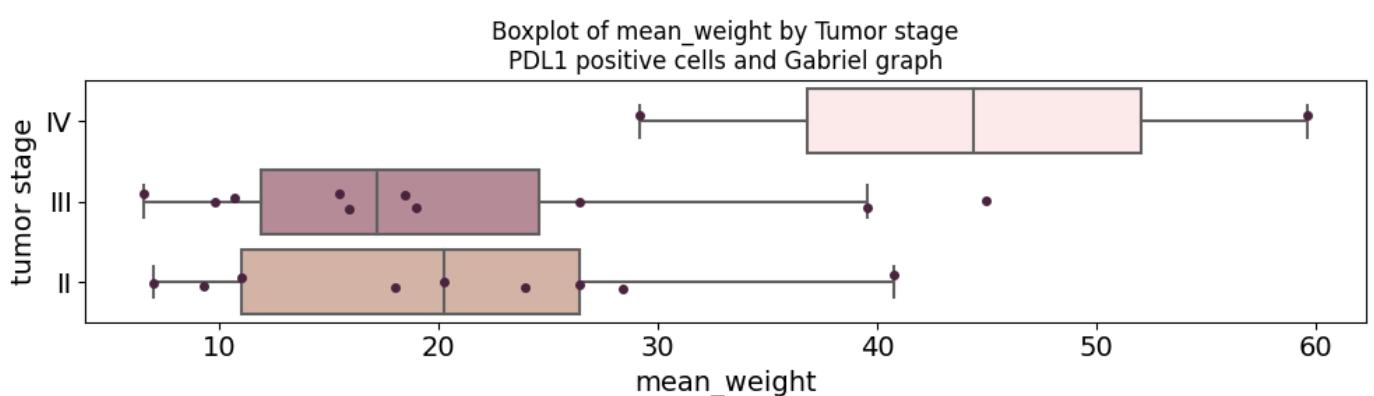
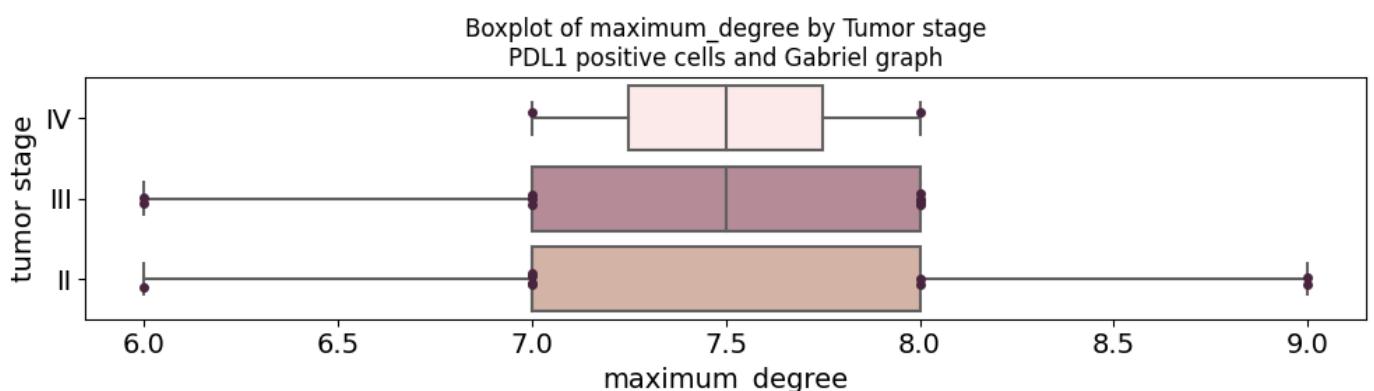
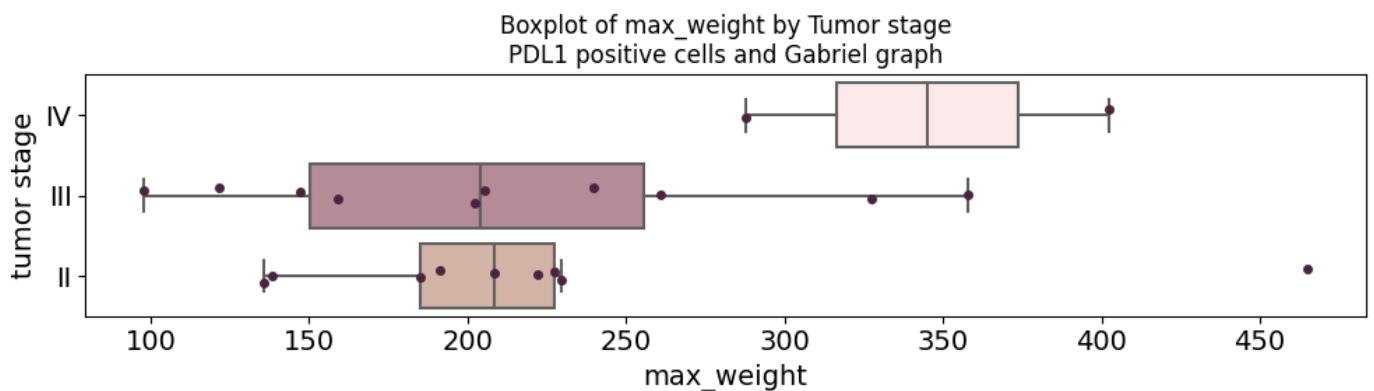
Boxplot of total\_weight by Tumor stage  
PD1 positive cells and Gabriel graph



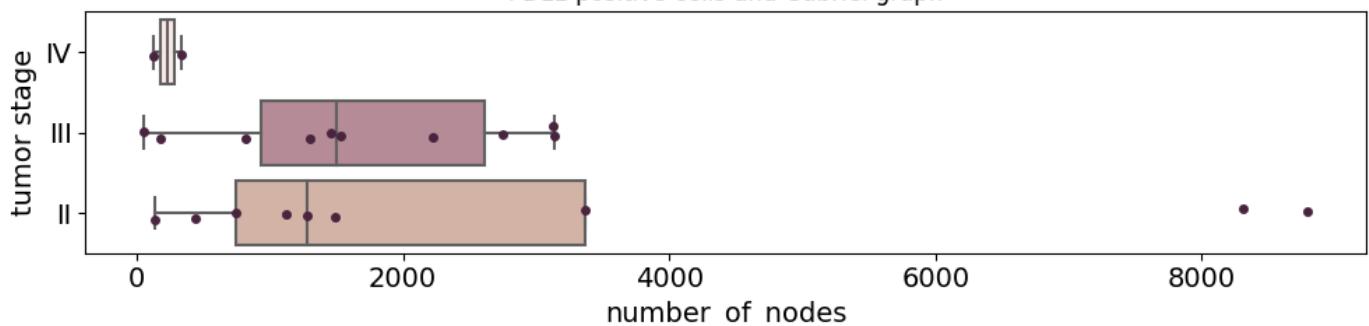
Boxplot of average\_cluster\_coefficient by Tumor stage  
PDL1 positive cells and Gabriel graph



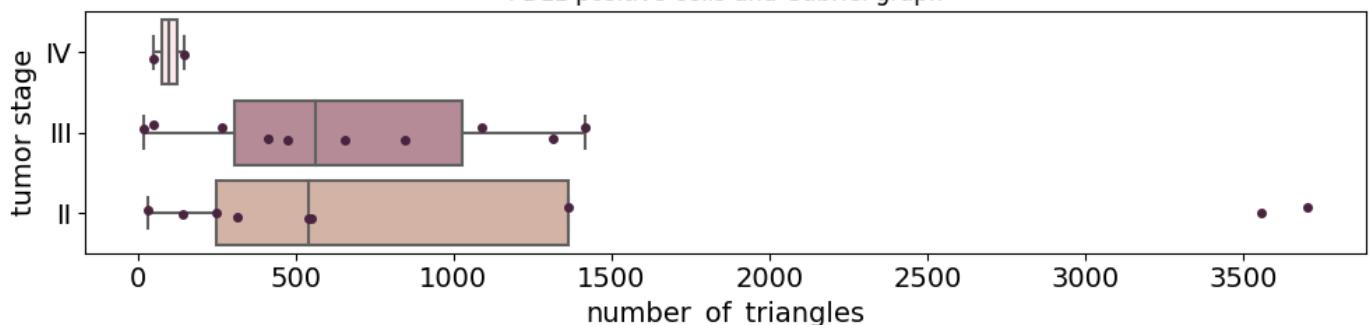




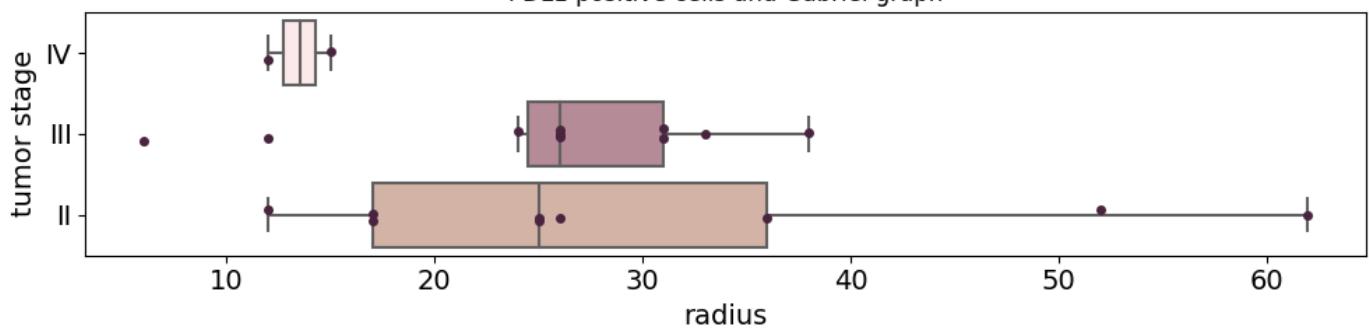
Boxplot of number\_of\_nodes by Tumor stage  
PDL1 positive cells and Gabriel graph



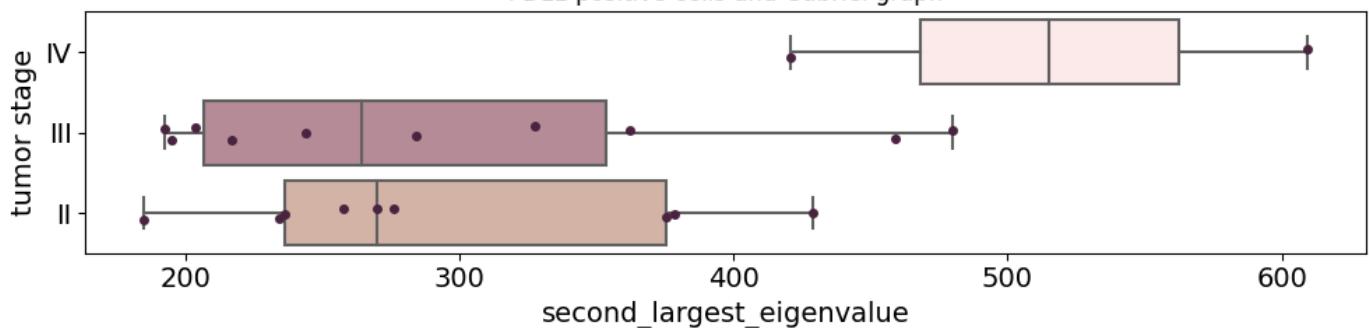
Boxplot of number\_of\_triangles by Tumor stage  
PDL1 positive cells and Gabriel graph



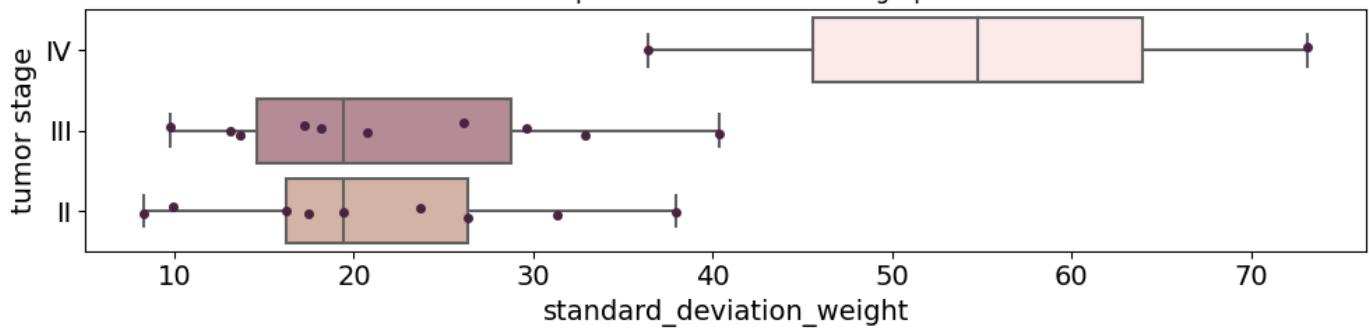
Boxplot of radius by Tumor stage  
PDL1 positive cells and Gabriel graph



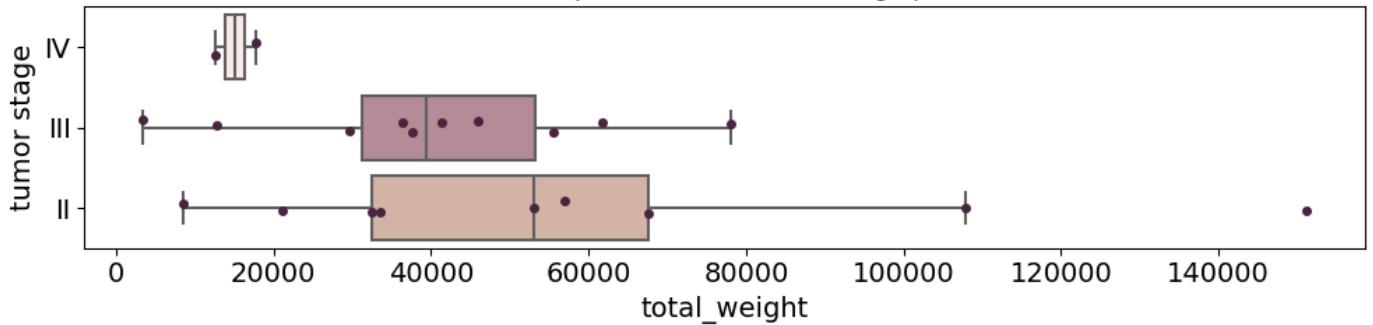
Boxplot of second\_largest\_eigenvalue by Tumor stage  
PDL1 positive cells and Gabriel graph



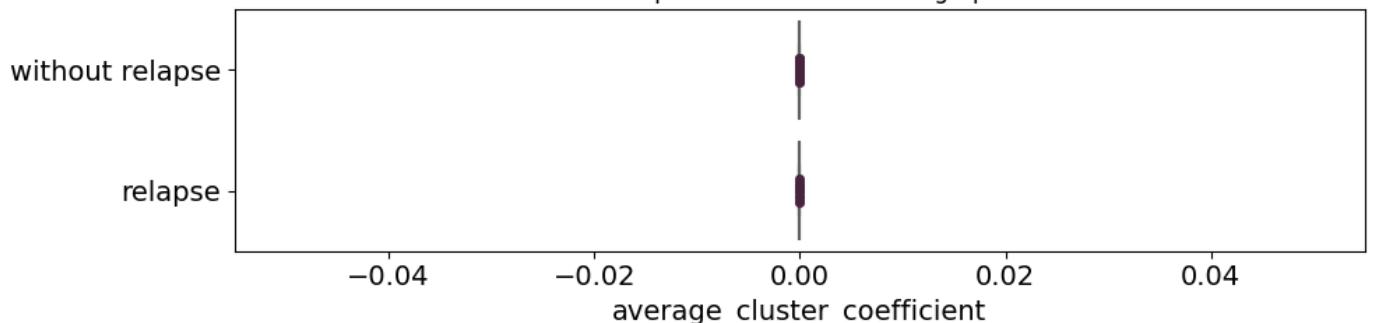
Boxplot of standard\_deviation\_weight by Tumor stage  
PDL1 positive cells and Gabriel graph



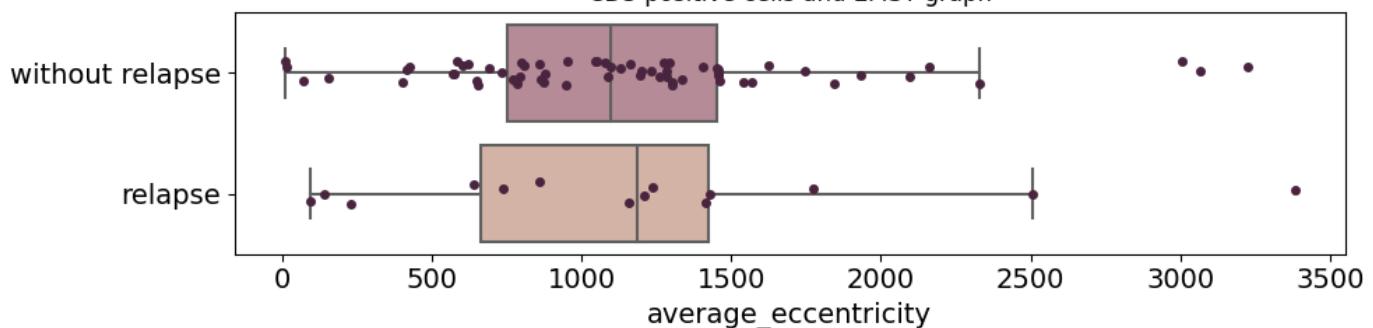
Boxplot of total\_weight by Tumor stage  
PDL1 positive cells and Gabriel graph



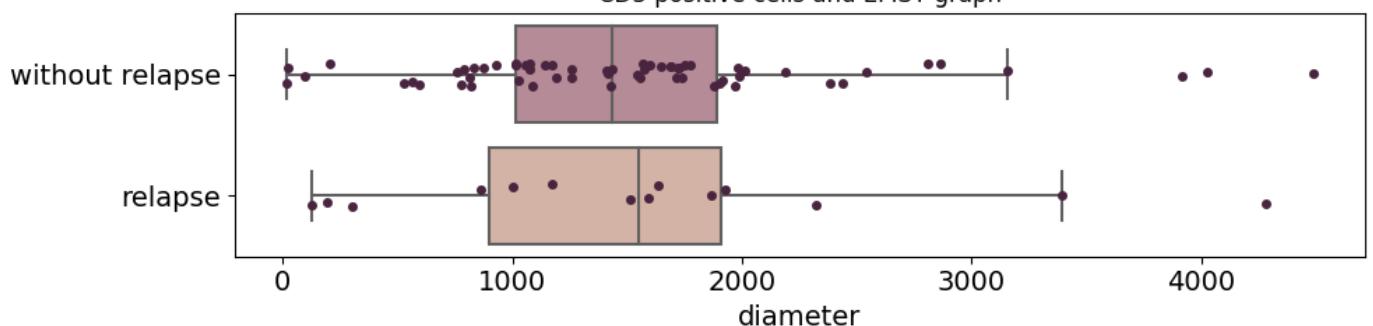
Boxplot of average\_cluster\_coefficient by Relapse free survival  
CD3 positive cells and EMST graph



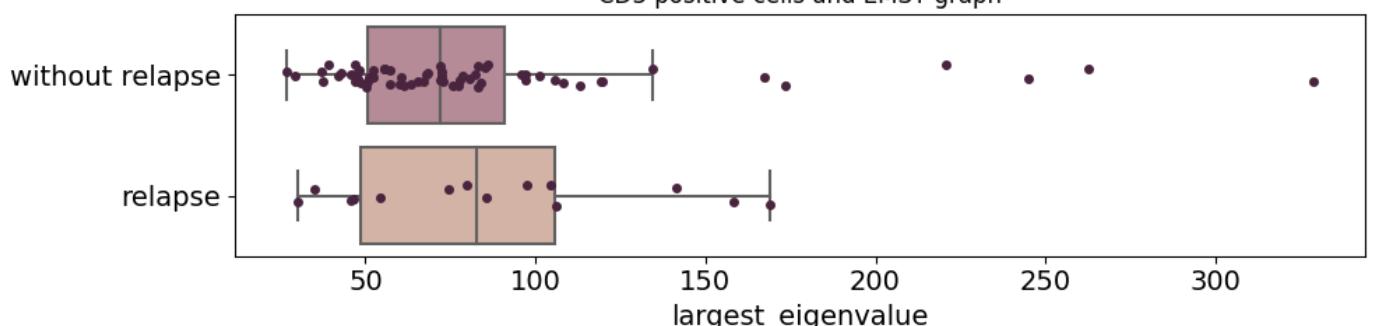
Boxplot of average\_eccentricity by Relapse free survival  
CD3 positive cells and EMST graph



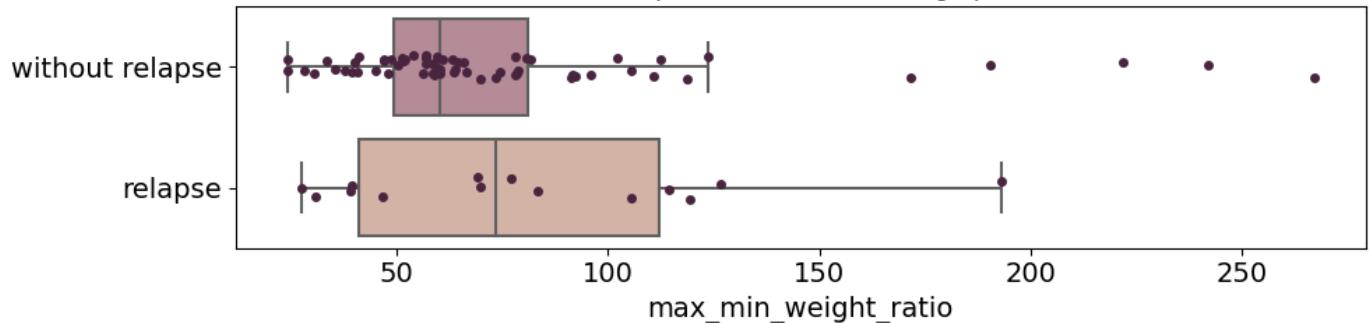
Boxplot of diameter by Relapse free survival  
CD3 positive cells and EMST graph



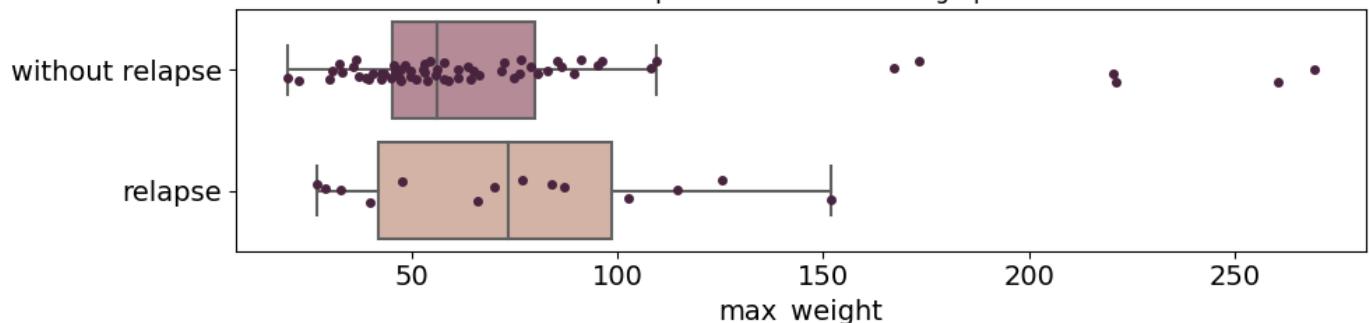
Boxplot of largest\_eigenvalue by Relapse free survival  
CD3 positive cells and EMST graph



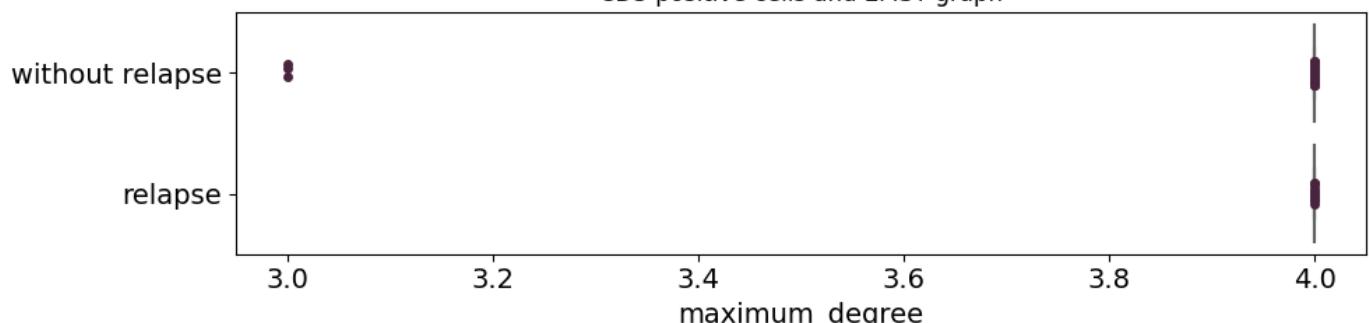
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD3 positive cells and EMST graph



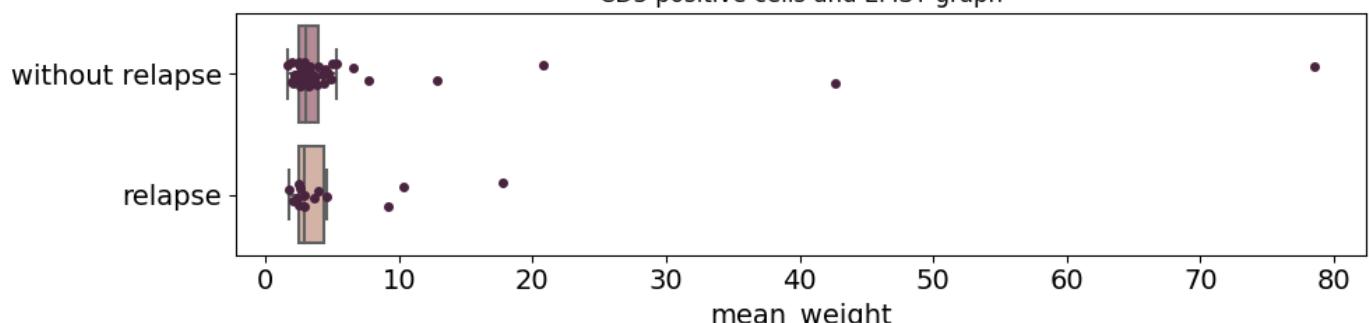
Boxplot of max\_weight by Relapse free survival  
CD3 positive cells and EMST graph



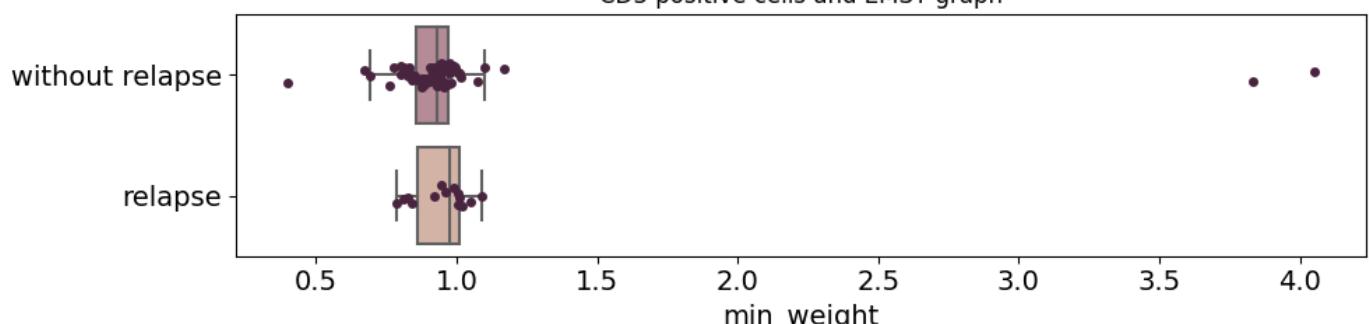
Boxplot of maximum\_degree by Relapse free survival  
CD3 positive cells and EMST graph



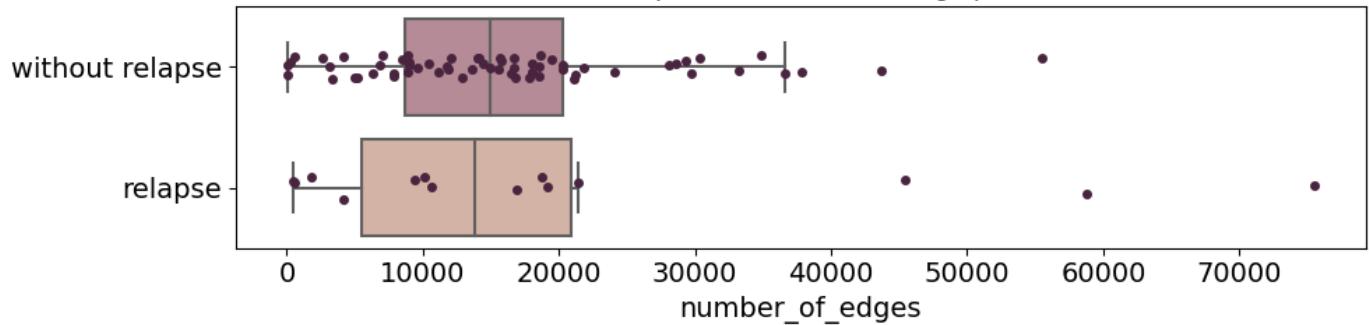
Boxplot of mean\_weight by Relapse free survival  
CD3 positive cells and EMST graph



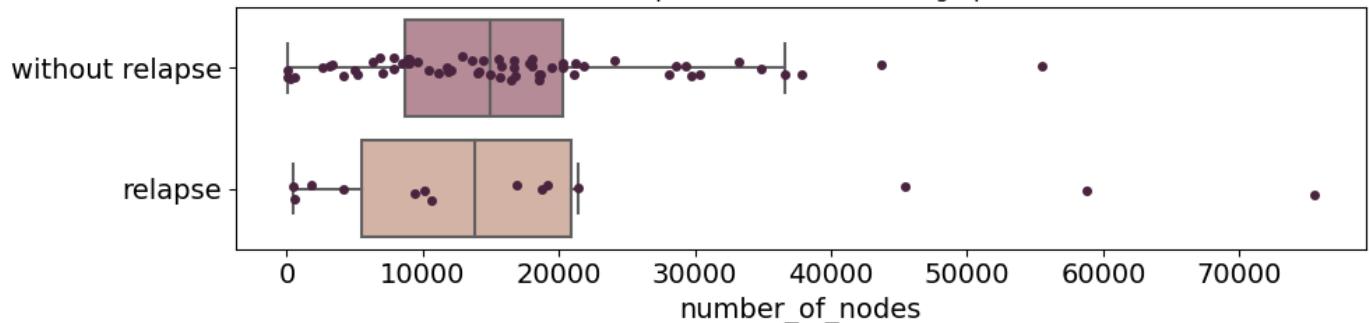
Boxplot of min\_weight by Relapse free survival  
CD3 positive cells and EMST graph



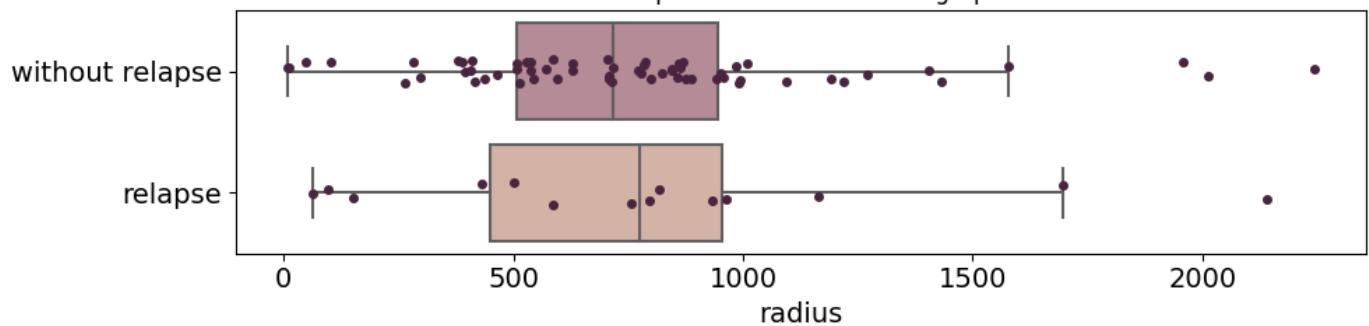
Boxplot of number\_of\_edges by Relapse free survival  
CD3 positive cells and EMST graph



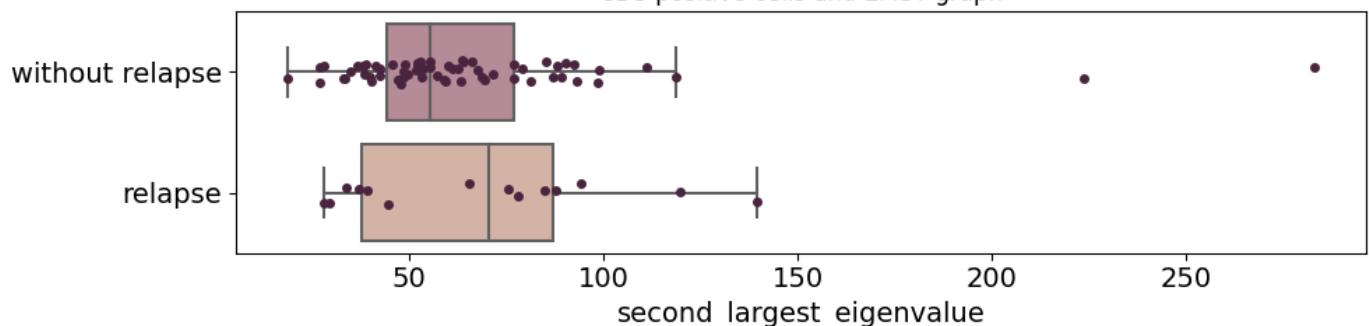
Boxplot of number\_of\_nodes by Relapse free survival  
CD3 positive cells and EMST graph



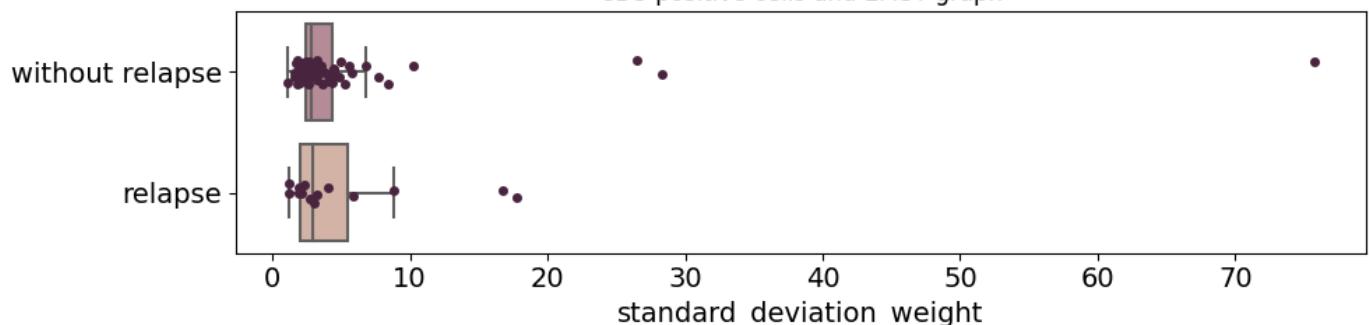
Boxplot of radius by Relapse free survival  
CD3 positive cells and EMST graph

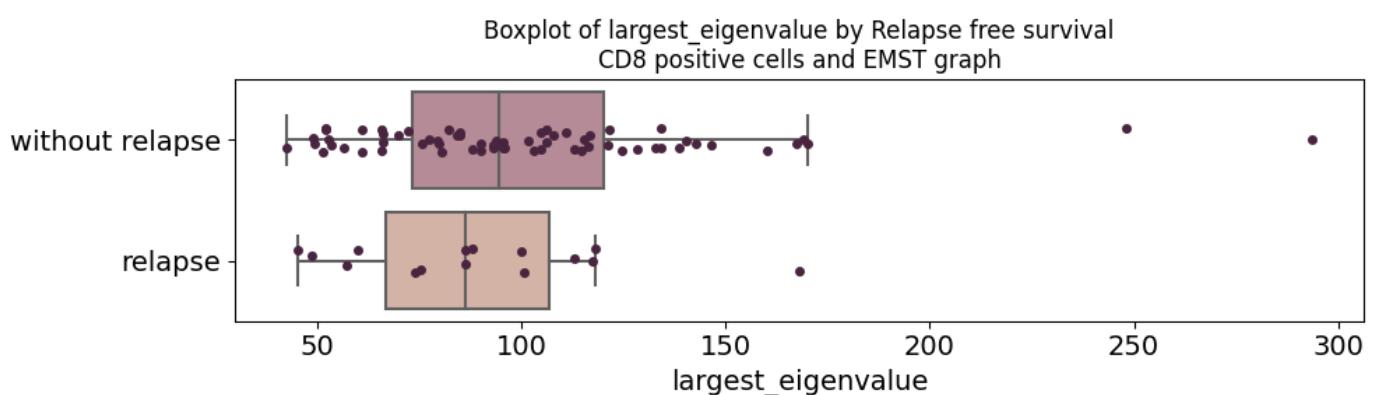
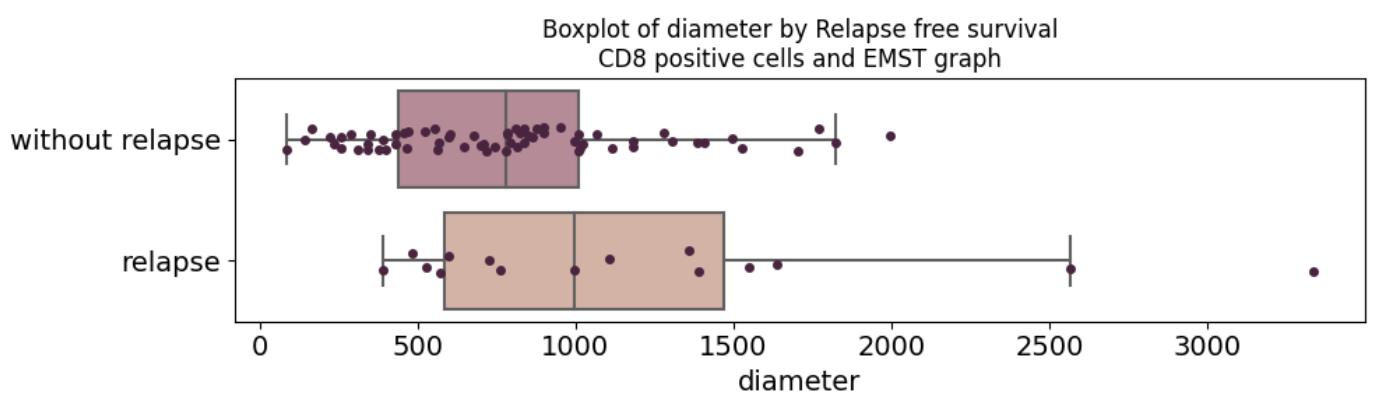
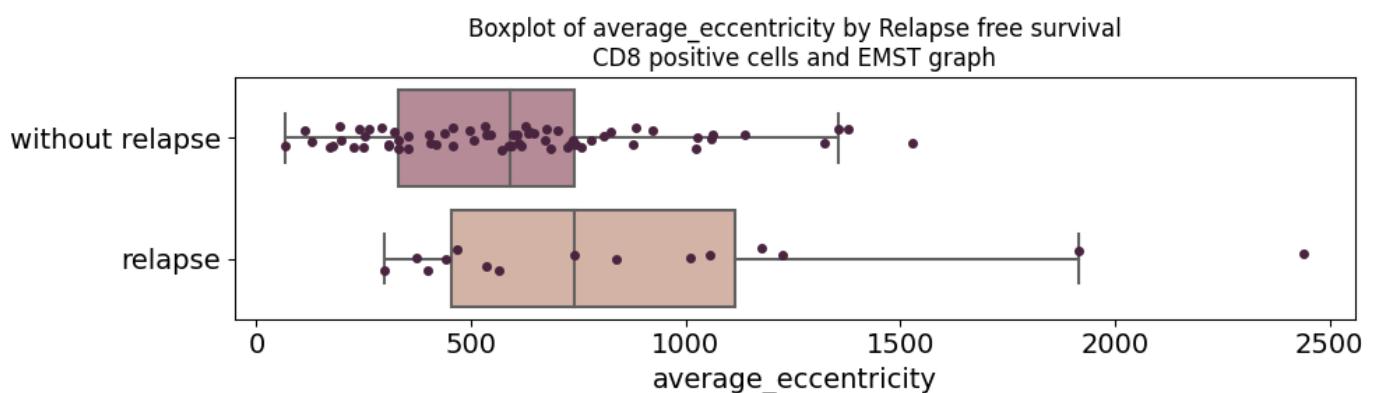
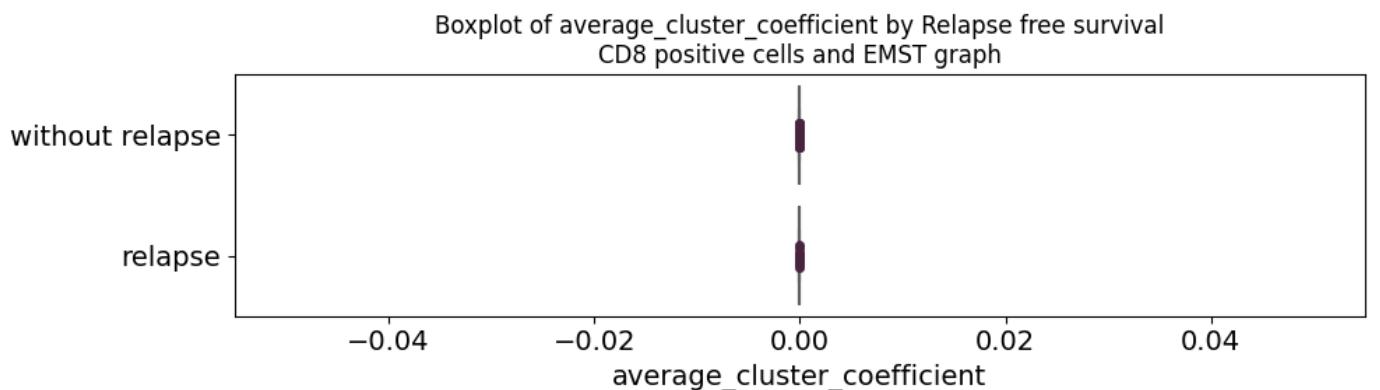
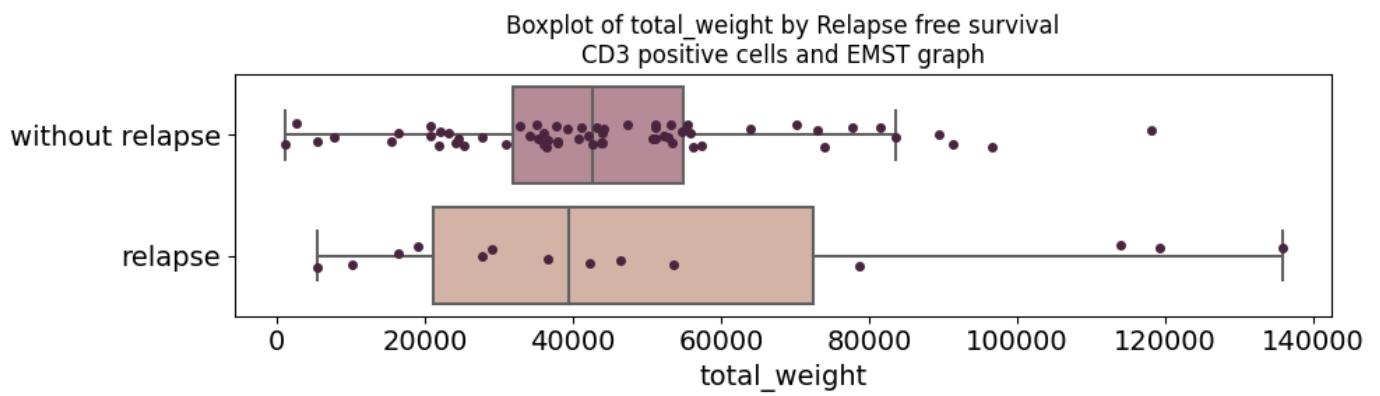


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD3 positive cells and EMST graph

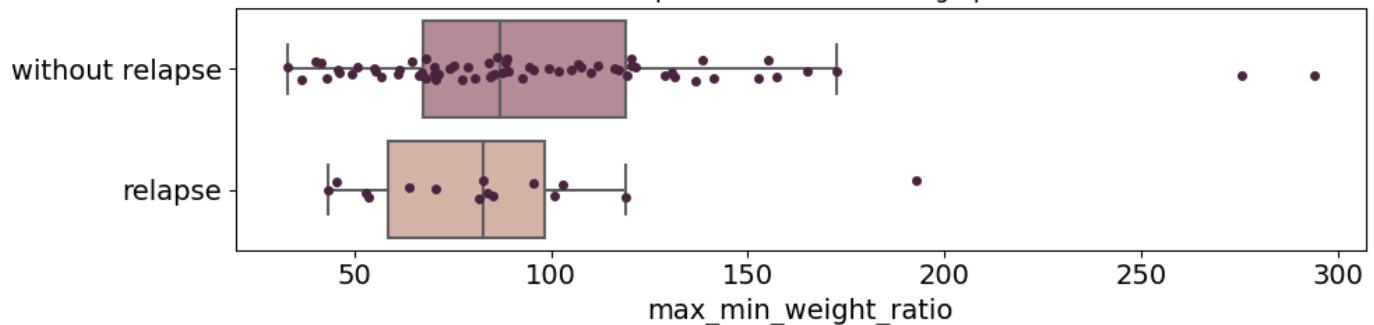


Boxplot of standard\_deviation\_weight by Relapse free survival  
CD3 positive cells and EMST graph

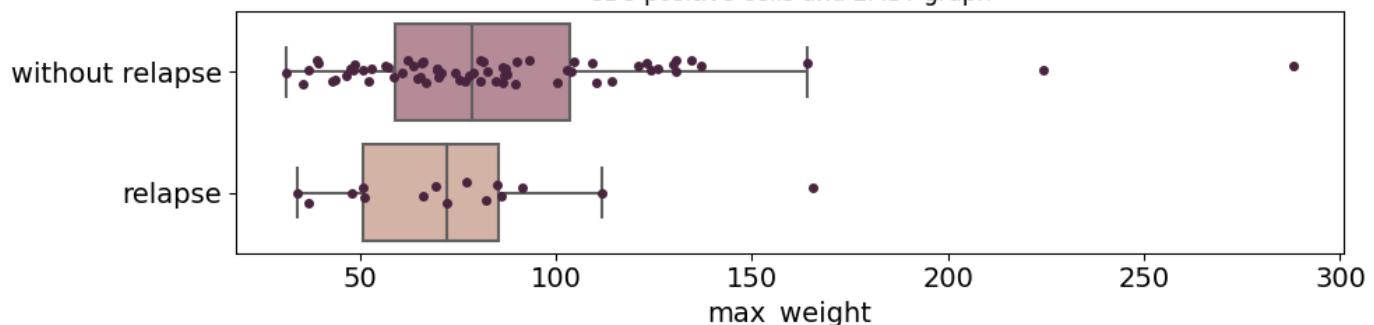




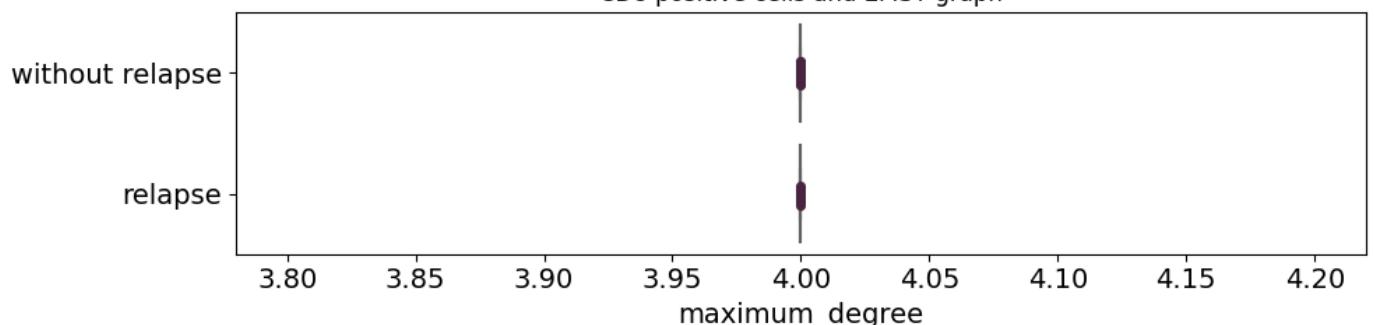
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD8 positive cells and EMST graph



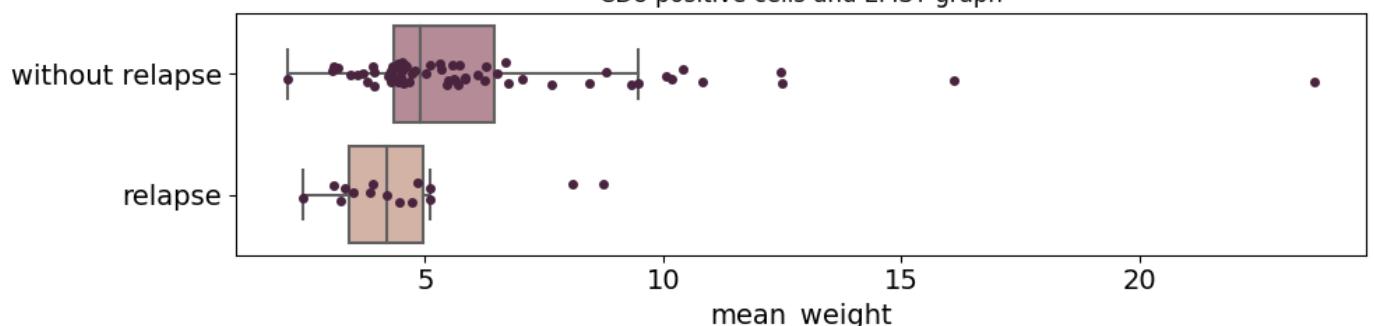
Boxplot of max\_weight by Relapse free survival  
CD8 positive cells and EMST graph



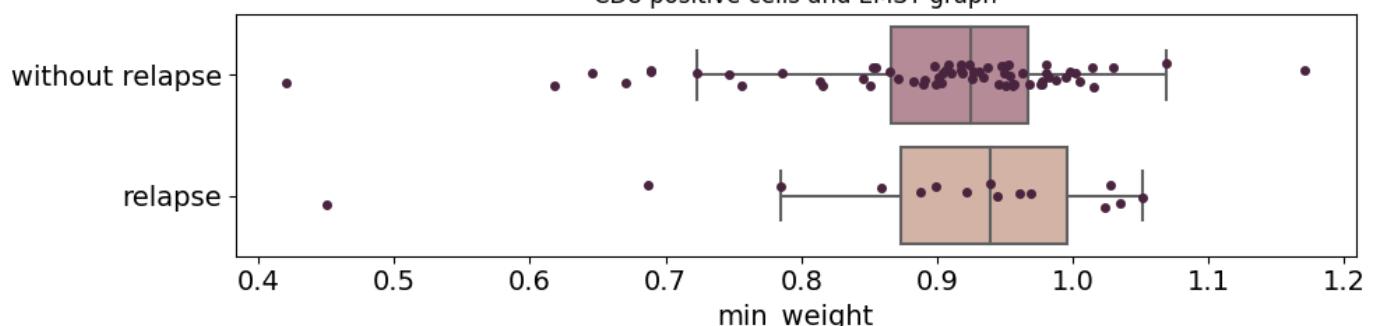
Boxplot of maximum\_degree by Relapse free survival  
CD8 positive cells and EMST graph



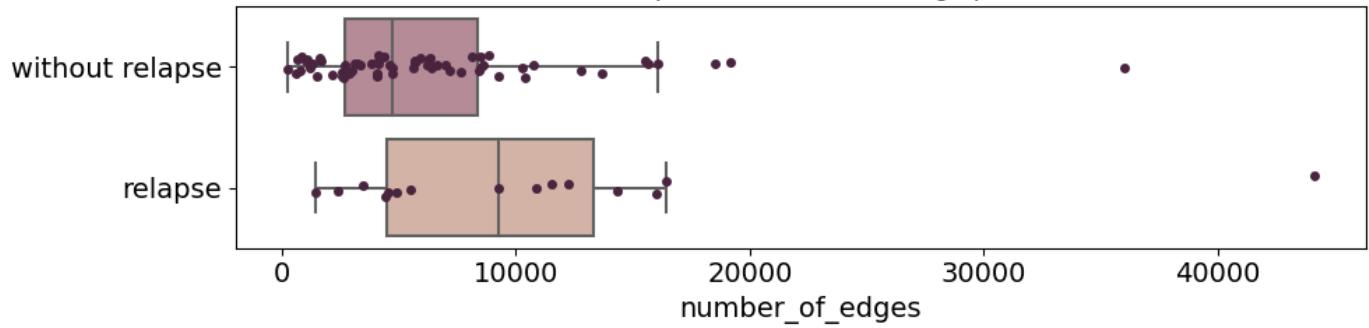
Boxplot of mean\_weight by Relapse free survival  
CD8 positive cells and EMST graph



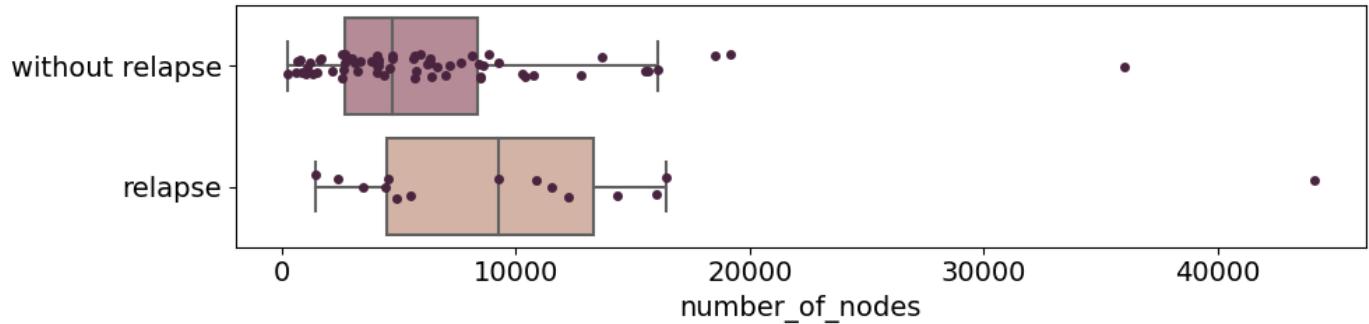
Boxplot of min\_weight by Relapse free survival  
CD8 positive cells and EMST graph



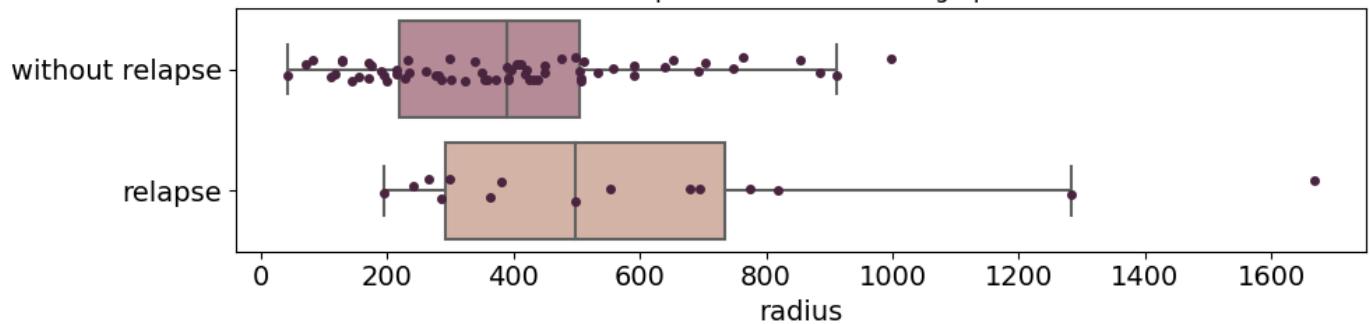
Boxplot of number\_of\_edges by Relapse free survival  
CD8 positive cells and EMST graph



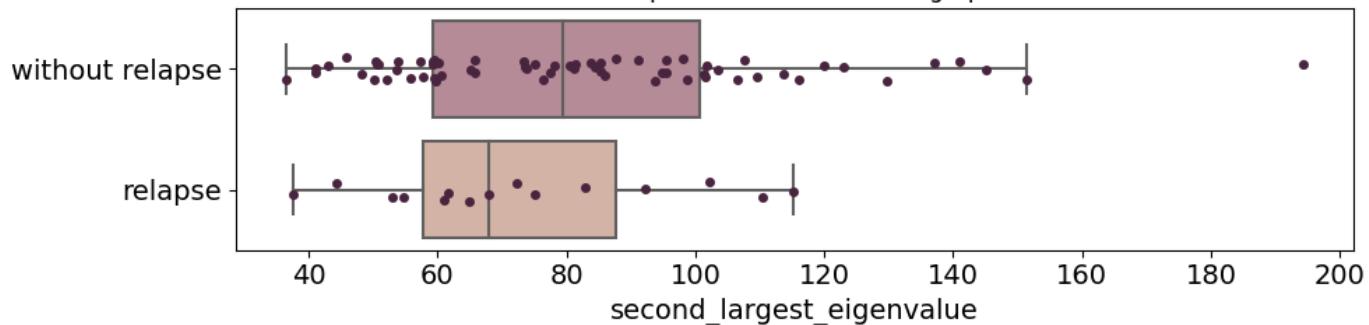
Boxplot of number\_of\_nodes by Relapse free survival  
CD8 positive cells and EMST graph



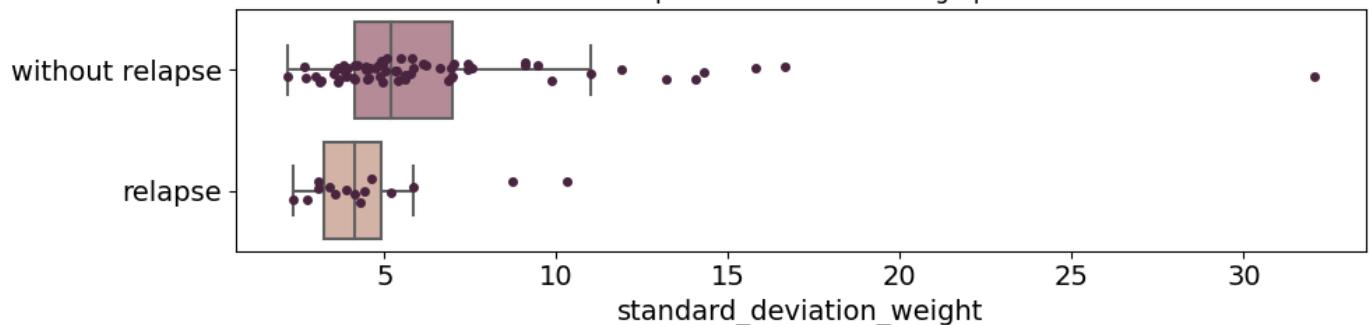
Boxplot of radius by Relapse free survival  
CD8 positive cells and EMST graph

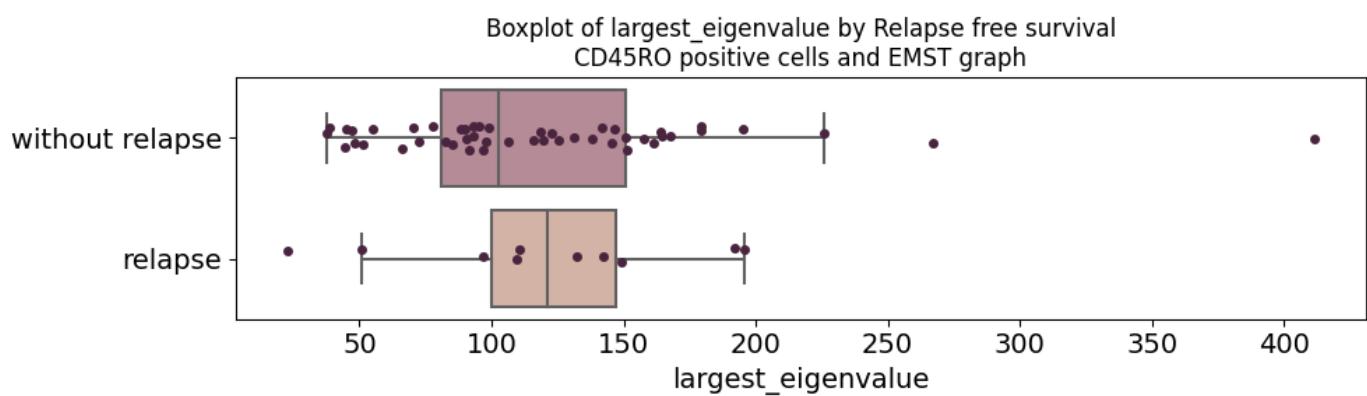
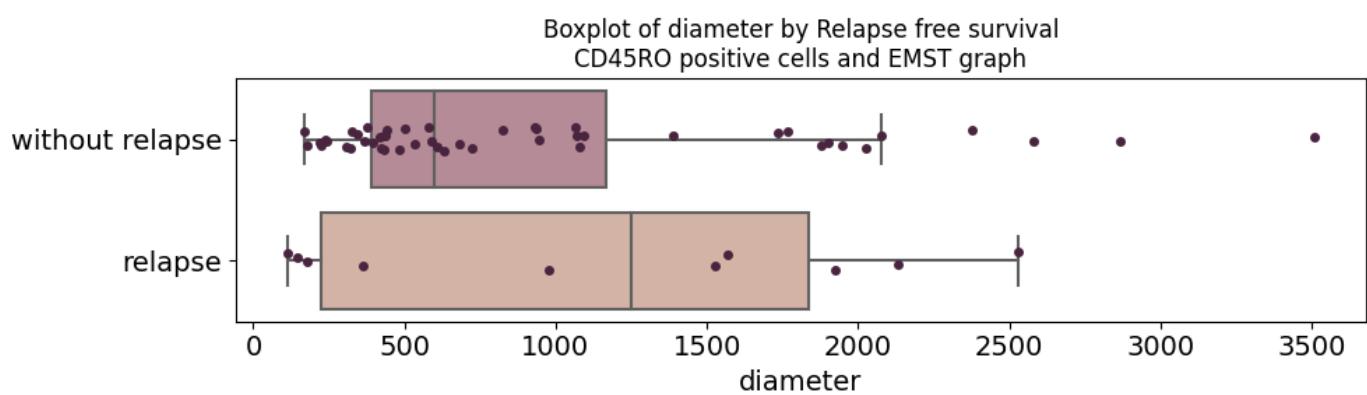
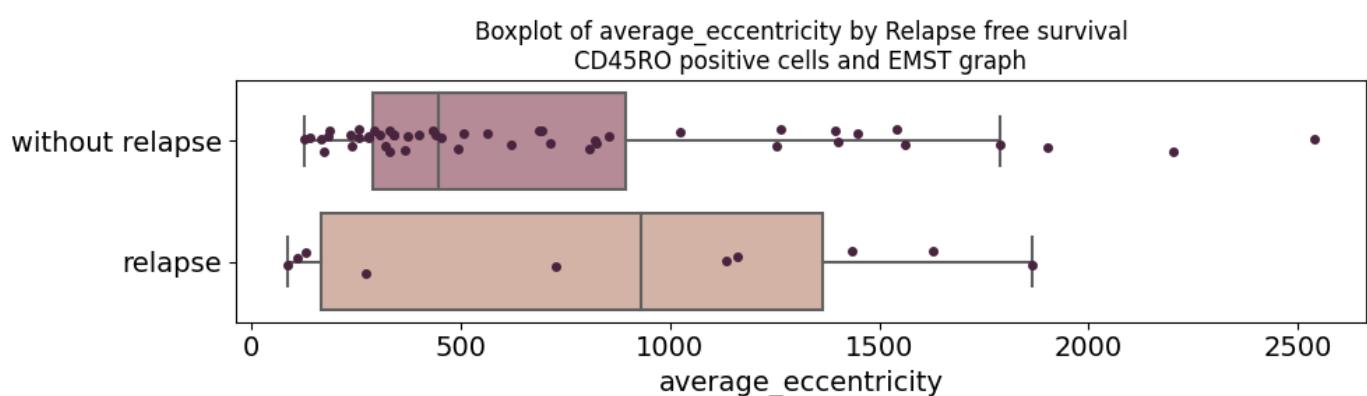
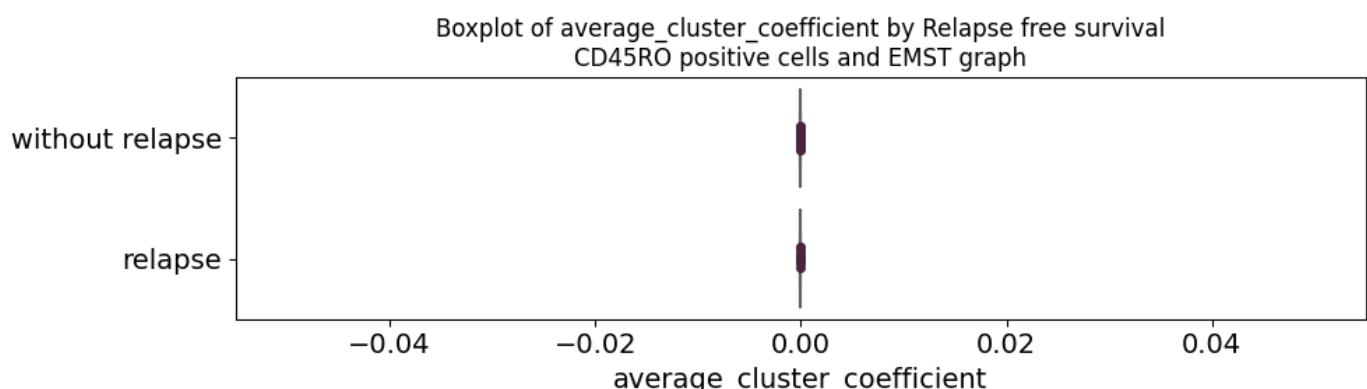
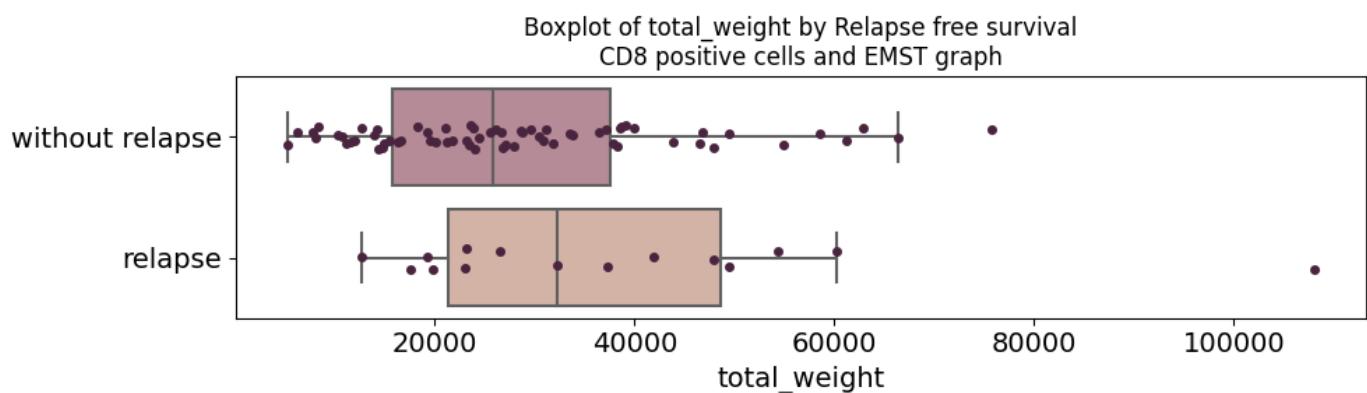


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD8 positive cells and EMST graph

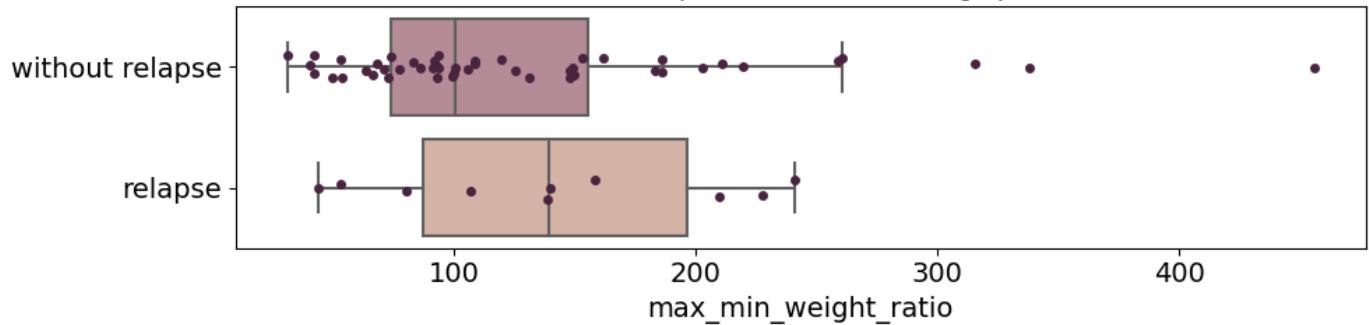


Boxplot of standard\_deviation\_weight by Relapse free survival  
CD8 positive cells and EMST graph

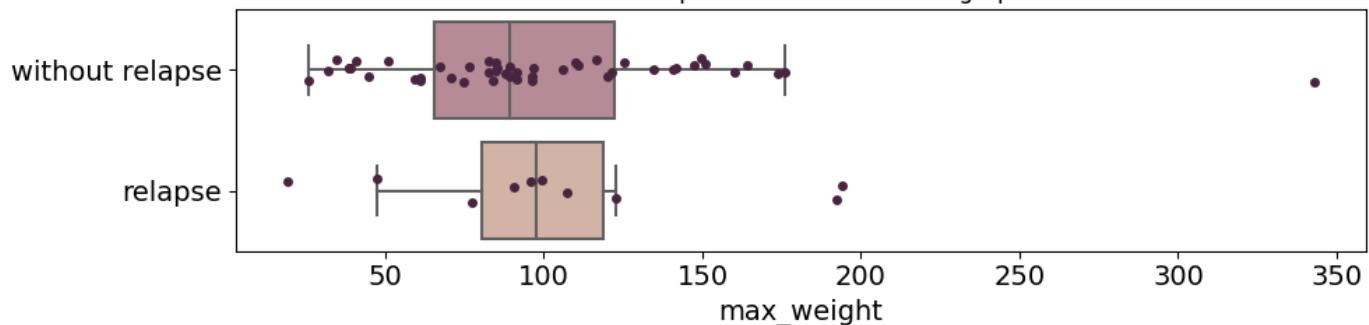




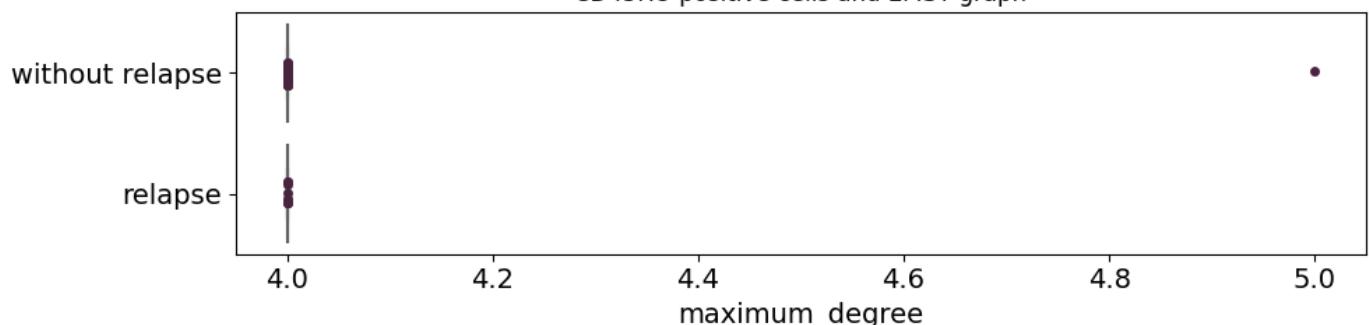
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD45RO positive cells and EMST graph



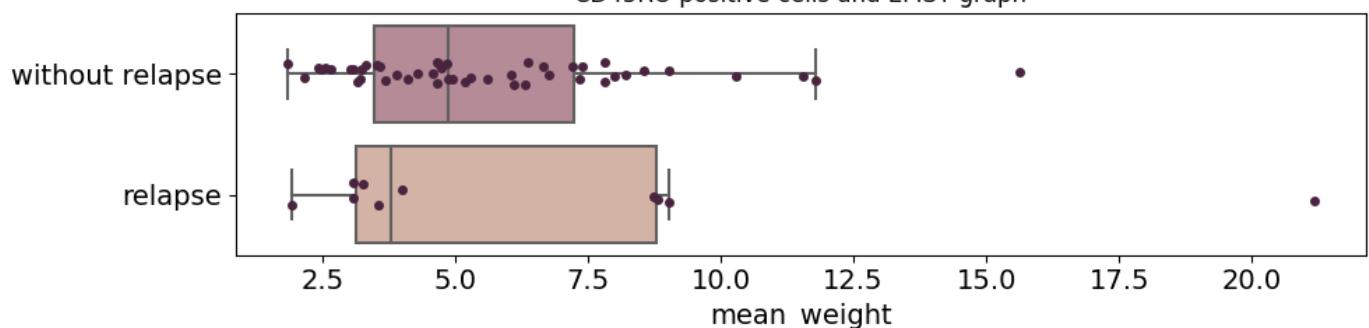
Boxplot of max\_weight by Relapse free survival  
CD45RO positive cells and EMST graph



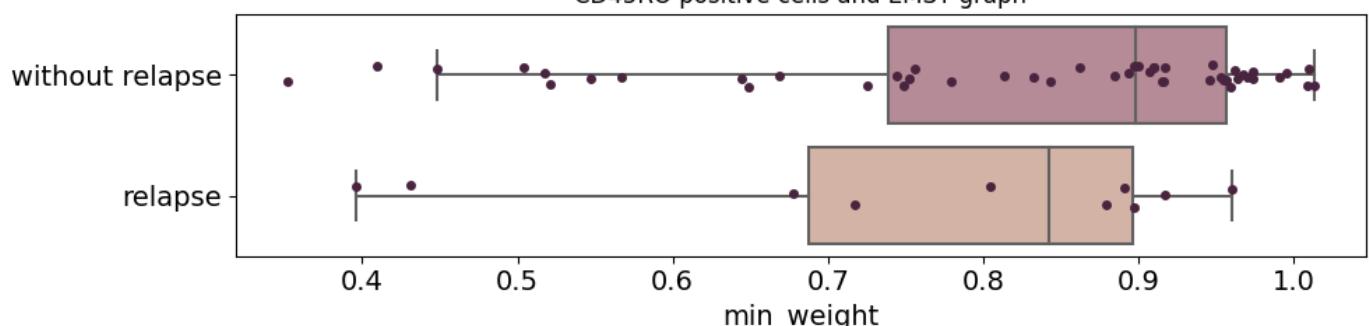
Boxplot of maximum\_degree by Relapse free survival  
CD45RO positive cells and EMST graph



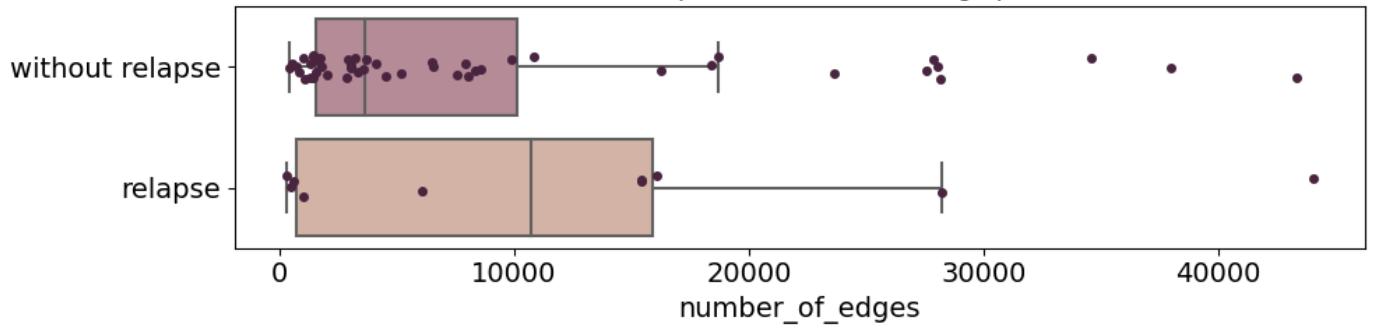
Boxplot of mean\_weight by Relapse free survival  
CD45RO positive cells and EMST graph



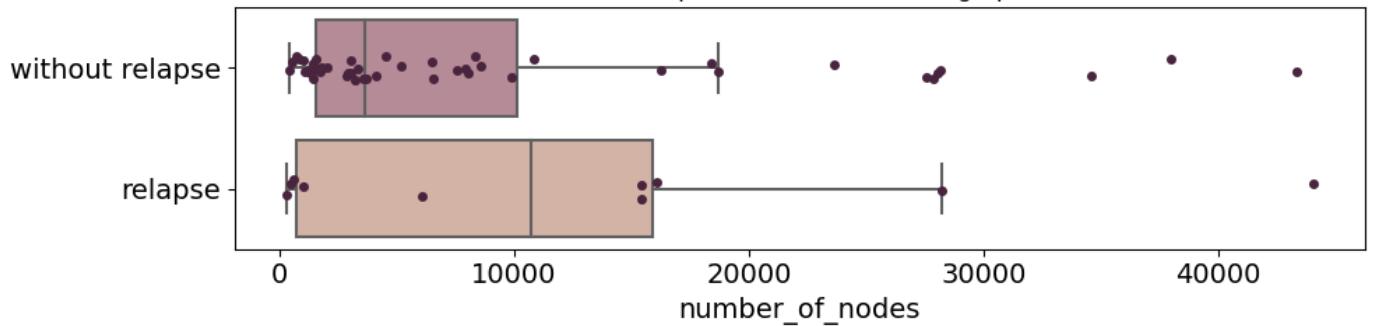
Boxplot of min\_weight by Relapse free survival  
CD45RO positive cells and EMST graph



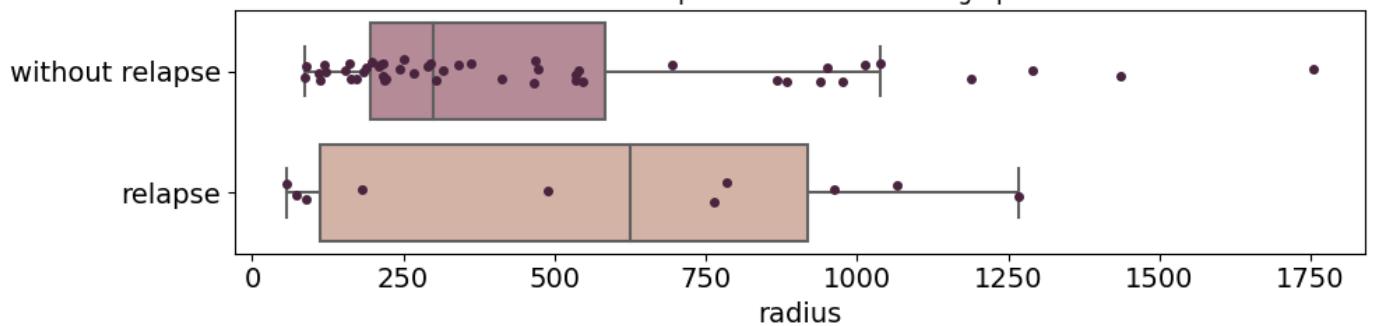
Boxplot of number\_of\_edges by Relapse free survival  
CD45RO positive cells and EMST graph



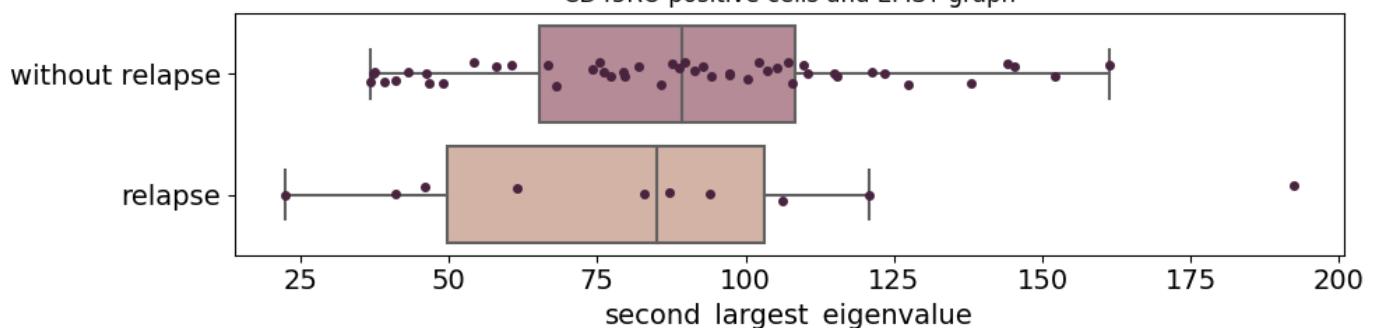
Boxplot of number\_of\_nodes by Relapse free survival  
CD45RO positive cells and EMST graph



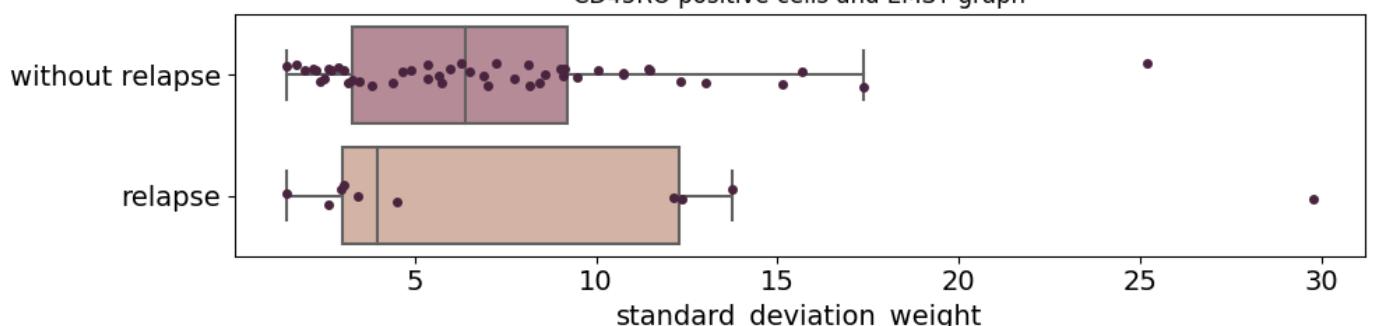
Boxplot of radius by Relapse free survival  
CD45RO positive cells and EMST graph

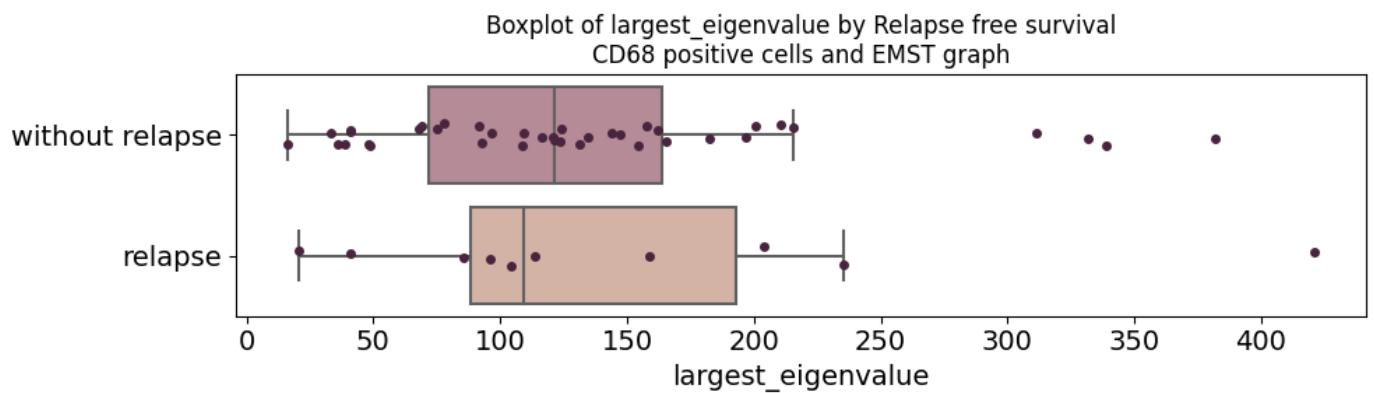
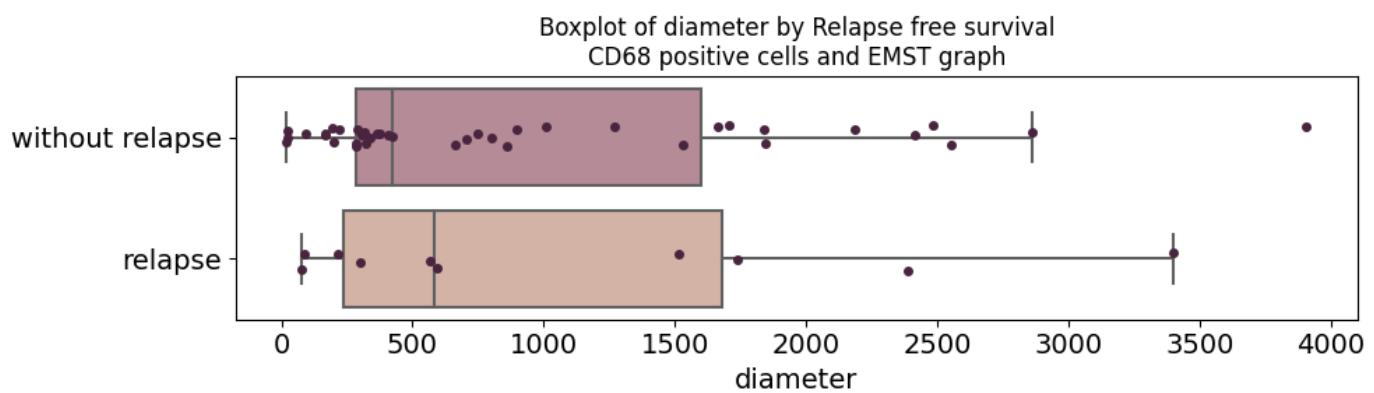
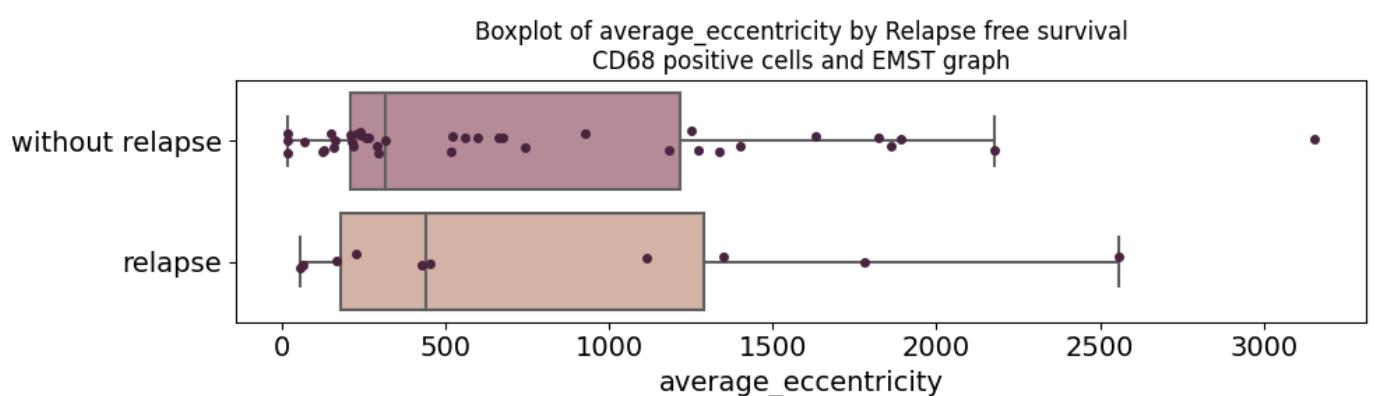
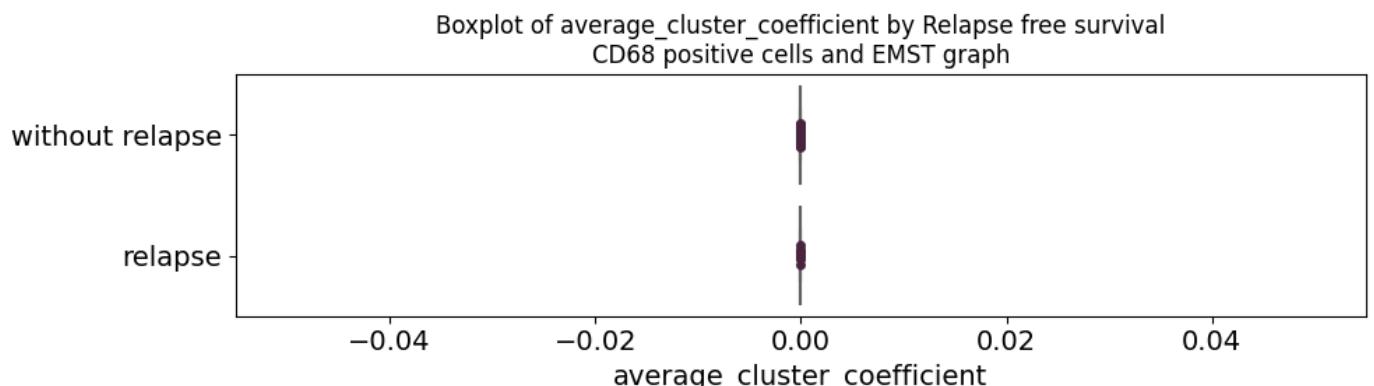
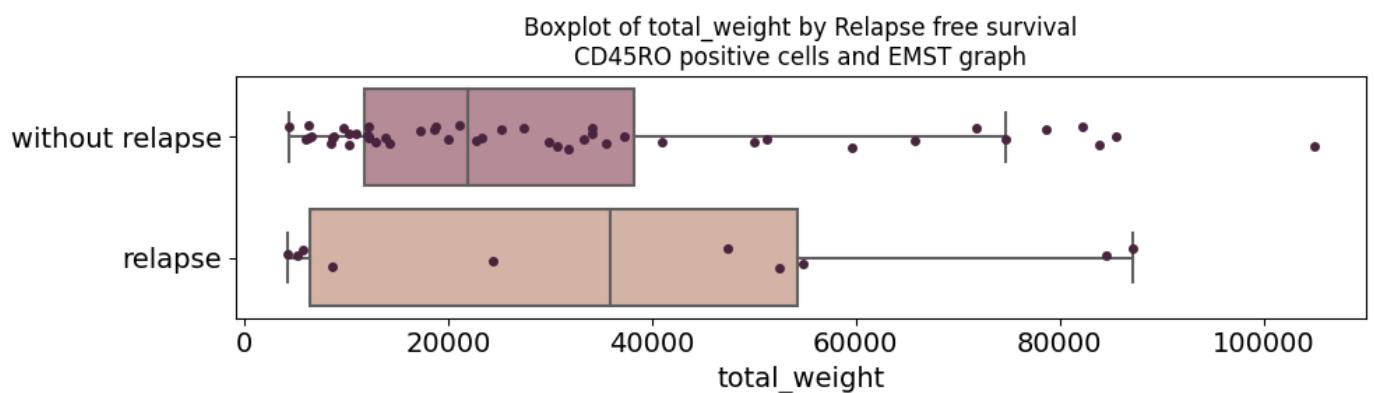


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD45RO positive cells and EMST graph

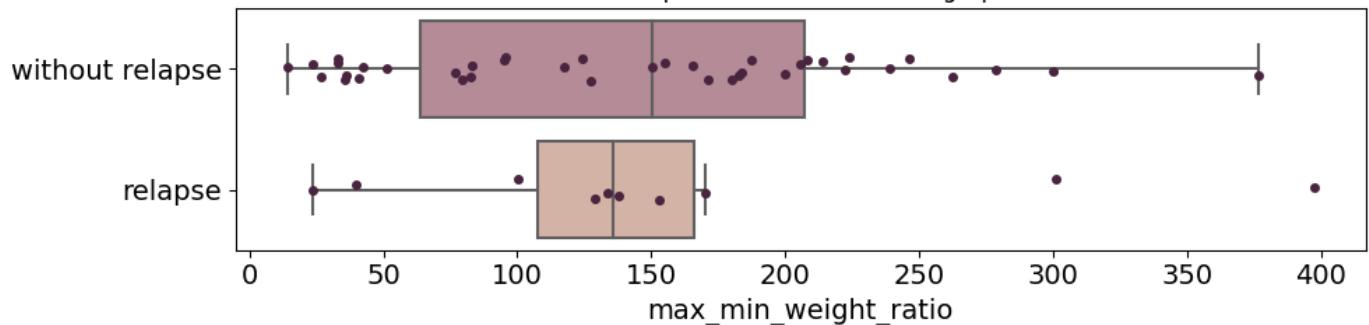


Boxplot of standard\_deviation\_weight by Relapse free survival  
CD45RO positive cells and EMST graph

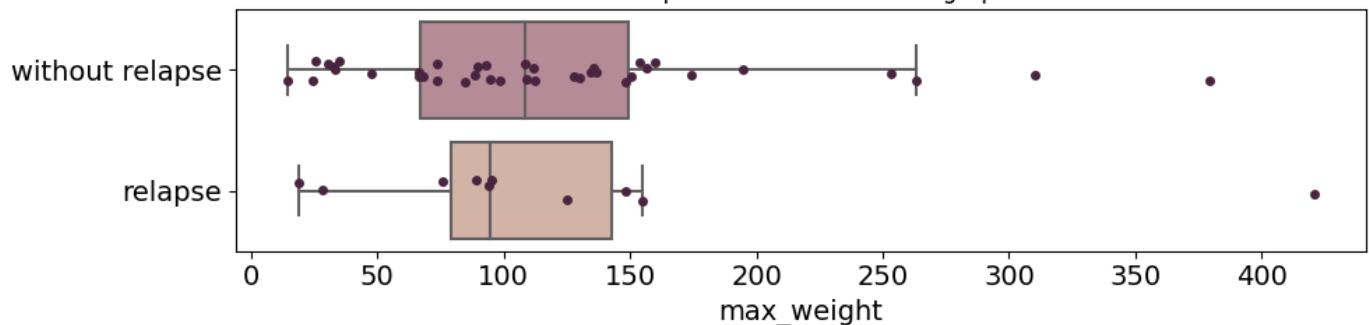




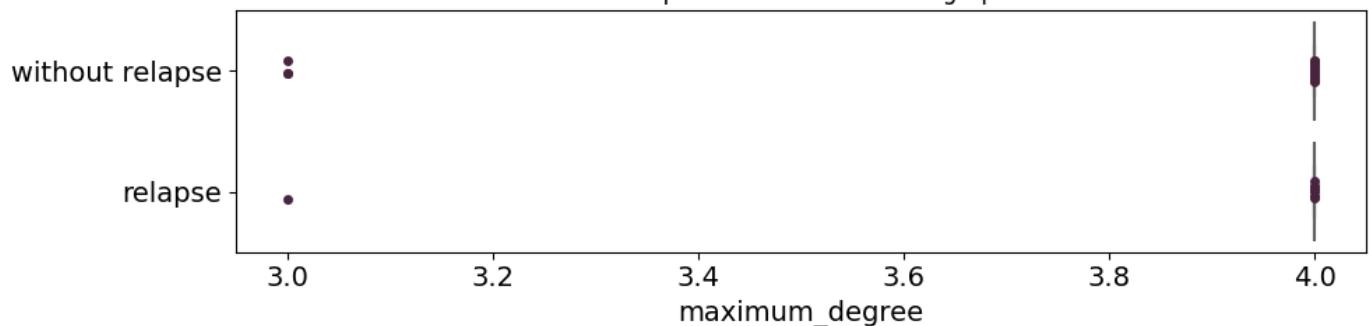
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
CD68 positive cells and EMST graph



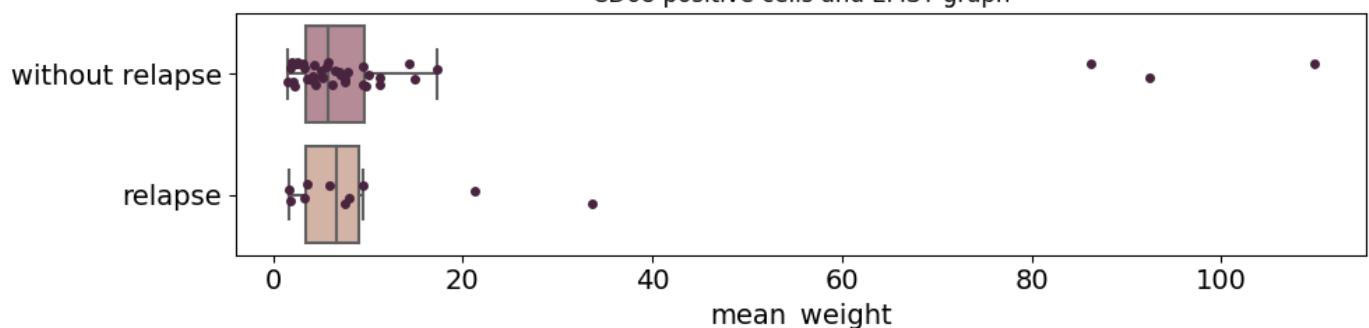
Boxplot of max\_weight by Relapse free survival  
CD68 positive cells and EMST graph



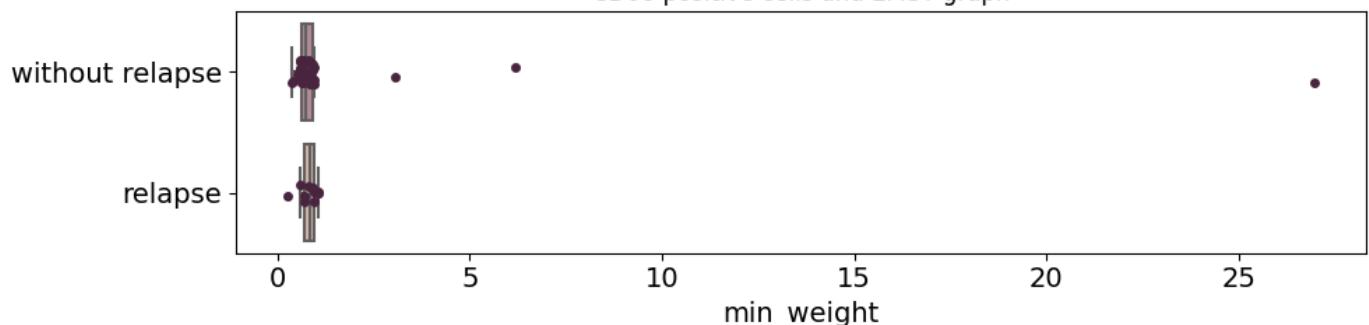
Boxplot of maximum\_degree by Relapse free survival  
CD68 positive cells and EMST graph



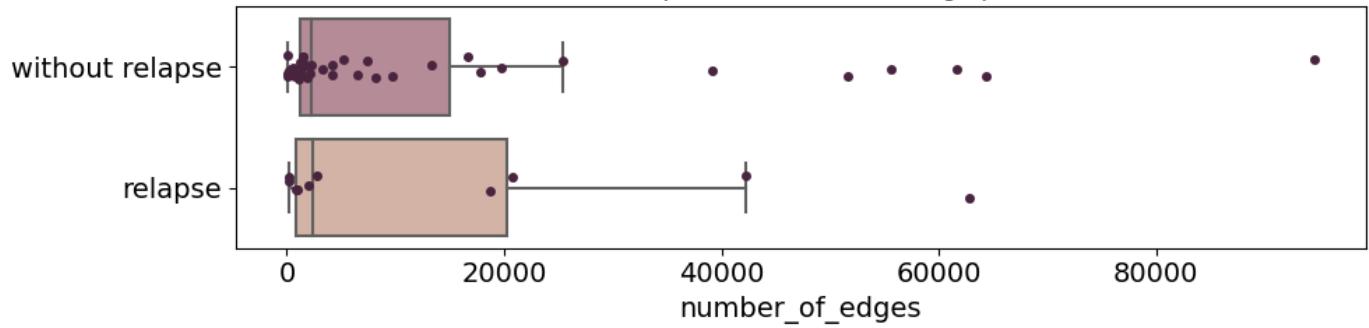
Boxplot of mean\_weight by Relapse free survival  
CD68 positive cells and EMST graph



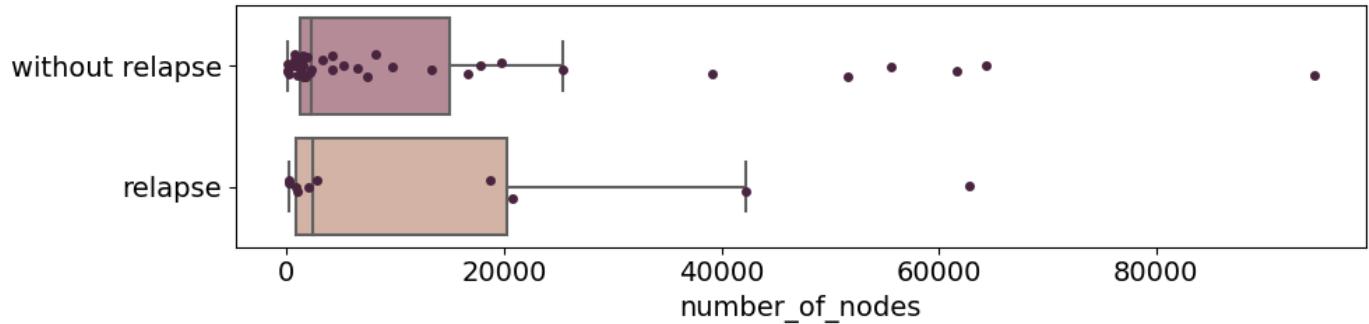
Boxplot of min\_weight by Relapse free survival  
CD68 positive cells and EMST graph



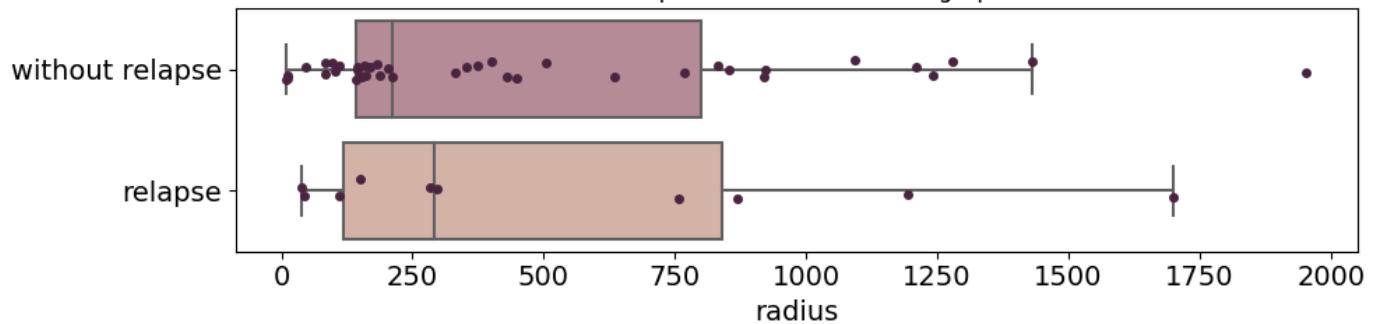
Boxplot of number\_of\_edges by Relapse free survival  
CD68 positive cells and EMST graph



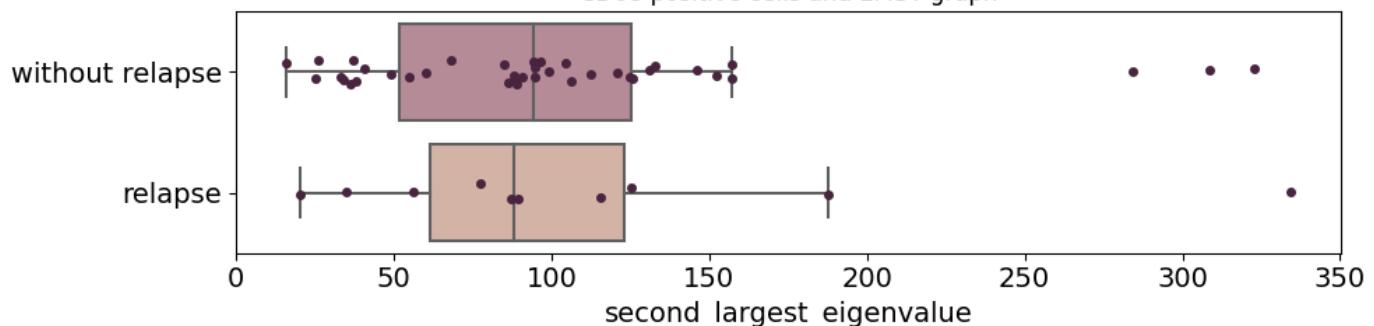
Boxplot of number\_of\_nodes by Relapse free survival  
CD68 positive cells and EMST graph



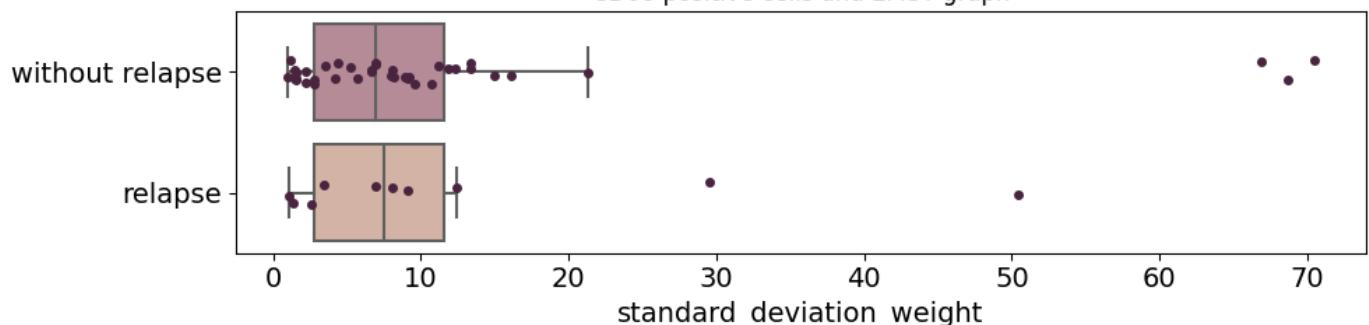
Boxplot of radius by Relapse free survival  
CD68 positive cells and EMST graph

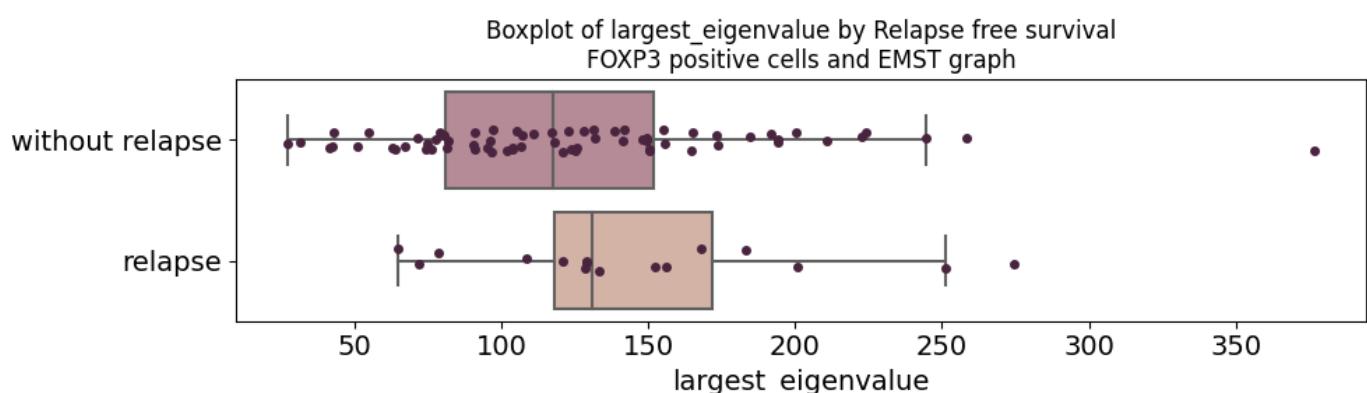
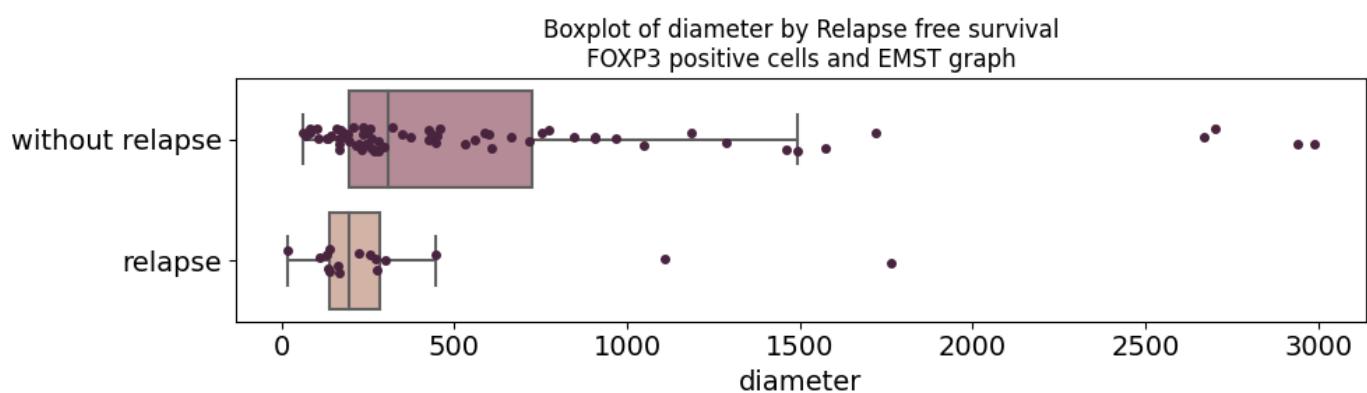
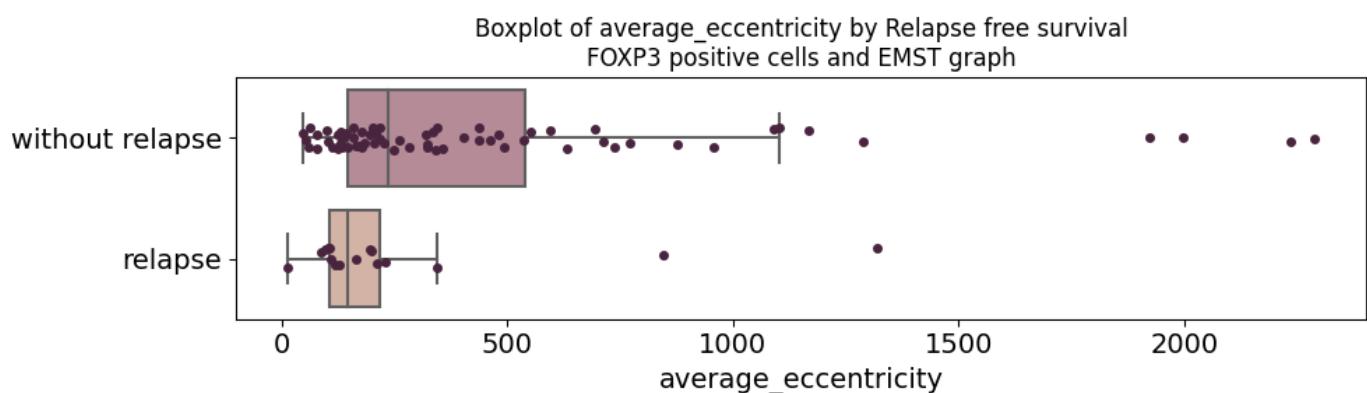
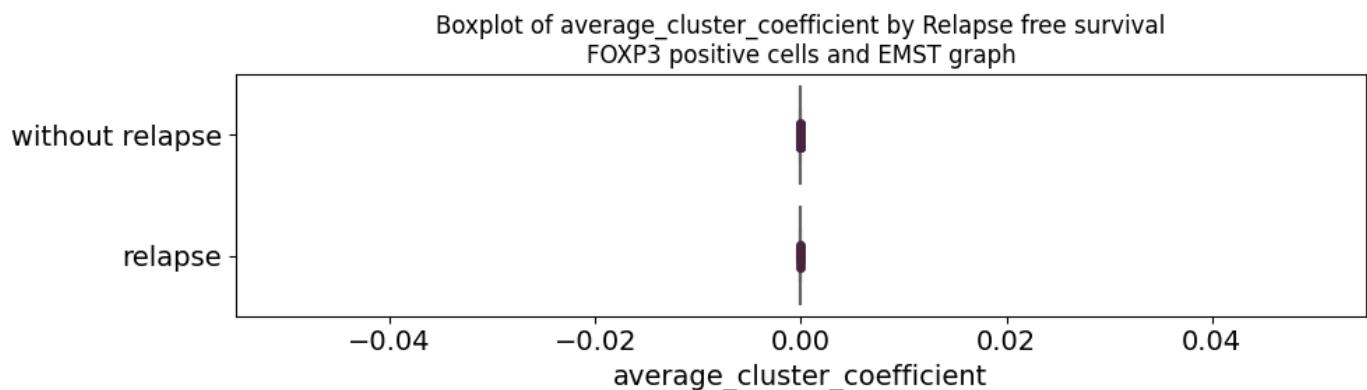
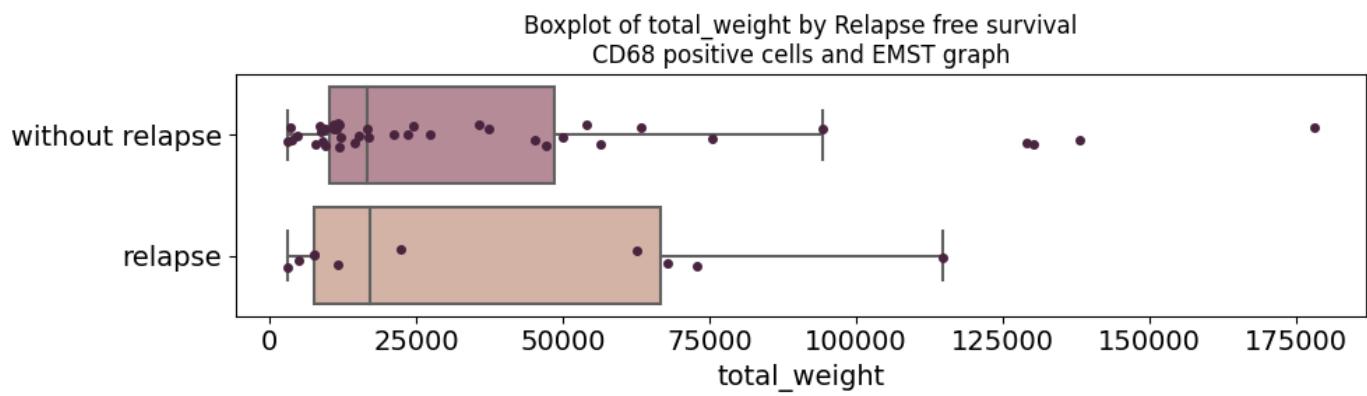


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
CD68 positive cells and EMST graph

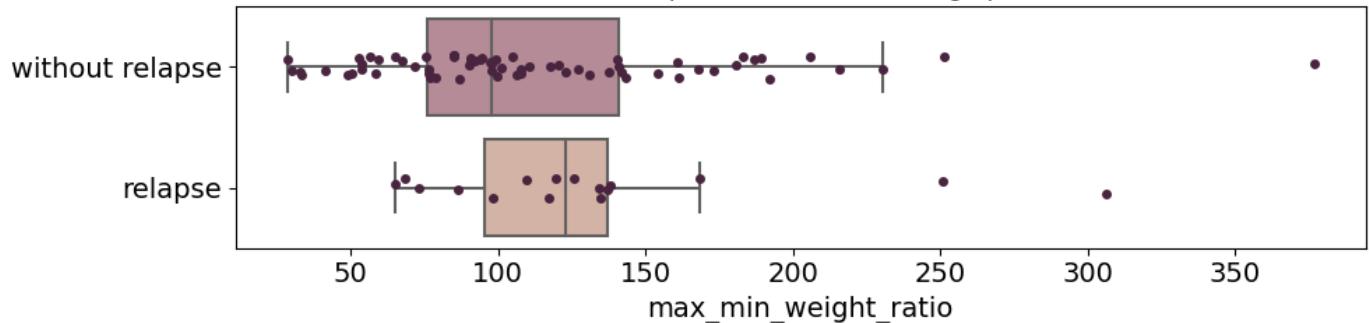


Boxplot of standard\_deviation\_weight by Relapse free survival  
CD68 positive cells and EMST graph

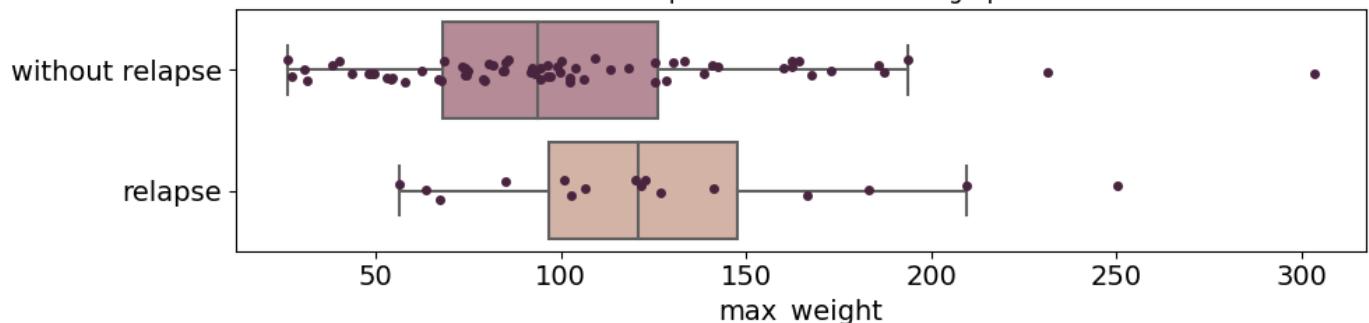




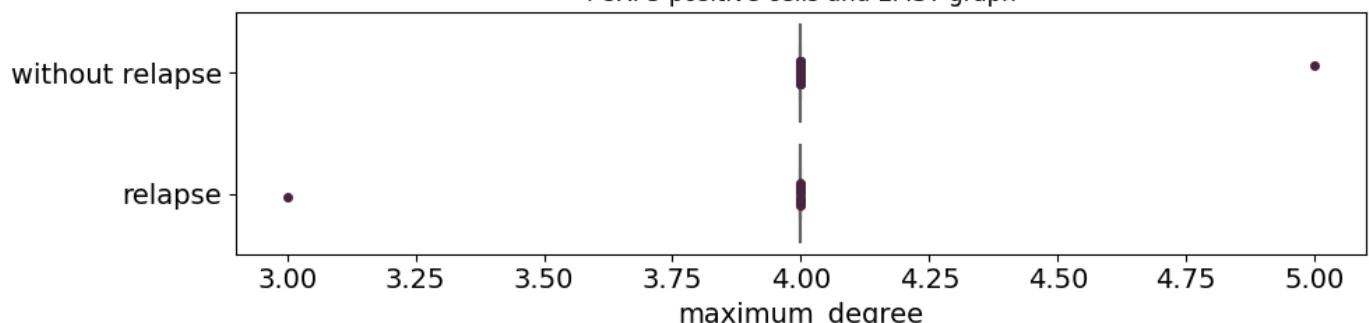
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
FOXP3 positive cells and EMST graph



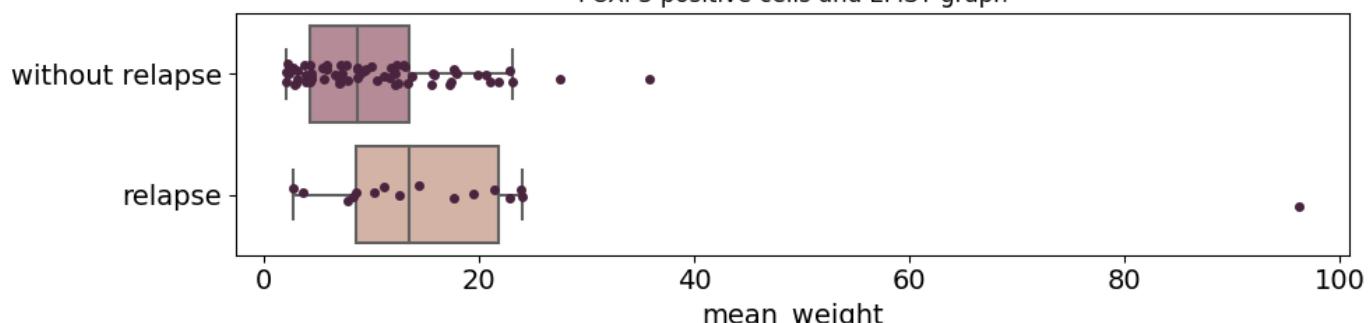
Boxplot of max\_weight by Relapse free survival  
FOXP3 positive cells and EMST graph



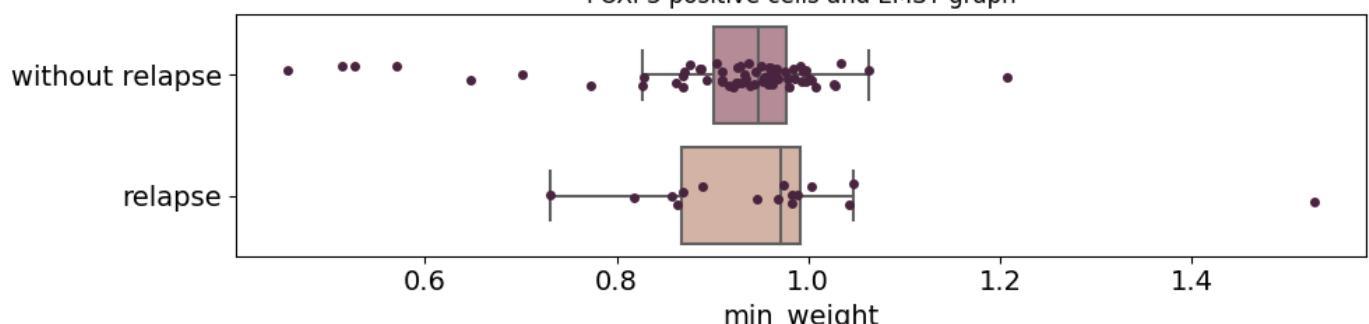
Boxplot of maximum\_degree by Relapse free survival  
FOXP3 positive cells and EMST graph



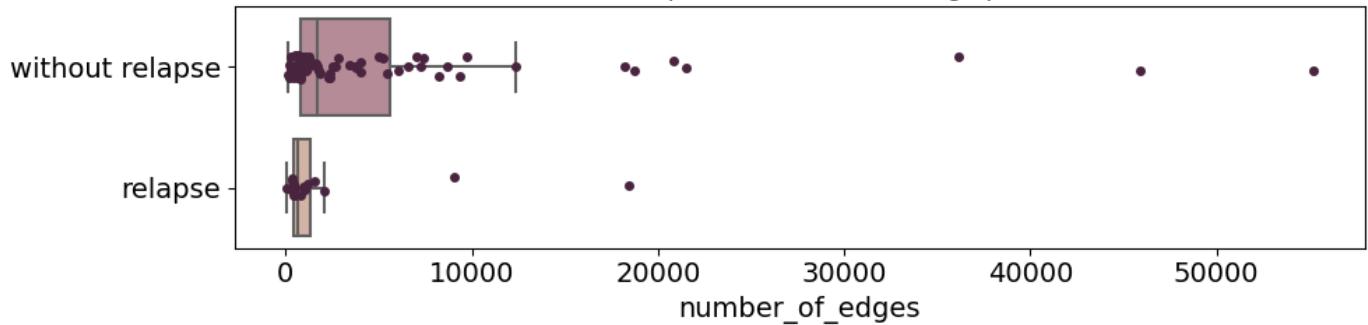
Boxplot of mean\_weight by Relapse free survival  
FOXP3 positive cells and EMST graph



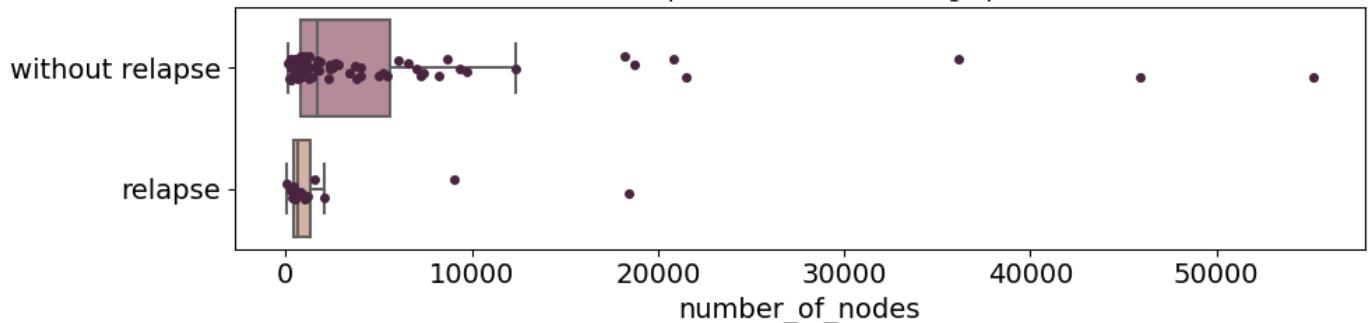
Boxplot of min\_weight by Relapse free survival  
FOXP3 positive cells and EMST graph



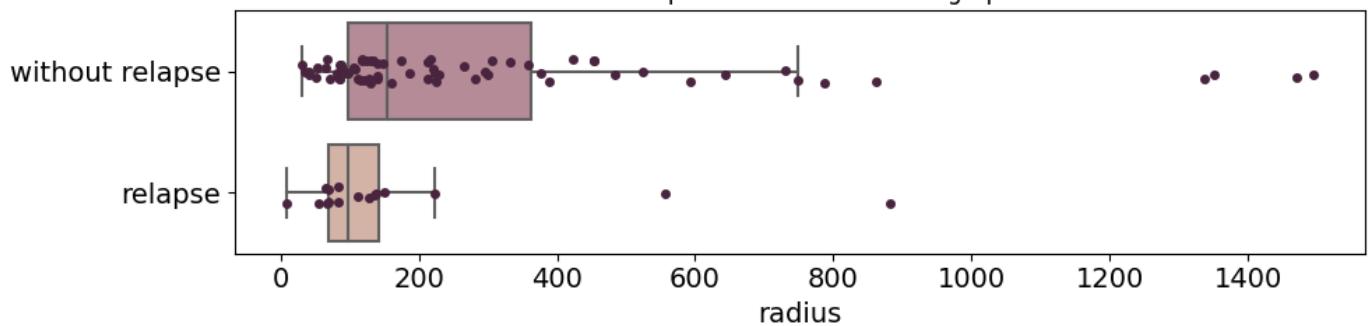
Boxplot of number\_of\_edges by Relapse free survival  
FOXP3 positive cells and EMST graph



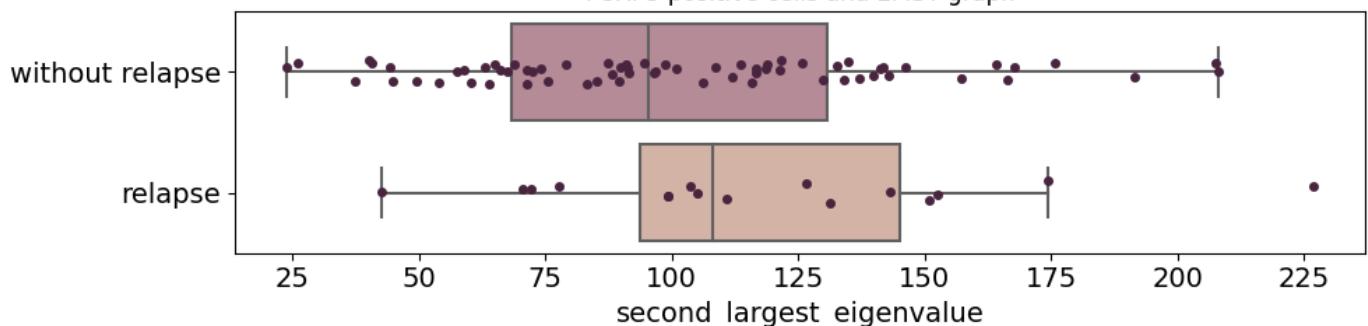
Boxplot of number\_of\_nodes by Relapse free survival  
FOXP3 positive cells and EMST graph



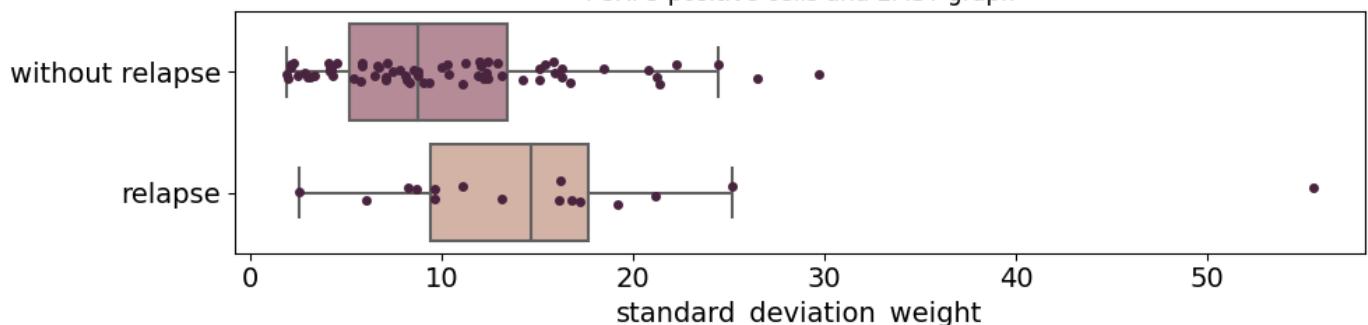
Boxplot of radius by Relapse free survival  
FOXP3 positive cells and EMST graph



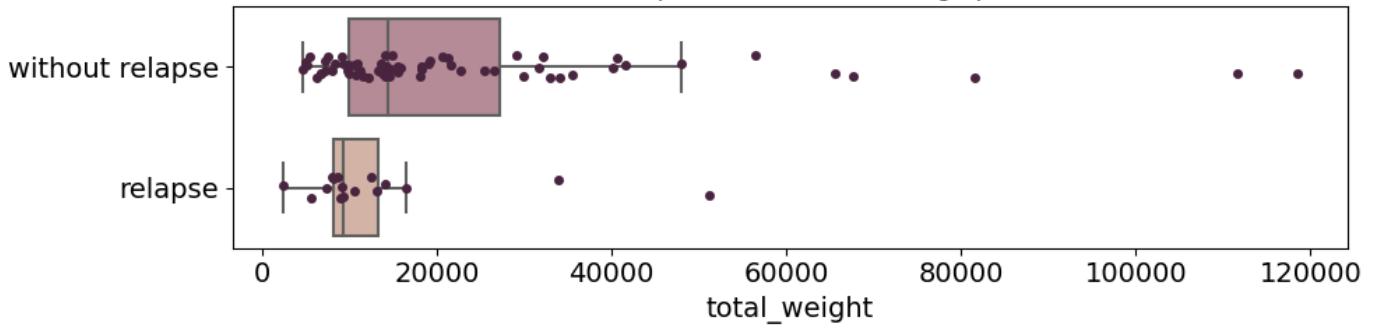
Boxplot of second\_largest\_eigenvalue by Relapse free survival  
FOXP3 positive cells and EMST graph



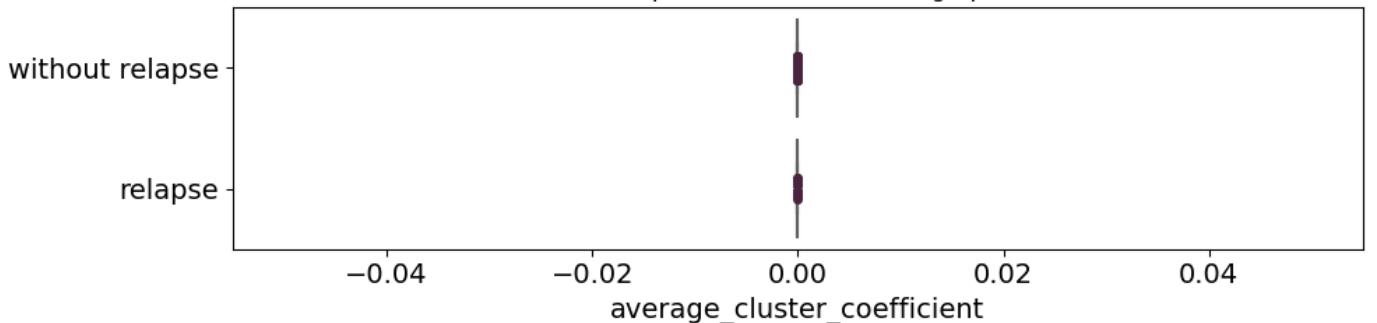
Boxplot of standard\_deviation\_weight by Relapse free survival  
FOXP3 positive cells and EMST graph



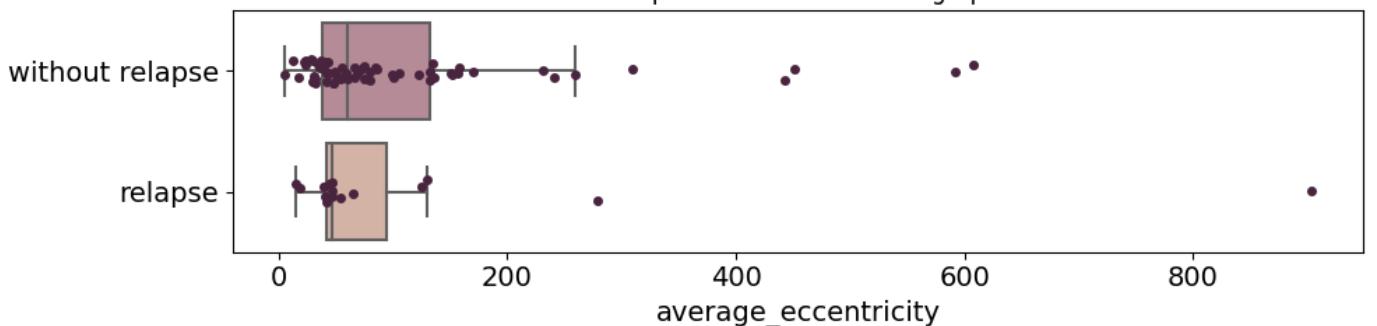
Boxplot of total\_weight by Relapse free survival  
FOXP3 positive cells and EMST graph



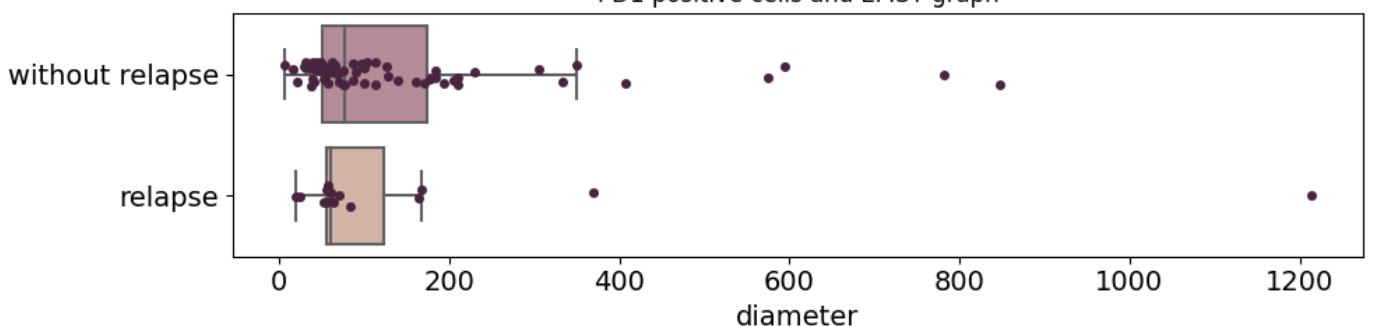
Boxplot of average\_cluster\_coefficient by Relapse free survival  
PD1 positive cells and EMST graph



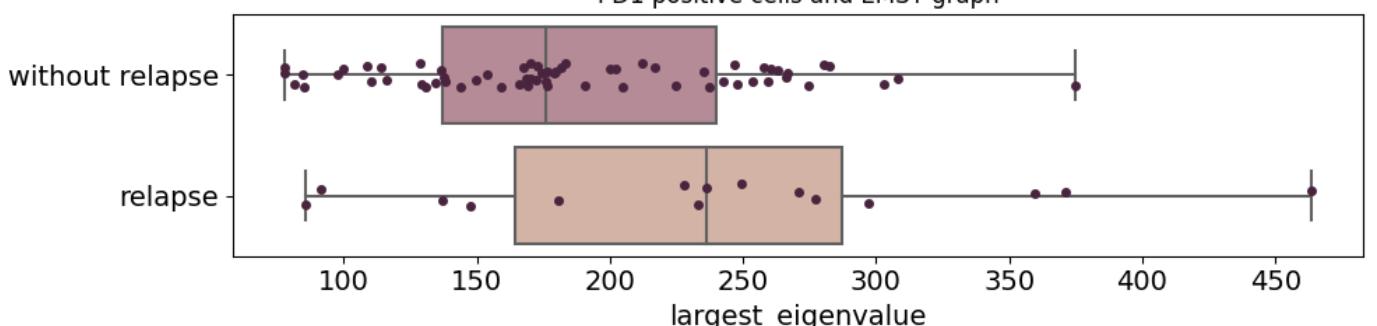
Boxplot of average\_eccentricity by Relapse free survival  
PD1 positive cells and EMST graph



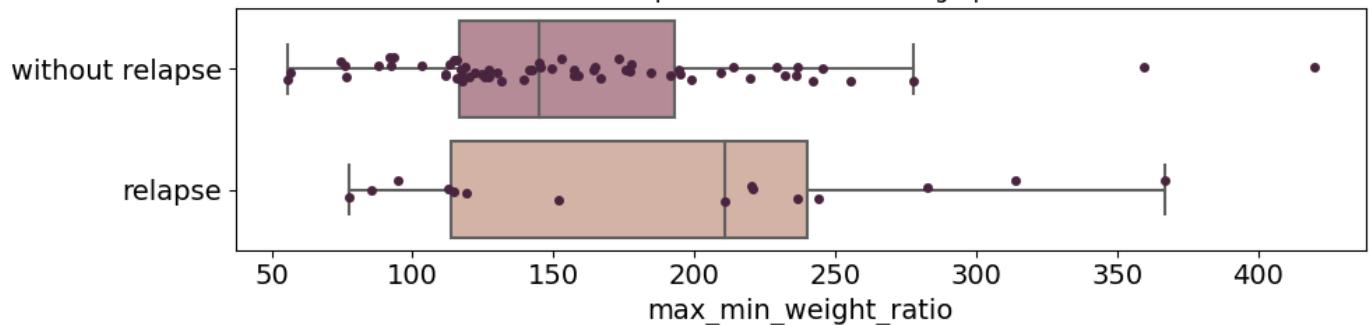
Boxplot of diameter by Relapse free survival  
PD1 positive cells and EMST graph



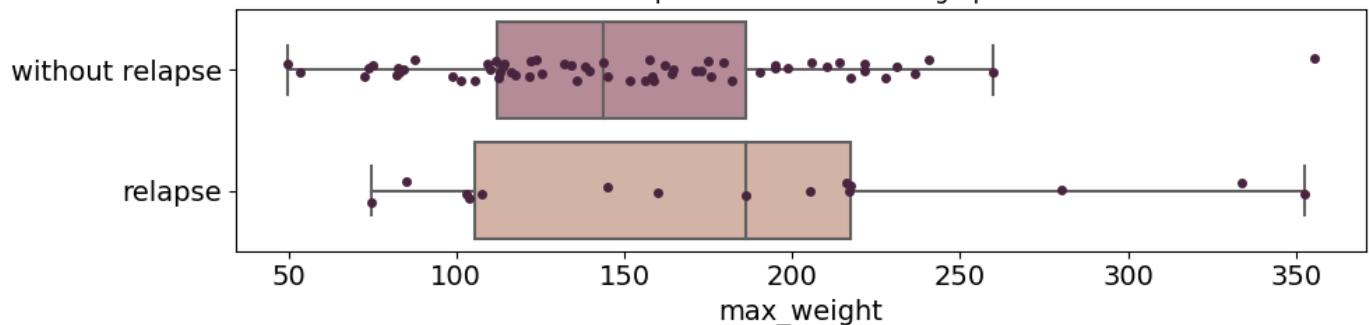
Boxplot of largest\_eigenvalue by Relapse free survival  
PD1 positive cells and EMST graph



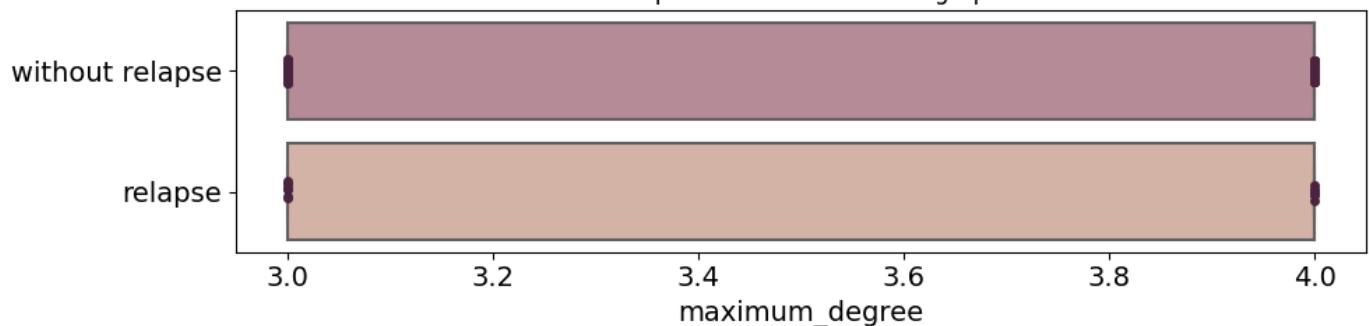
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
PD1 positive cells and EMST graph



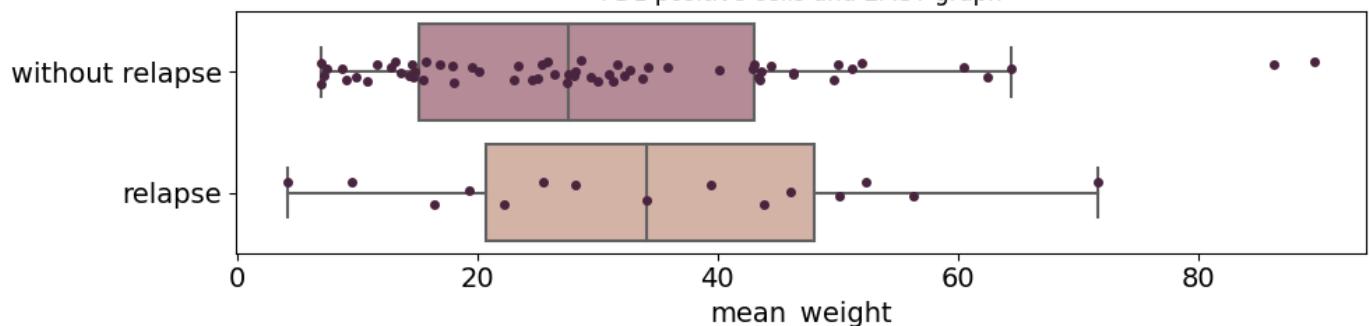
Boxplot of max\_weight by Relapse free survival  
PD1 positive cells and EMST graph



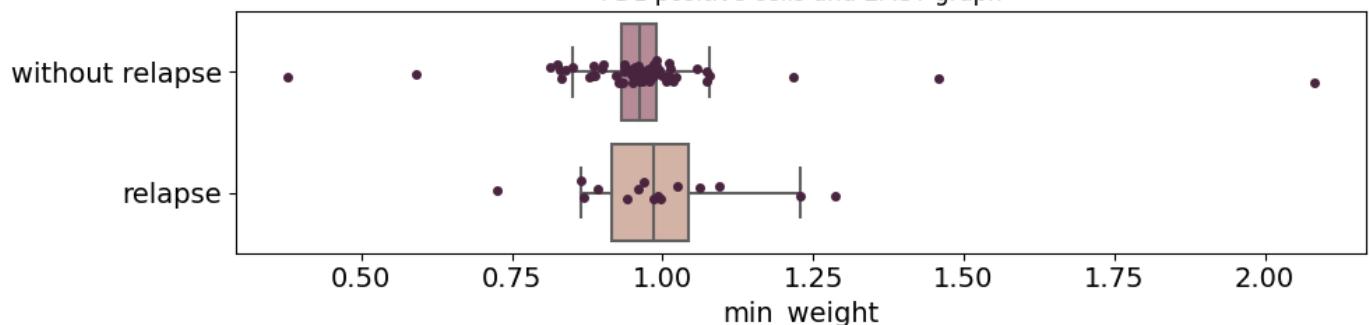
Boxplot of maximum\_degree by Relapse free survival  
PD1 positive cells and EMST graph



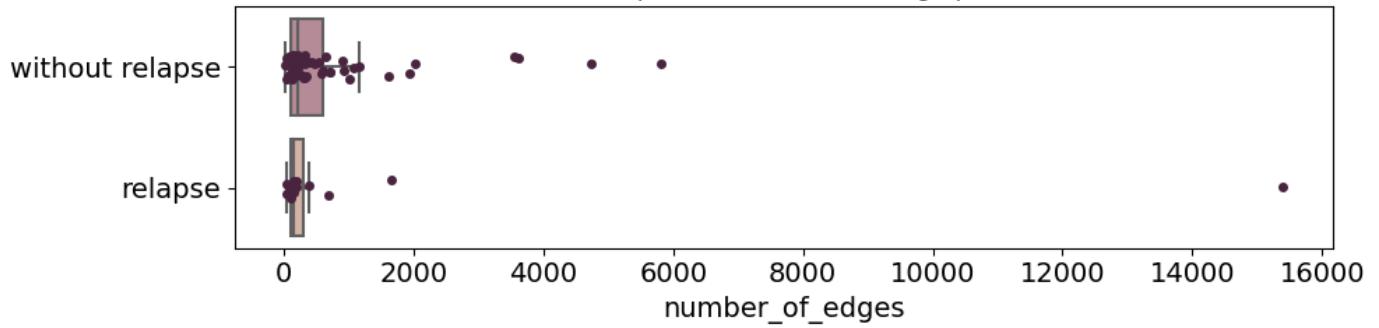
Boxplot of mean\_weight by Relapse free survival  
PD1 positive cells and EMST graph



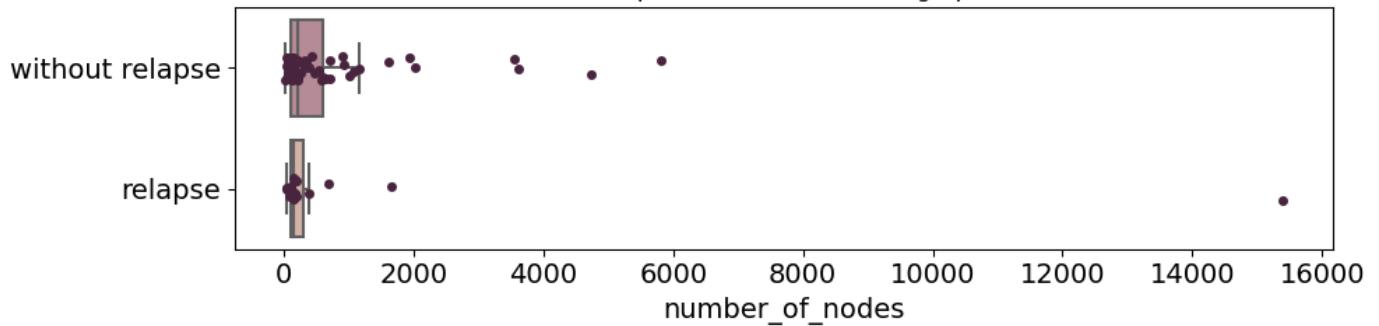
Boxplot of min\_weight by Relapse free survival  
PD1 positive cells and EMST graph



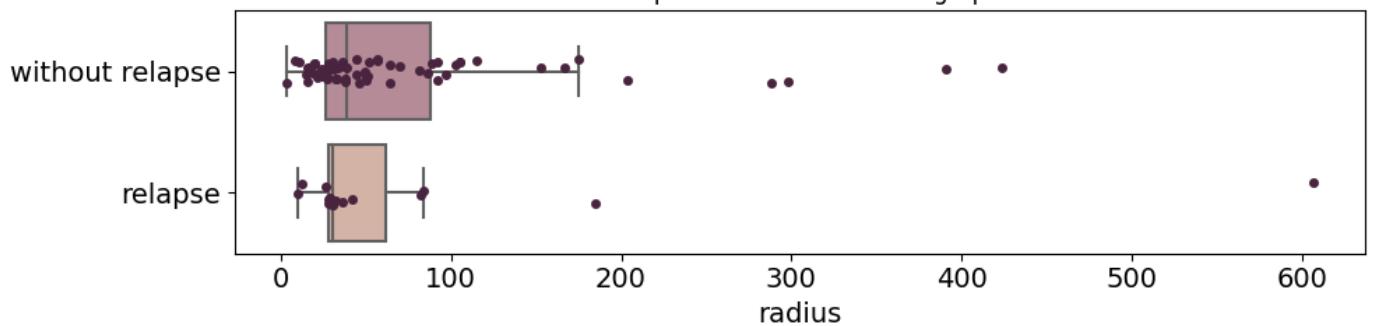
Boxplot of number\_of\_edges by Relapse free survival  
PD1 positive cells and EMST graph



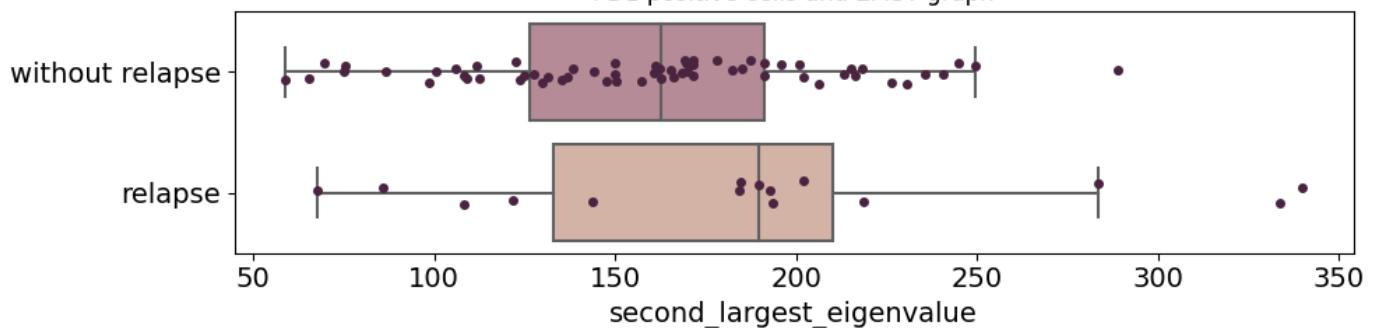
Boxplot of number\_of\_nodes by Relapse free survival  
PD1 positive cells and EMST graph



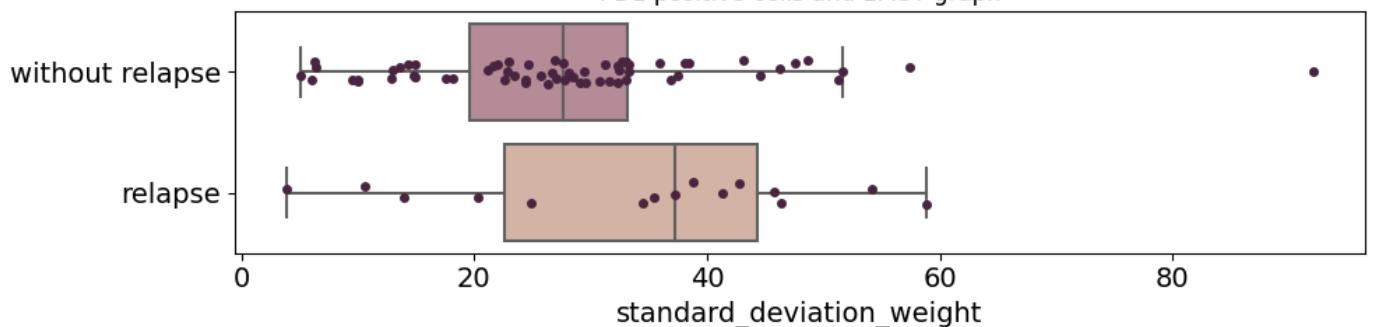
Boxplot of radius by Relapse free survival  
PD1 positive cells and EMST graph

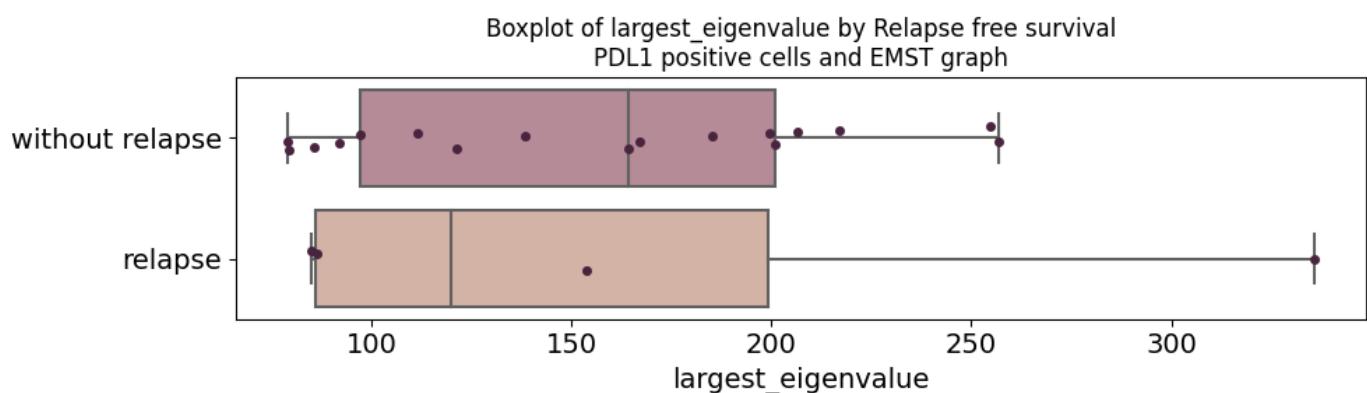
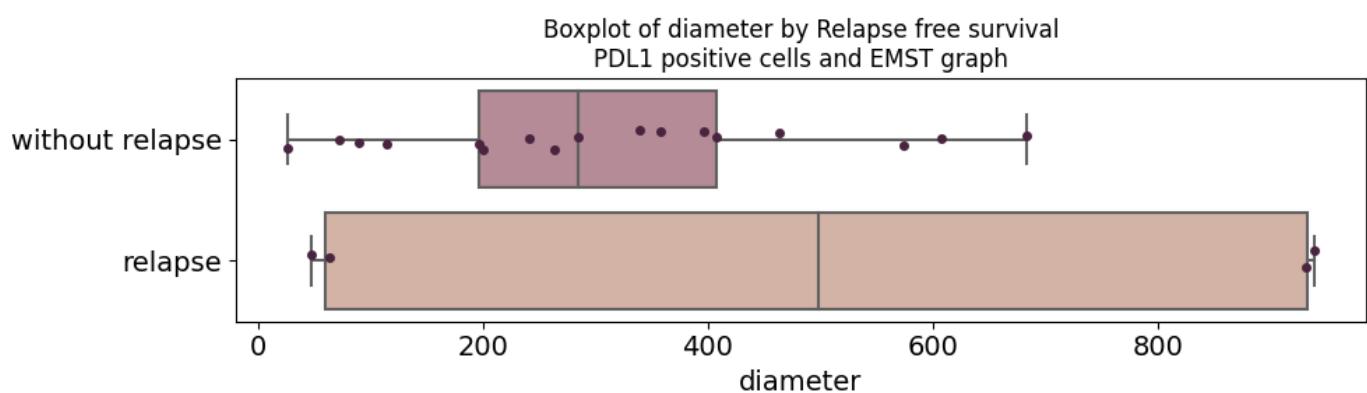
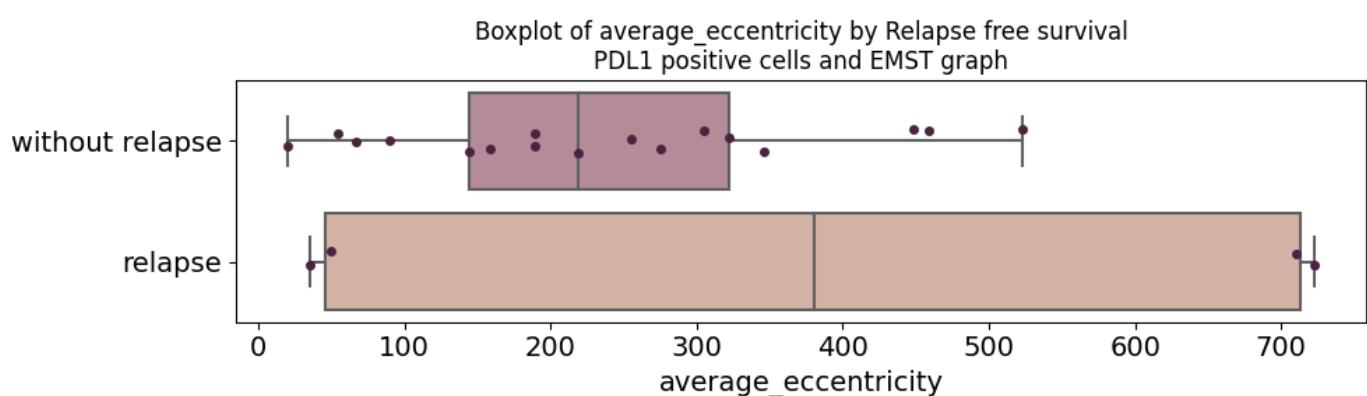
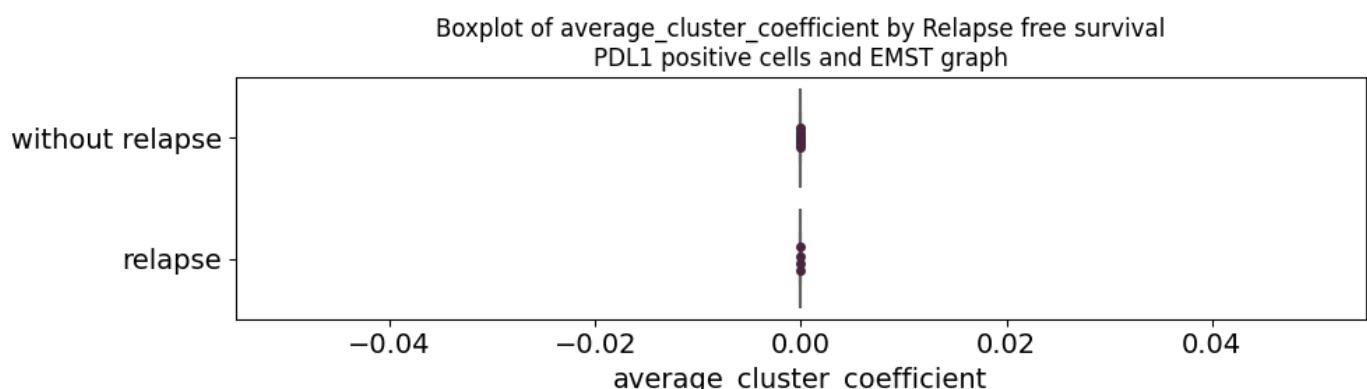
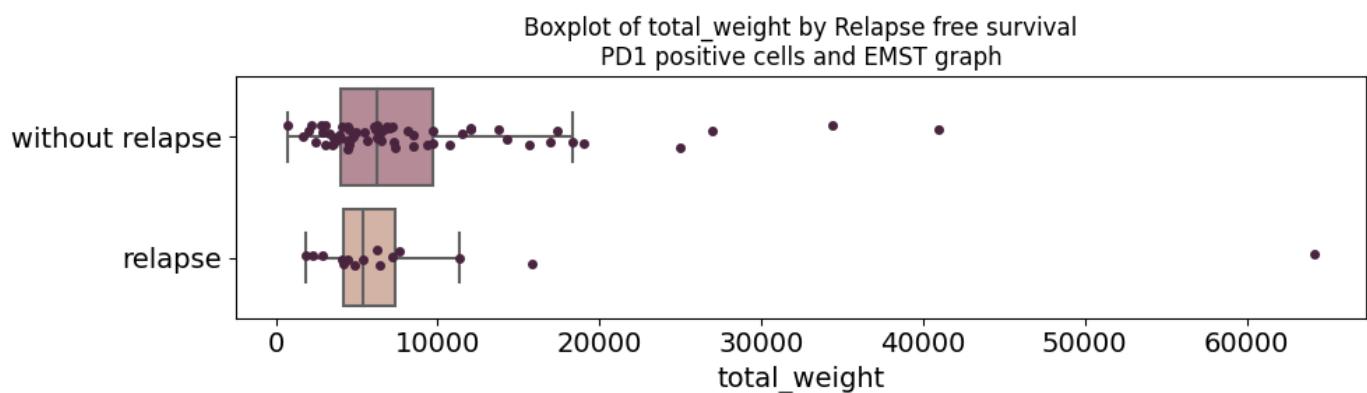


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
PD1 positive cells and EMST graph

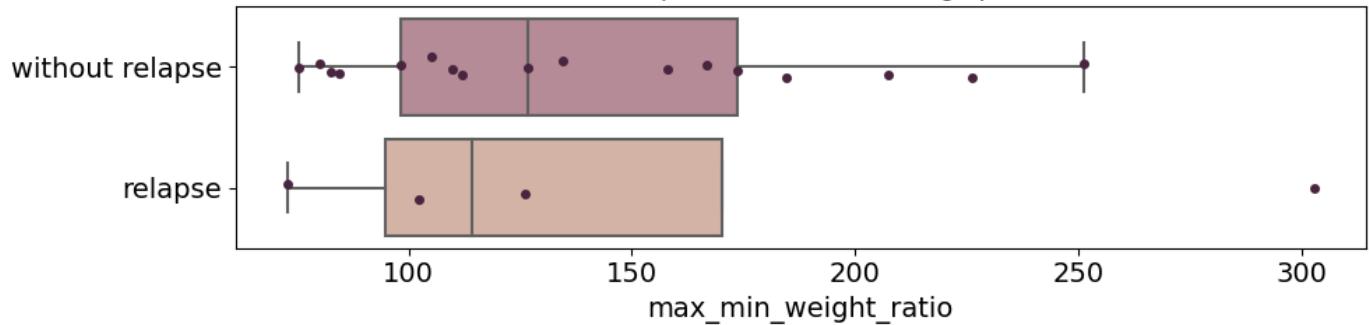


Boxplot of standard\_deviation\_weight by Relapse free survival  
PD1 positive cells and EMST graph

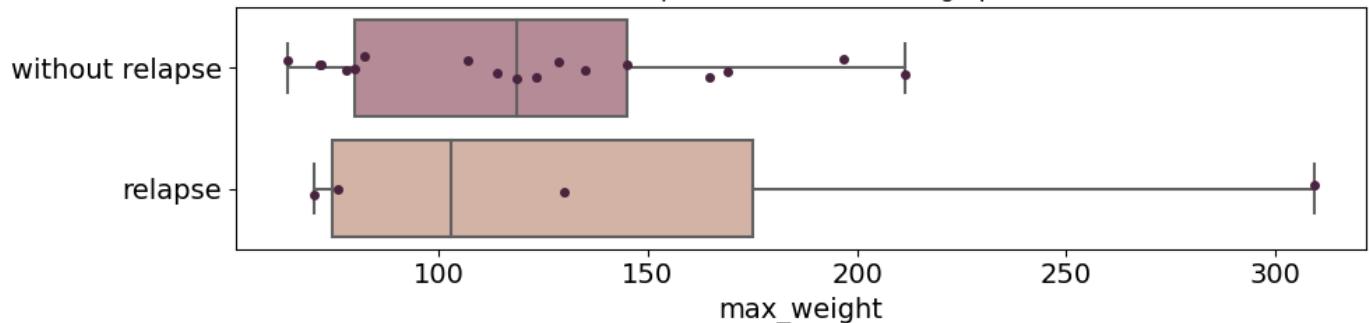




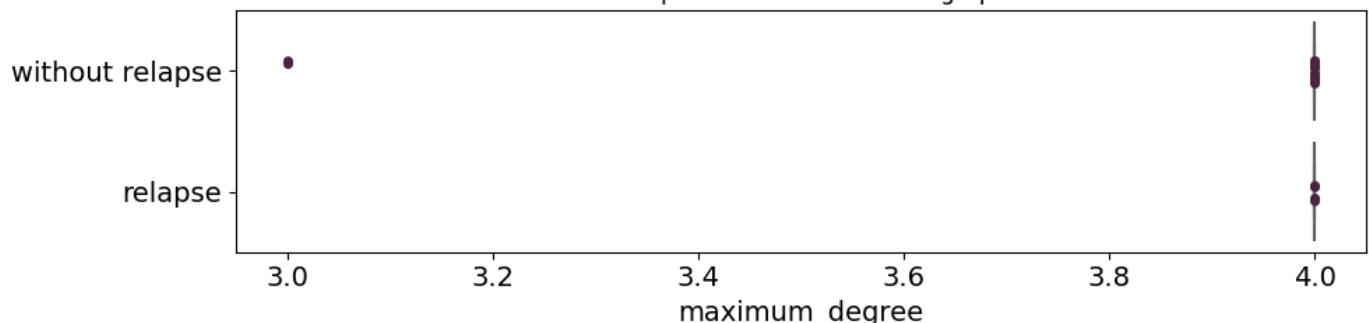
Boxplot of max\_min\_weight\_ratio by Relapse free survival  
PDL1 positive cells and EMST graph



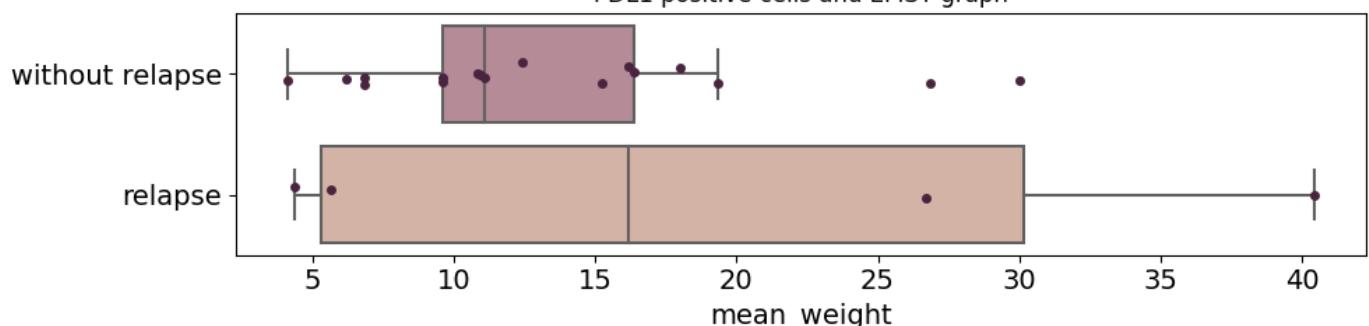
Boxplot of max\_weight by Relapse free survival  
PDL1 positive cells and EMST graph



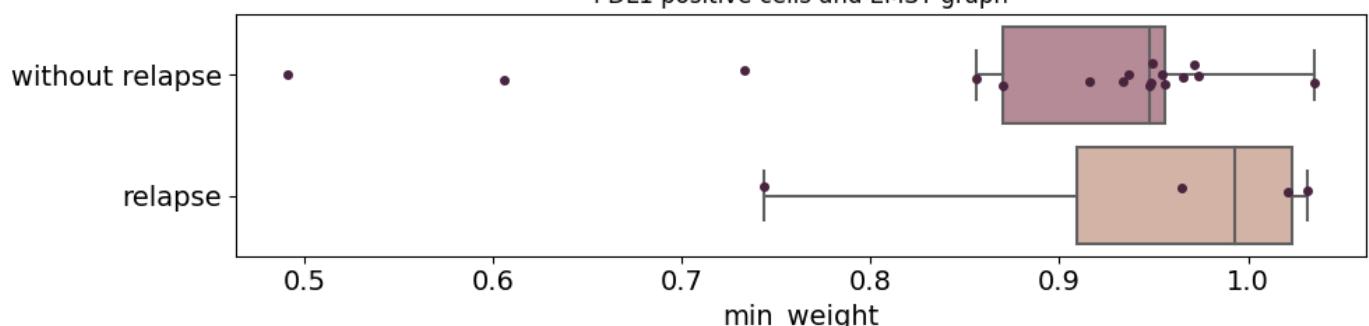
Boxplot of maximum\_degree by Relapse free survival  
PDL1 positive cells and EMST graph



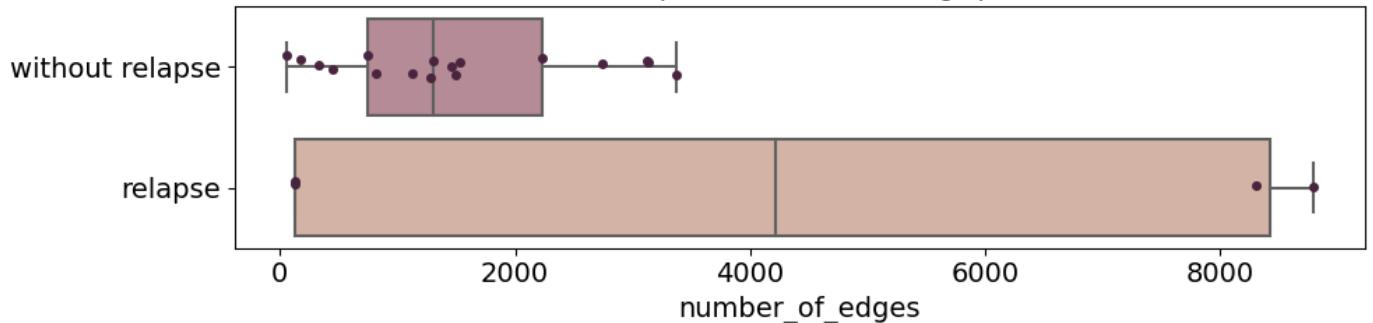
Boxplot of mean\_weight by Relapse free survival  
PDL1 positive cells and EMST graph



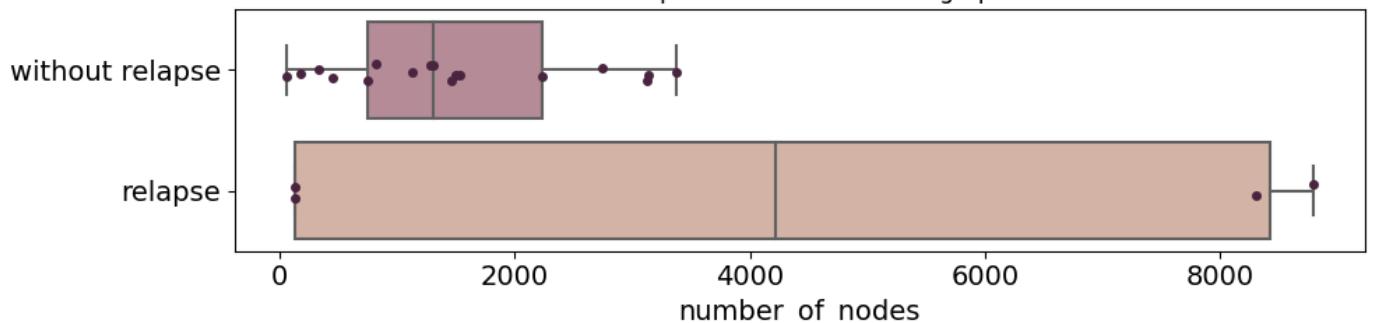
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PDL1 positive cells and EMST graph



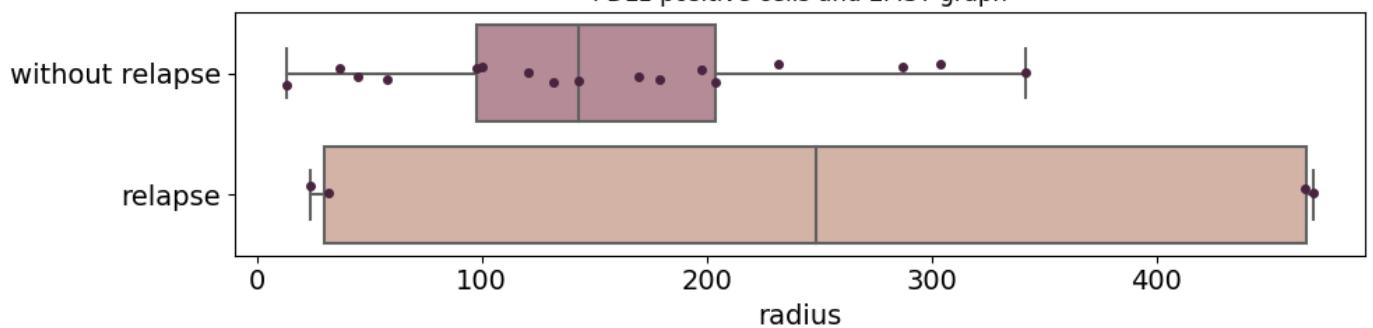
Boxplot of number\_of\_edges by Relapse free survival  
PDL1 positive cells and EMST graph



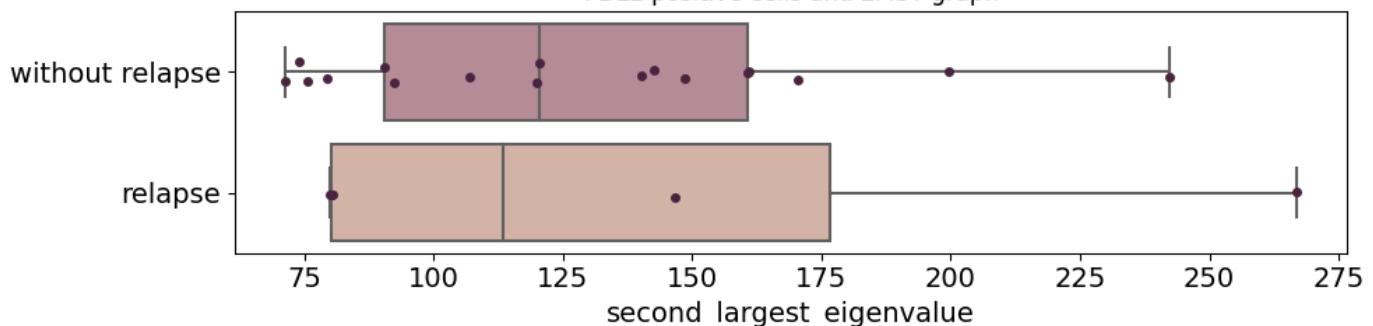
Boxplot of number\_of\_nodes by Relapse free survival  
PDL1 positive cells and EMST graph



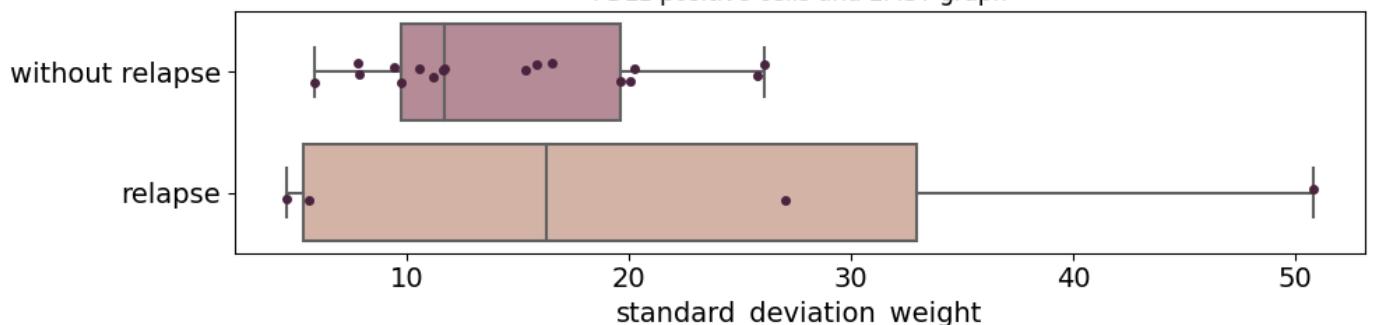
Boxplot of radius by Relapse free survival  
PDL1 positive cells and EMST graph

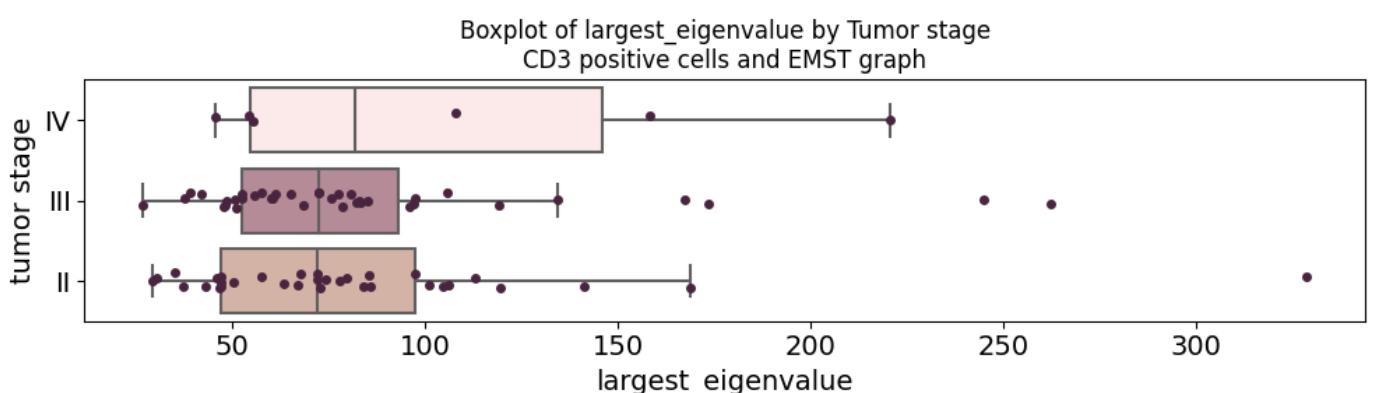
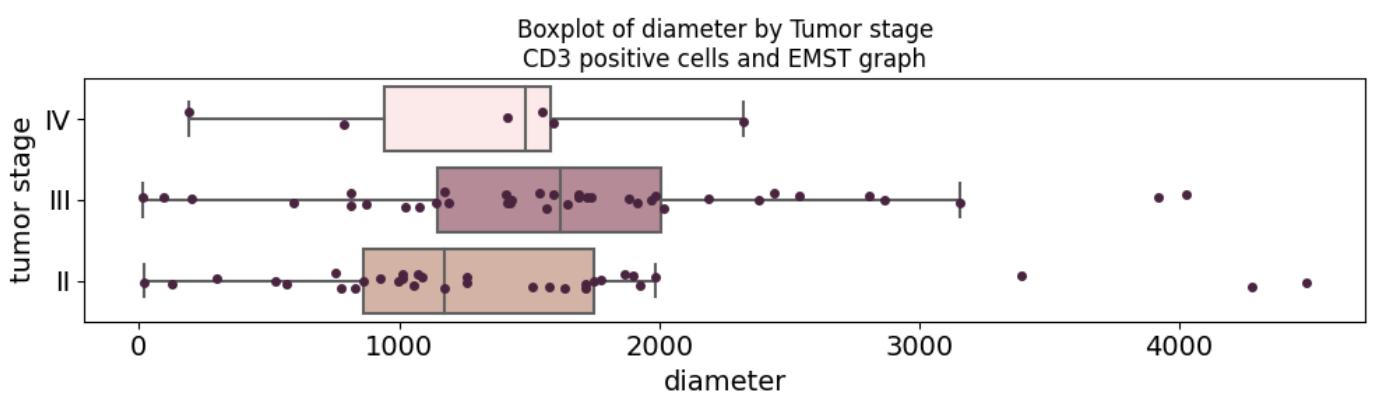
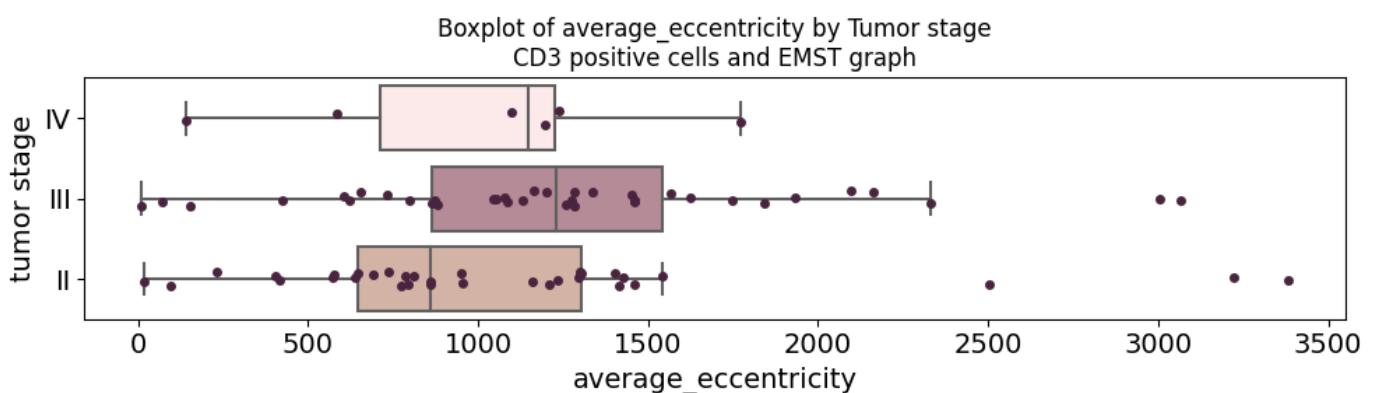
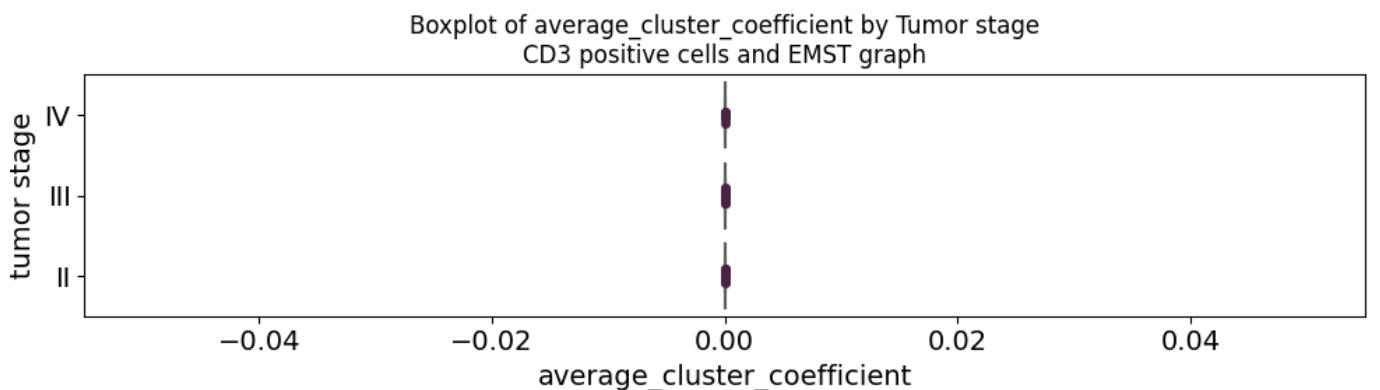
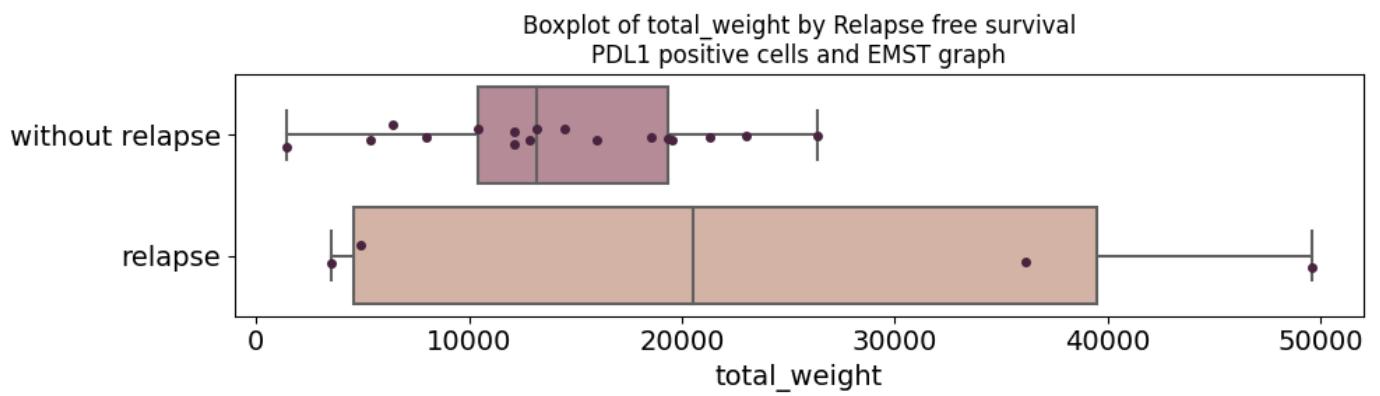


Boxplot of second\_largest\_eigenvalue by Relapse free survival  
PDL1 positive cells and EMST graph

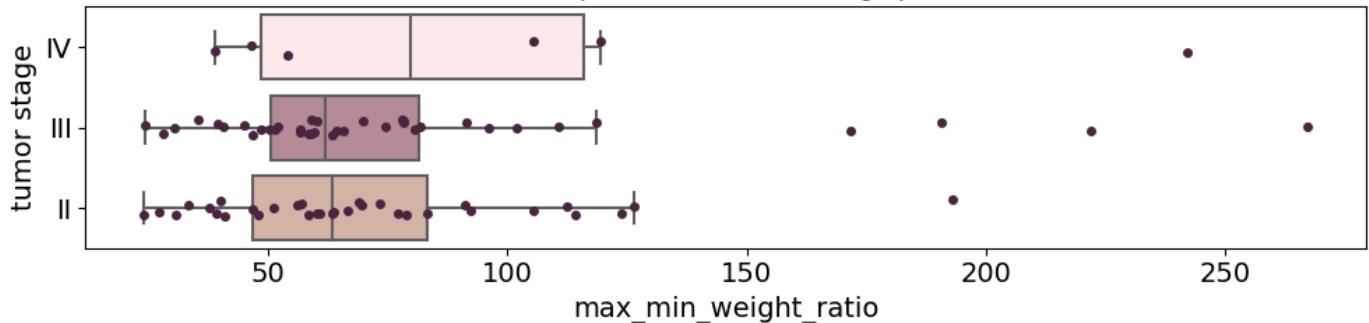


Boxplot of standard\_deviation\_weight by Relapse free survival  
PDL1 positive cells and EMST graph

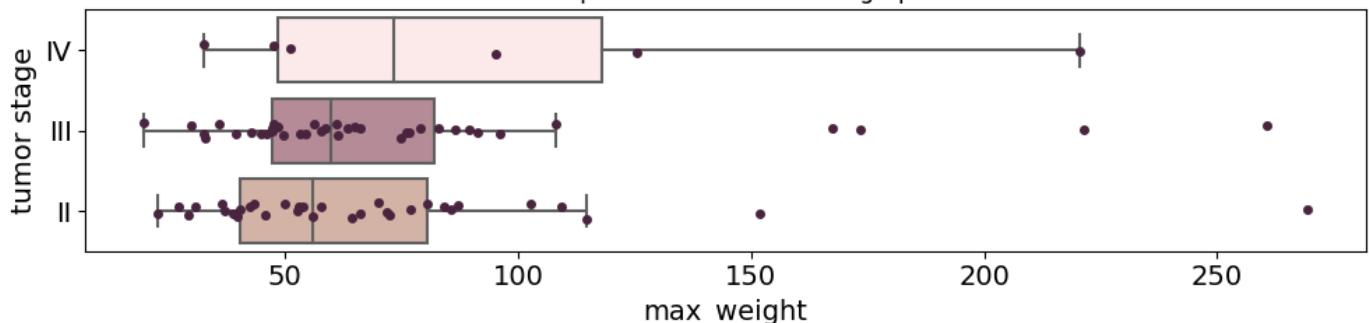




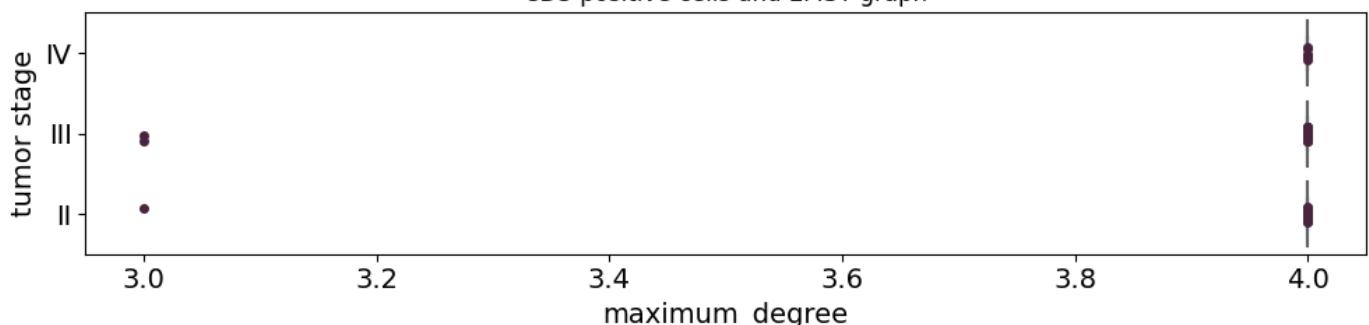
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD3 positive cells and EMST graph



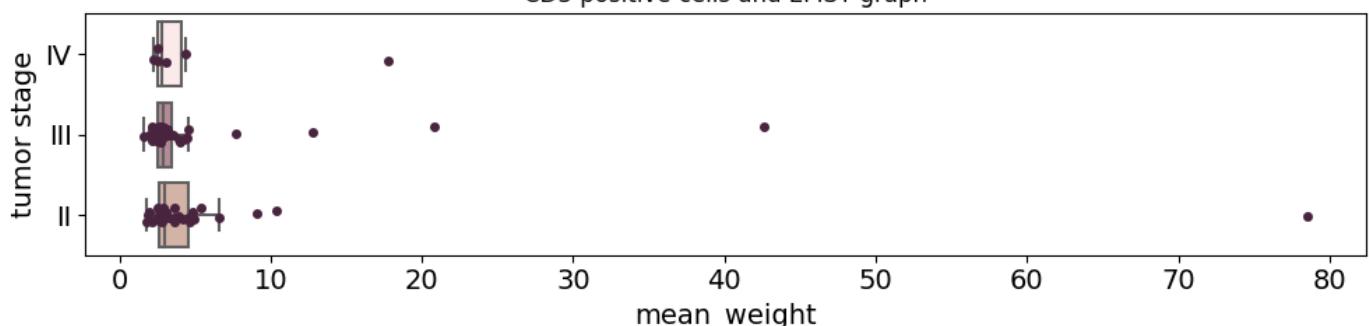
Boxplot of max\_weight by Tumor stage  
CD3 positive cells and EMST graph



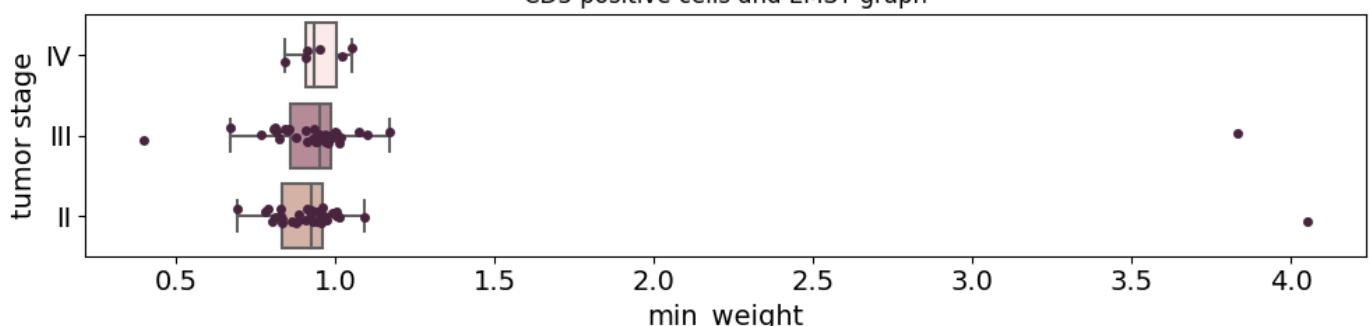
Boxplot of maximum\_degree by Tumor stage  
CD3 positive cells and EMST graph



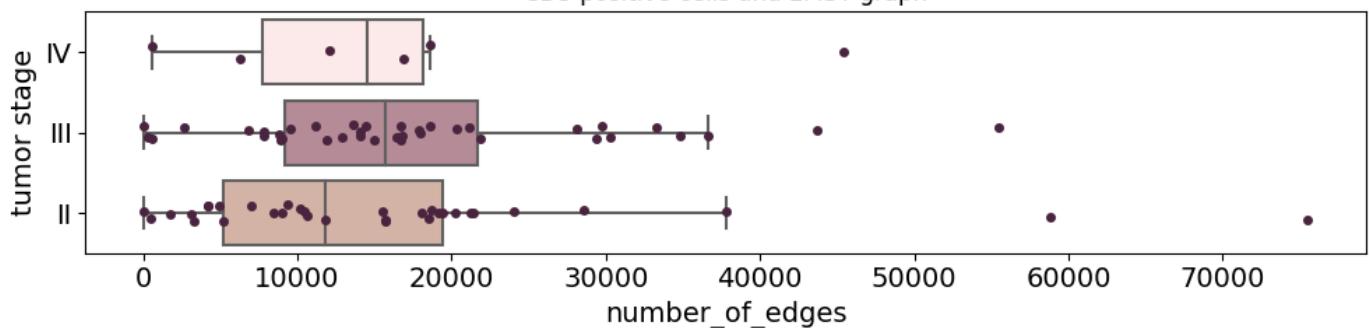
Boxplot of mean\_weight by Tumor stage  
CD3 positive cells and EMST graph



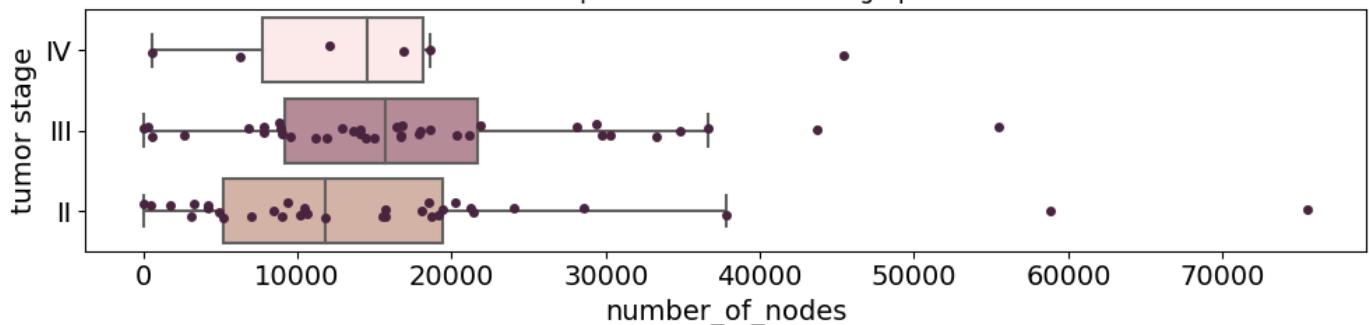
Boxplot of min\_weight by Tumor stage  
CD3 positive cells and EMST graph



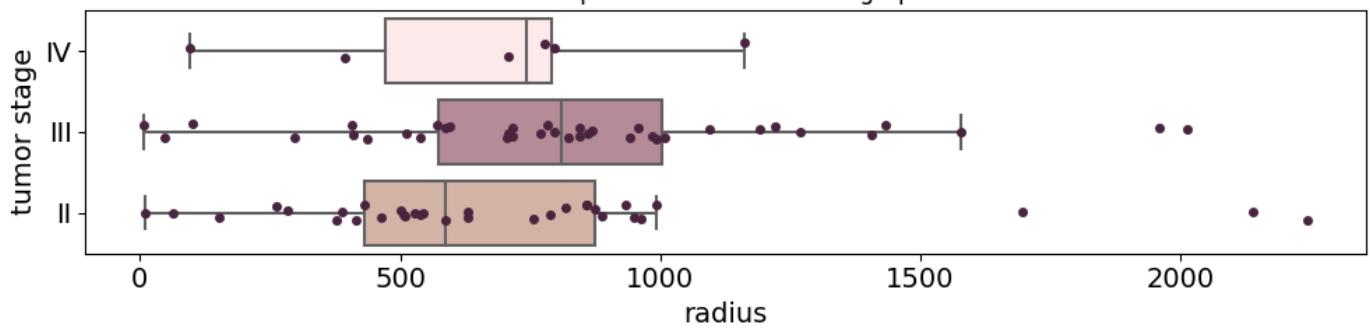
Boxplot of number\_of\_edges by Tumor stage  
CD3 positive cells and EMST graph



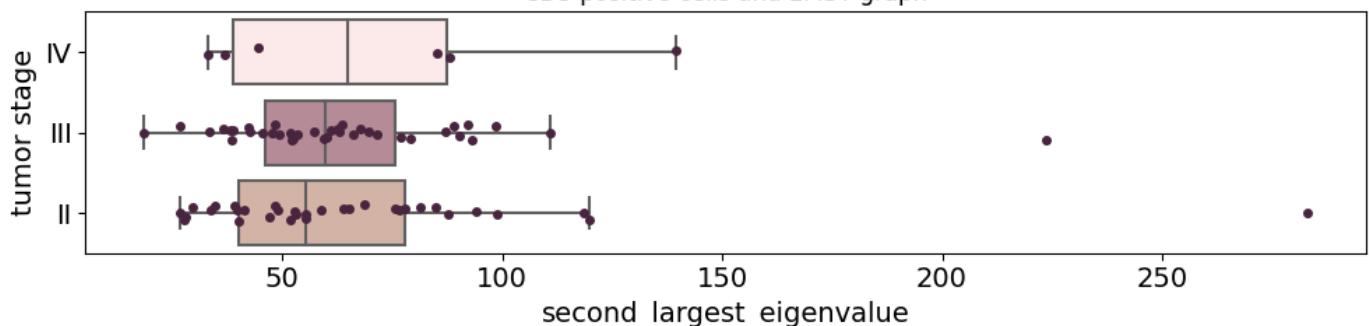
Boxplot of number\_of\_nodes by Tumor stage  
CD3 positive cells and EMST graph



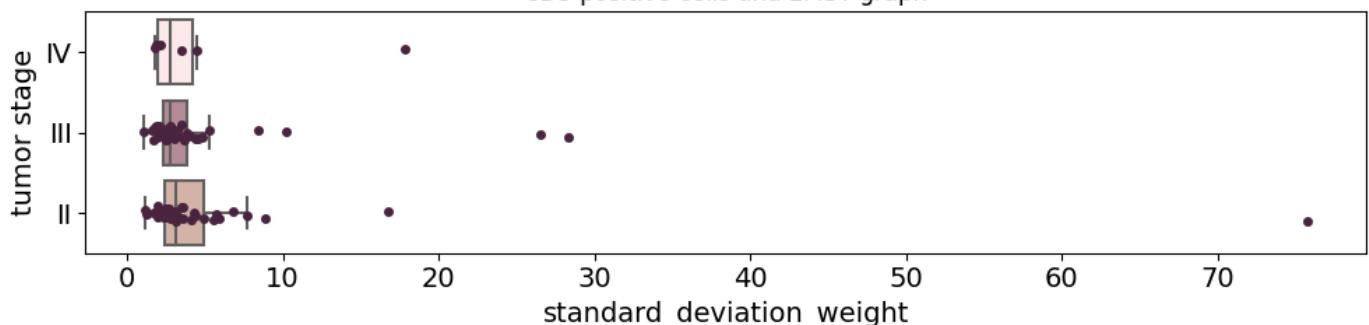
Boxplot of radius by Tumor stage  
CD3 positive cells and EMST graph

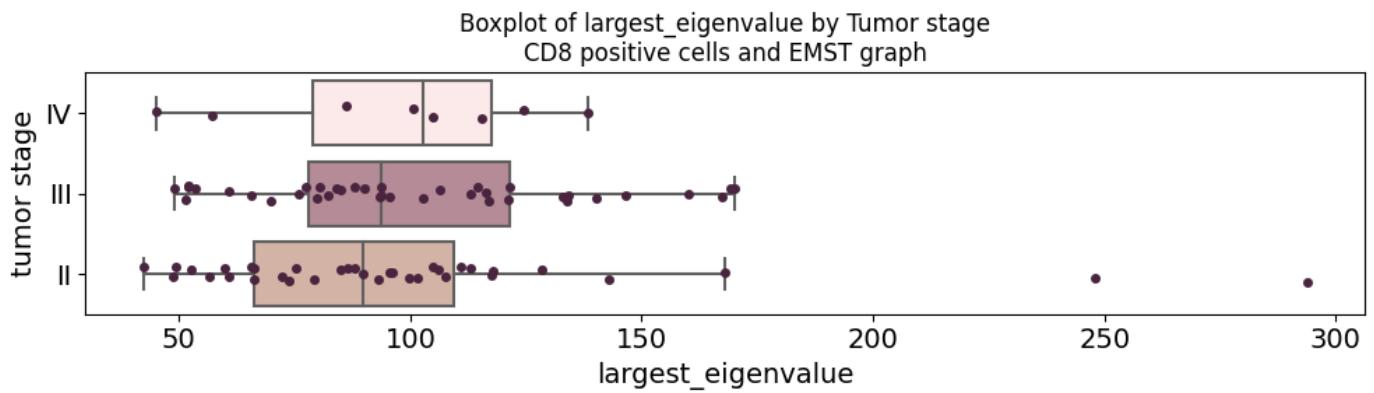
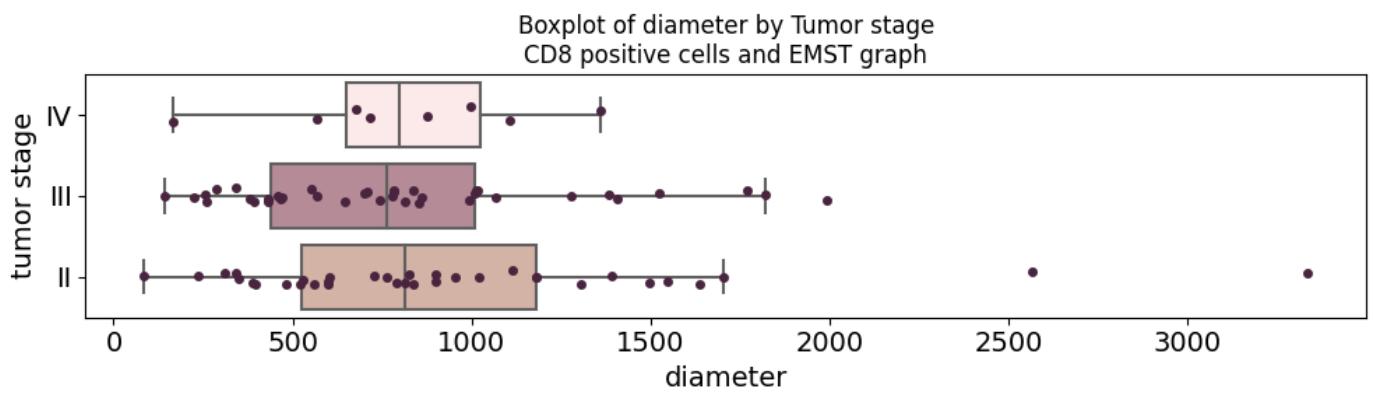
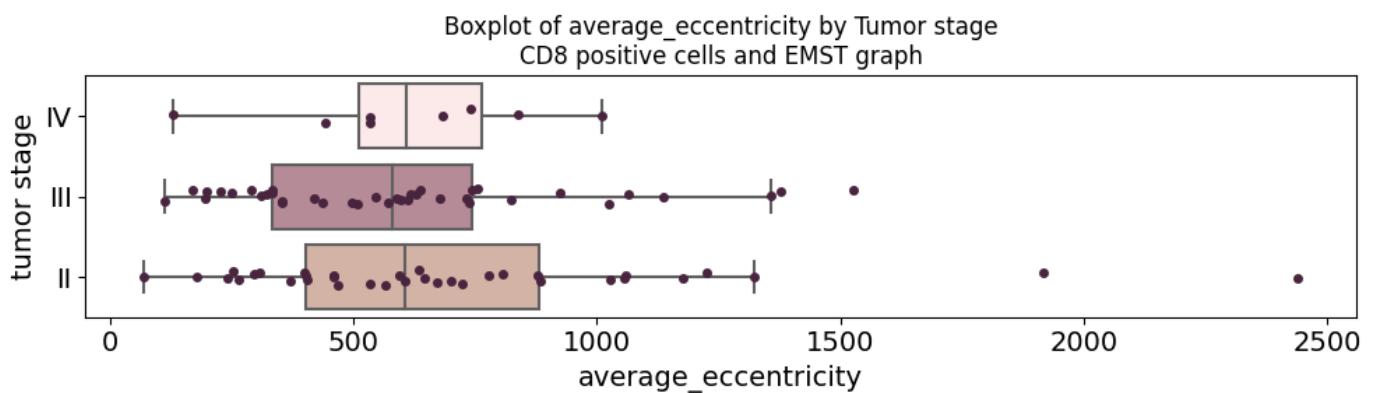
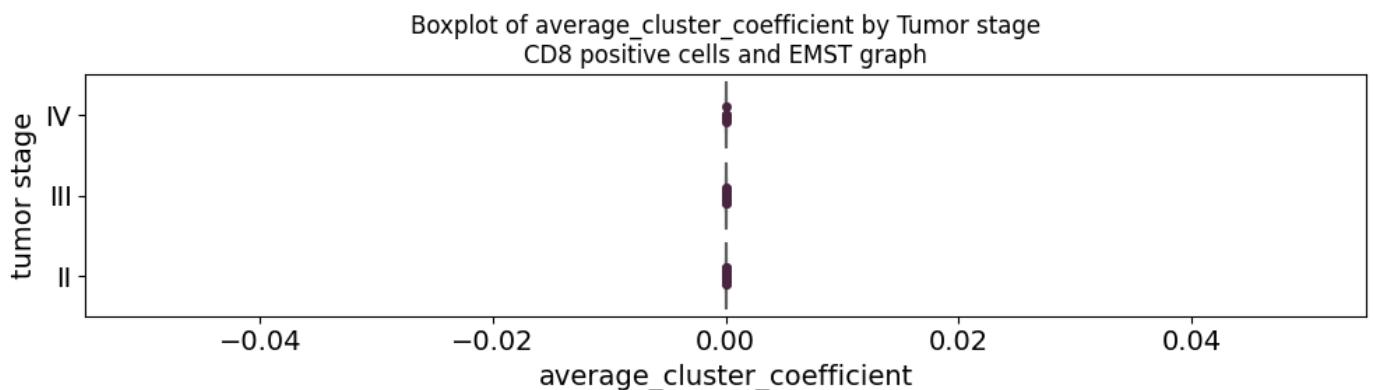
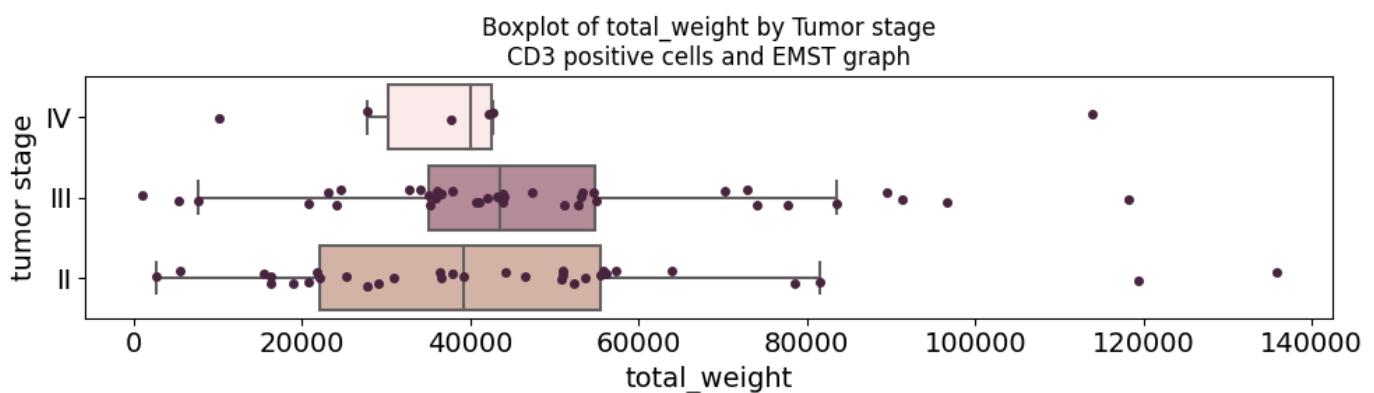


Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD3 positive cells and EMST graph

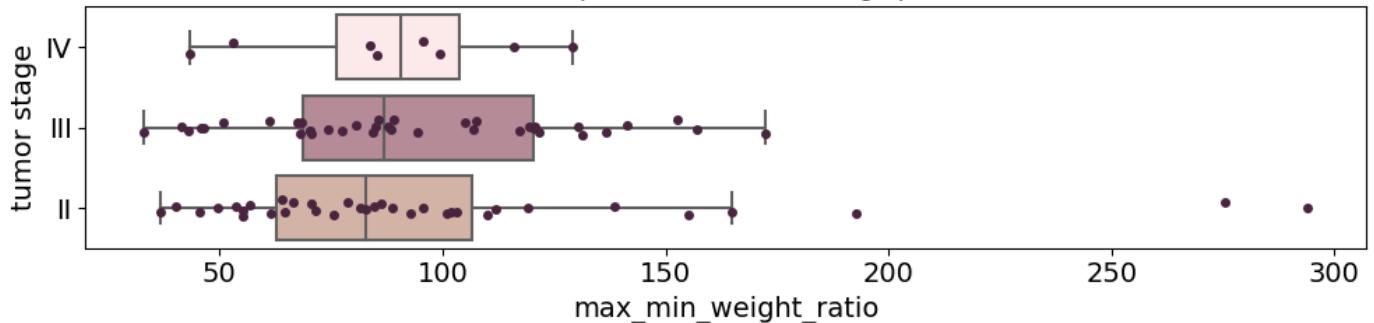


Boxplot of standard\_deviation\_weight by Tumor stage  
CD3 positive cells and EMST graph

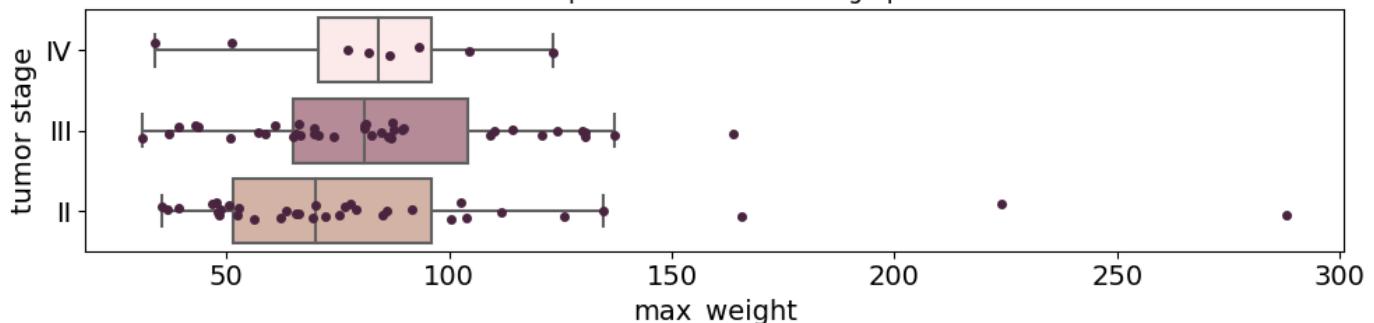




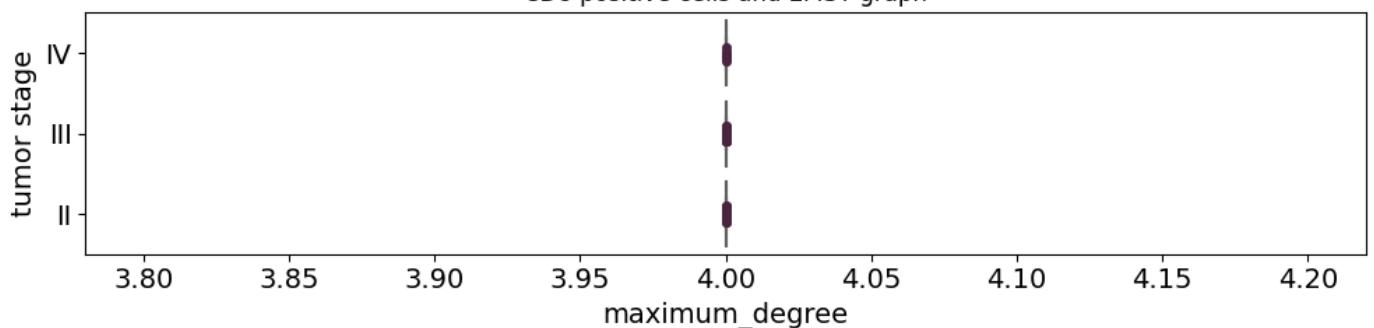
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD8 positive cells and EMST graph



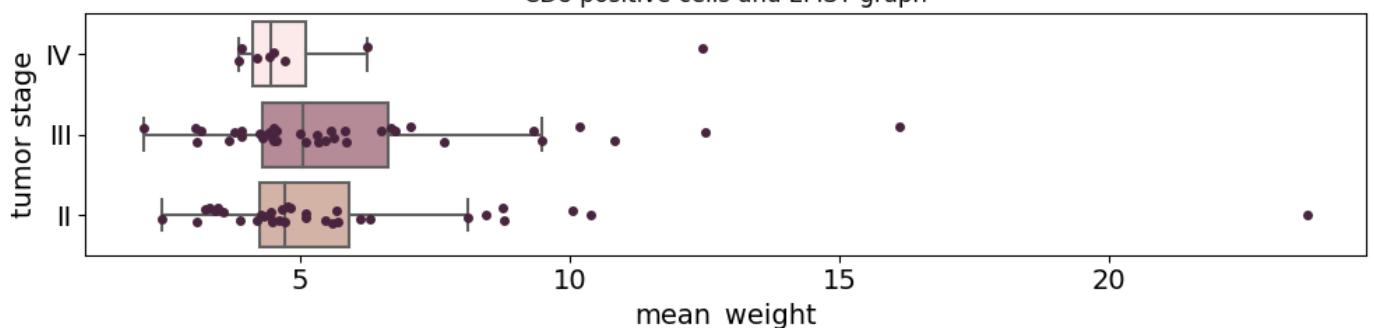
Boxplot of max\_weight by Tumor stage  
CD8 positive cells and EMST graph



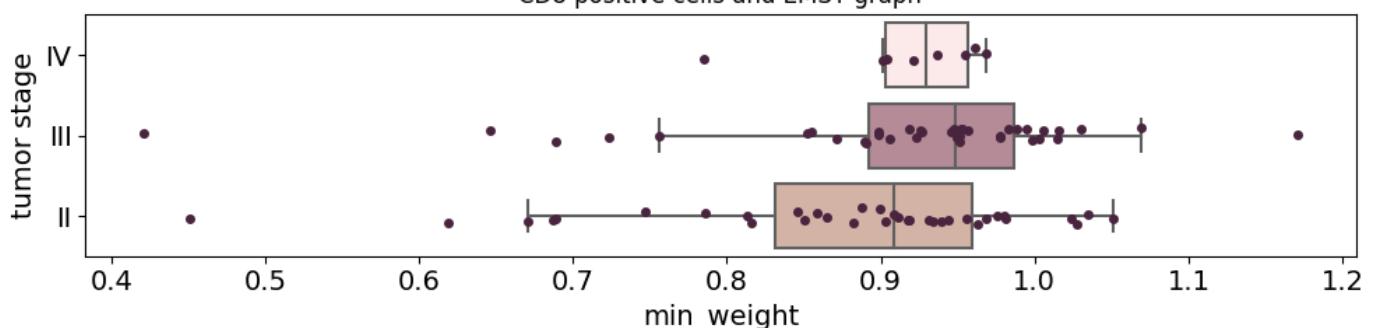
Boxplot of maximum\_degree by Tumor stage  
CD8 positive cells and EMST graph



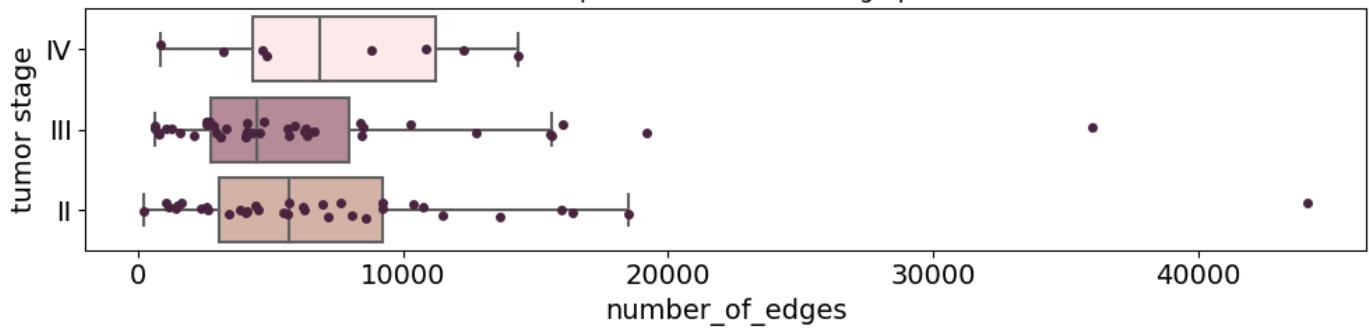
Boxplot of mean\_weight by Tumor stage  
CD8 positive cells and EMST graph



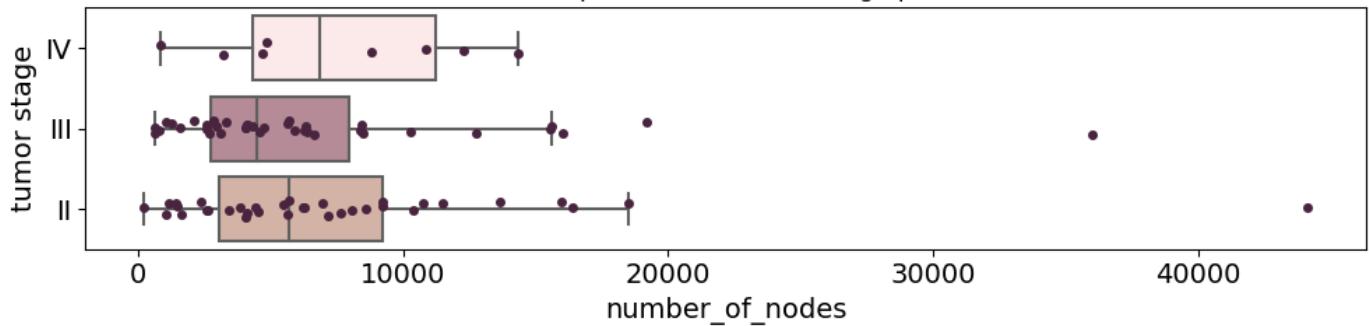
Boxplot of min\_weight by Tumor stage  
CD8 positive cells and EMST graph



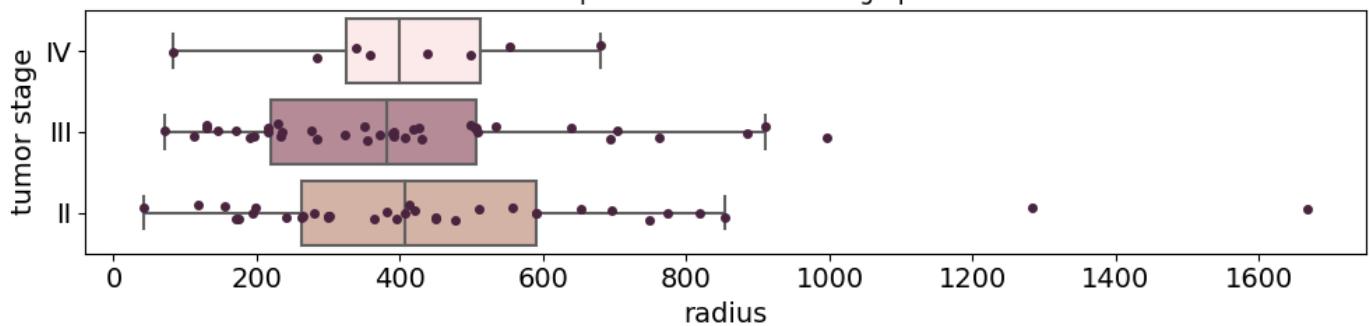
Boxplot of number\_of\_edges by Tumor stage  
CD8 positive cells and EMST graph



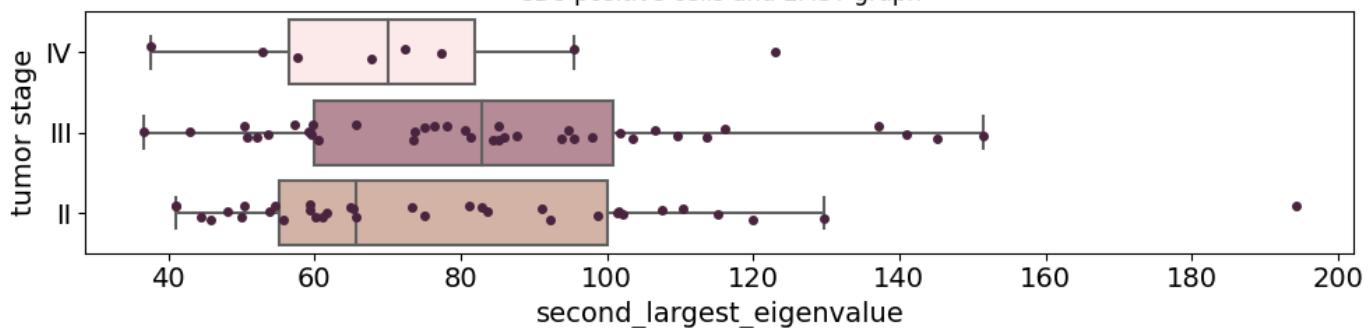
Boxplot of number\_of\_nodes by Tumor stage  
CD8 positive cells and EMST graph



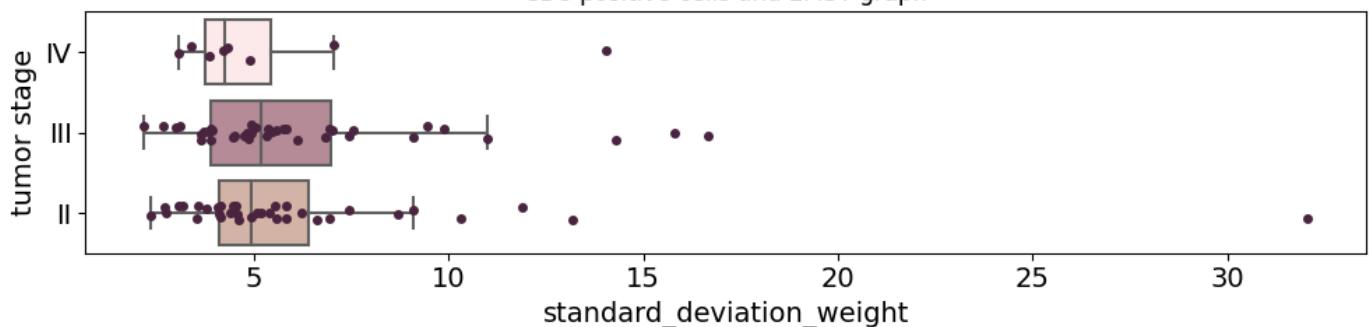
Boxplot of radius by Tumor stage  
CD8 positive cells and EMST graph



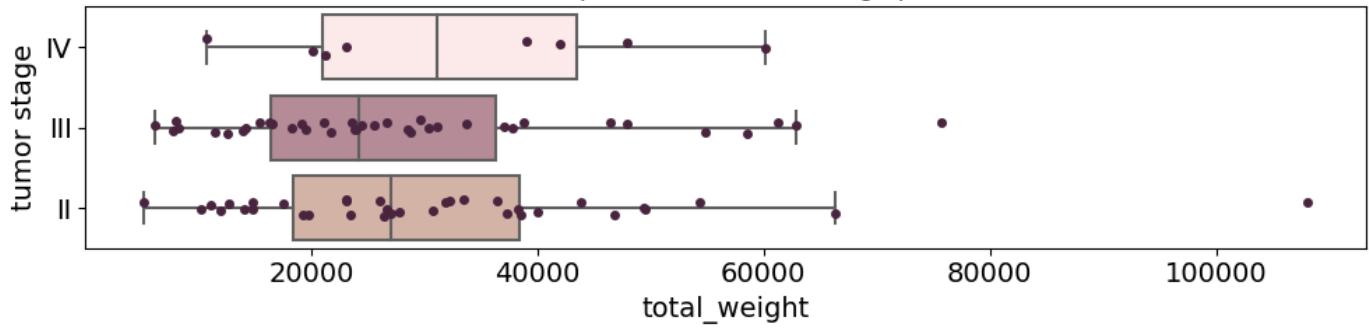
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD8 positive cells and EMST graph



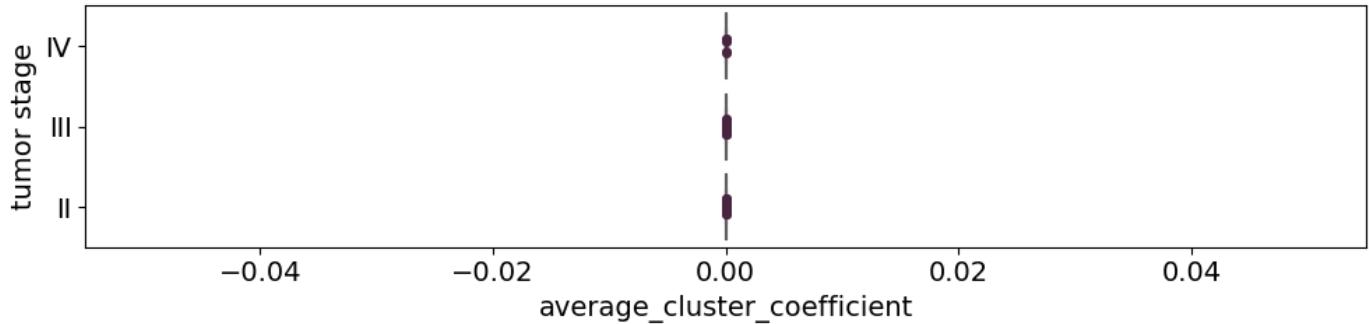
Boxplot of standard\_deviation\_weight by Tumor stage  
CD8 positive cells and EMST graph



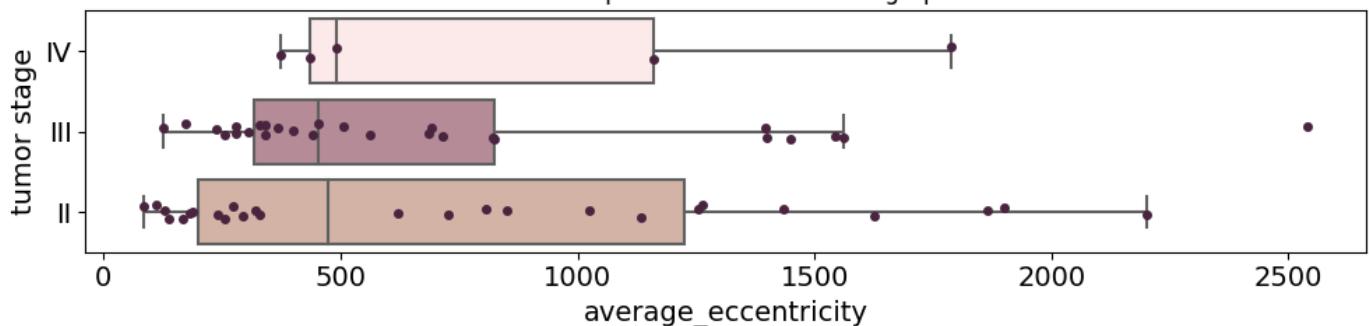
Boxplot of total\_weight by Tumor stage  
CD8 positive cells and EMST graph



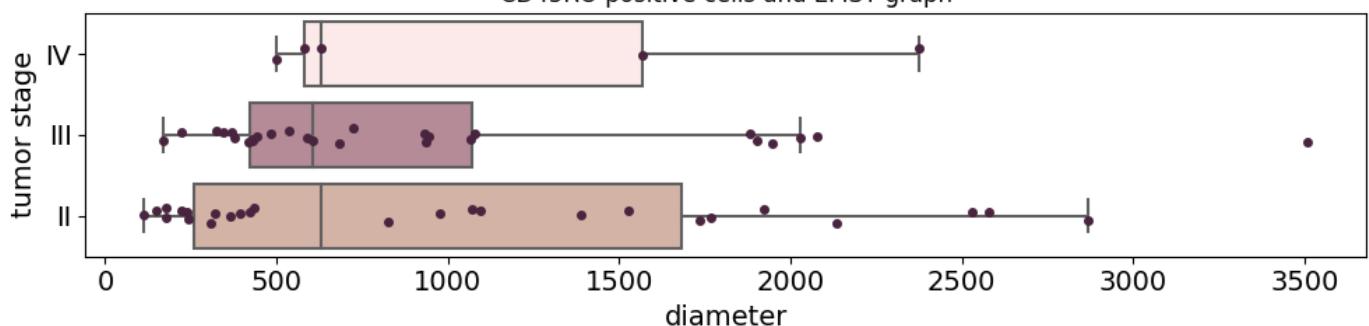
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD45RO positive cells and EMST graph



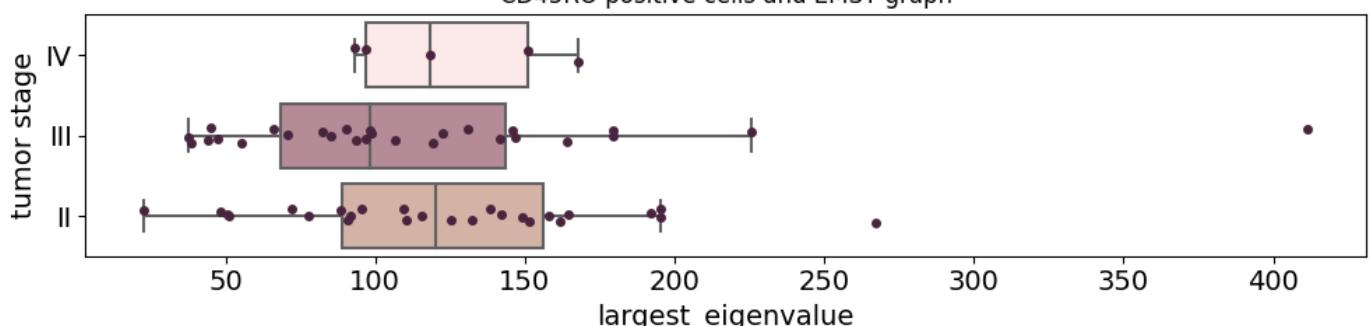
Boxplot of average\_eccentricity by Tumor stage  
CD45RO positive cells and EMST graph



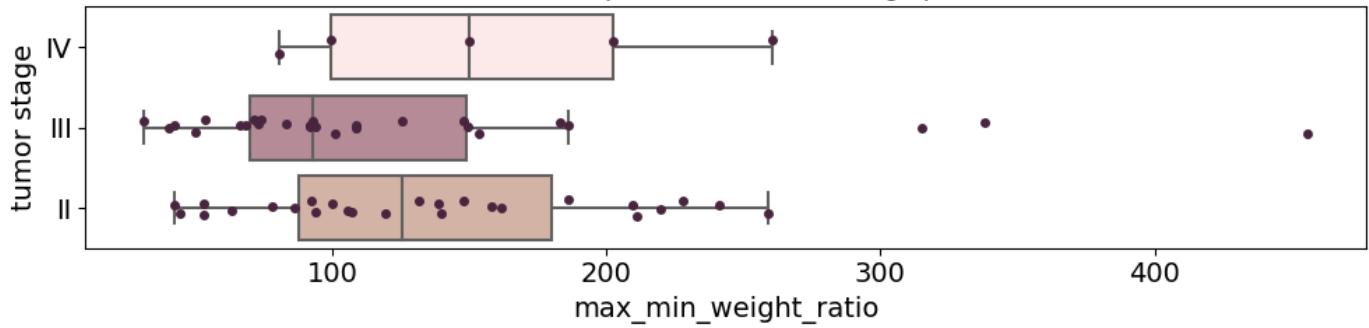
Boxplot of diameter by Tumor stage  
CD45RO positive cells and EMST graph



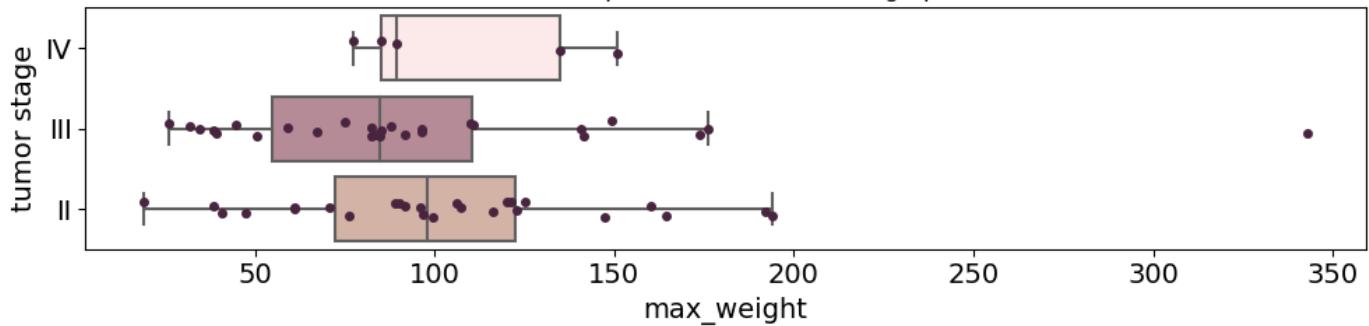
Boxplot of largest\_eigenvalue by Tumor stage  
CD45RO positive cells and EMST graph



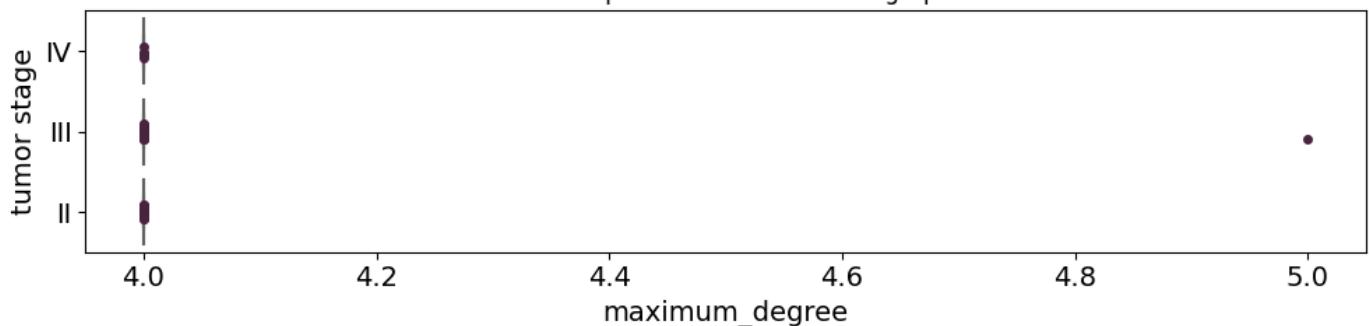
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CD45RO positive cells and EMST graph



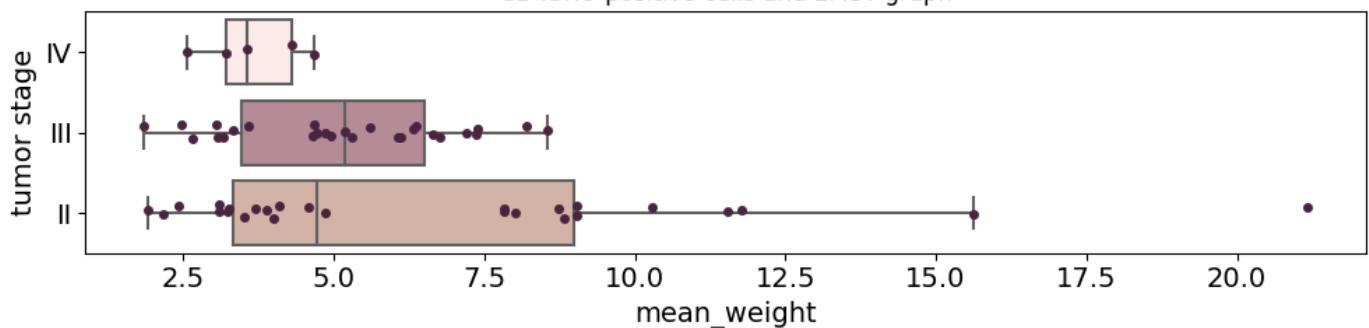
Boxplot of max\_weight by Tumor stage  
CD45RO positive cells and EMST graph



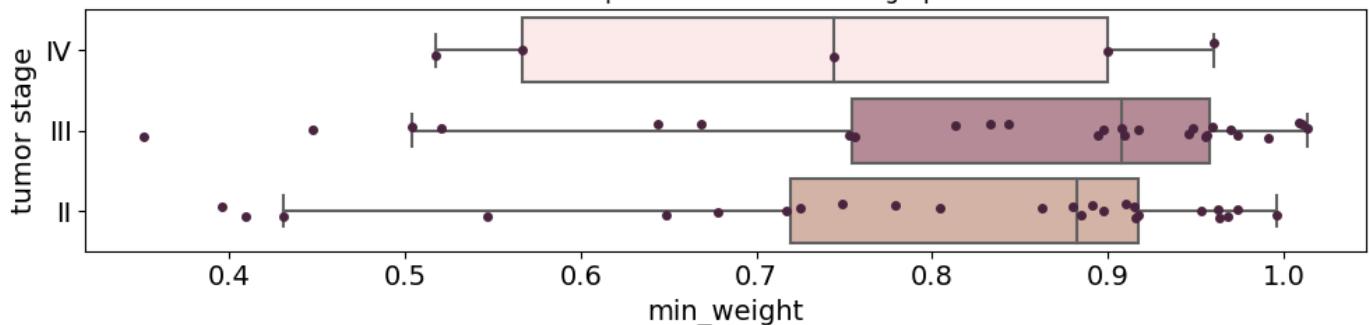
Boxplot of maximum\_degree by Tumor stage  
CD45RO positive cells and EMST graph



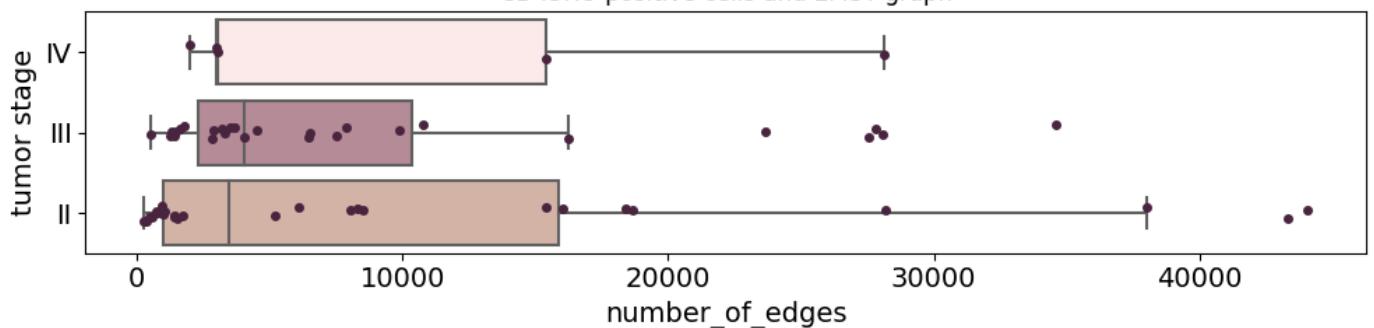
Boxplot of mean\_weight by Tumor stage  
CD45RO positive cells and EMST graph



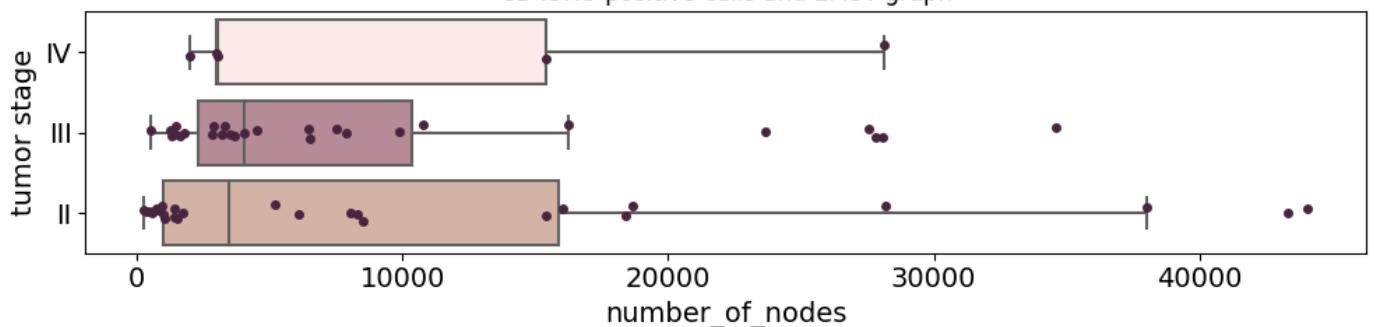
Boxplot of min\_weight by Tumor stage  
CD45RO positive cells and EMST graph



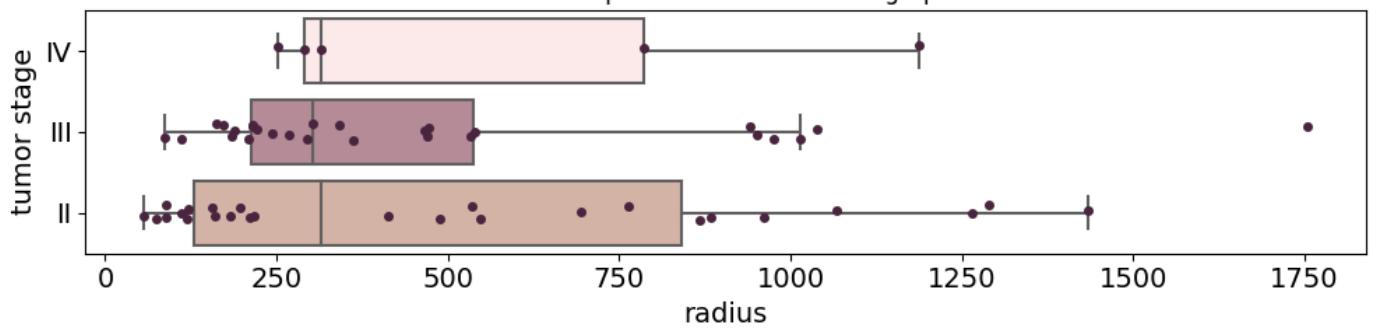
Boxplot of number\_of\_edges by Tumor stage  
CD45RO positive cells and EMST graph



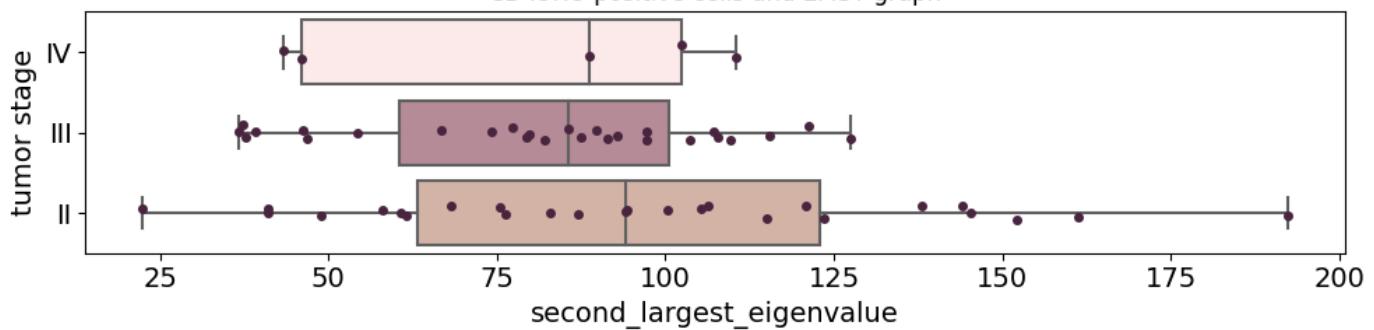
Boxplot of number\_of\_nodes by Tumor stage  
CD45RO positive cells and EMST graph



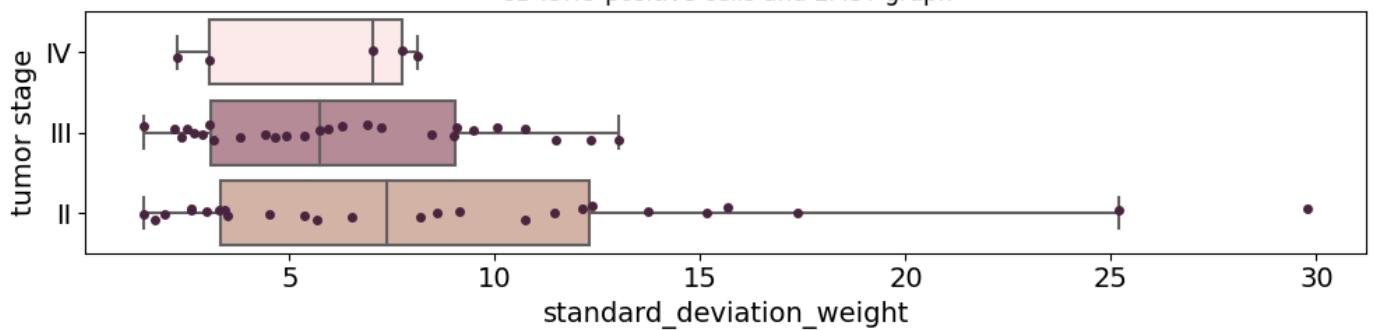
Boxplot of radius by Tumor stage  
CD45RO positive cells and EMST graph



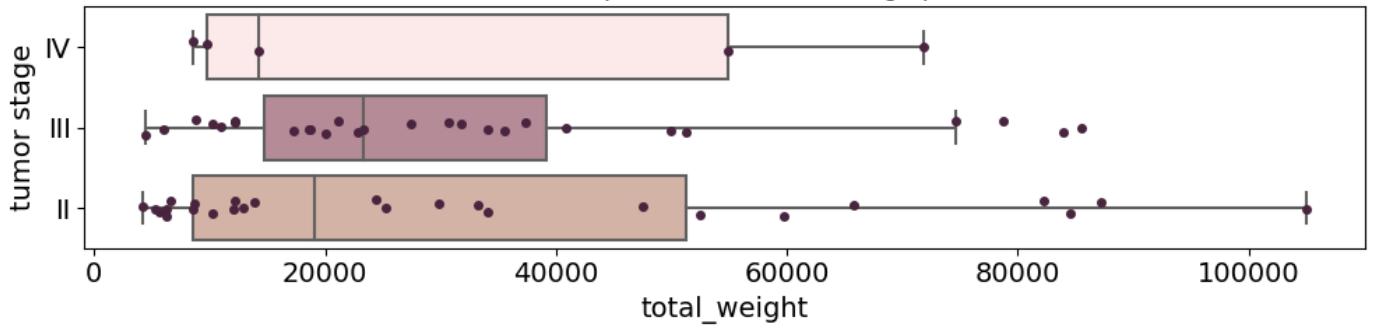
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD45RO positive cells and EMST graph



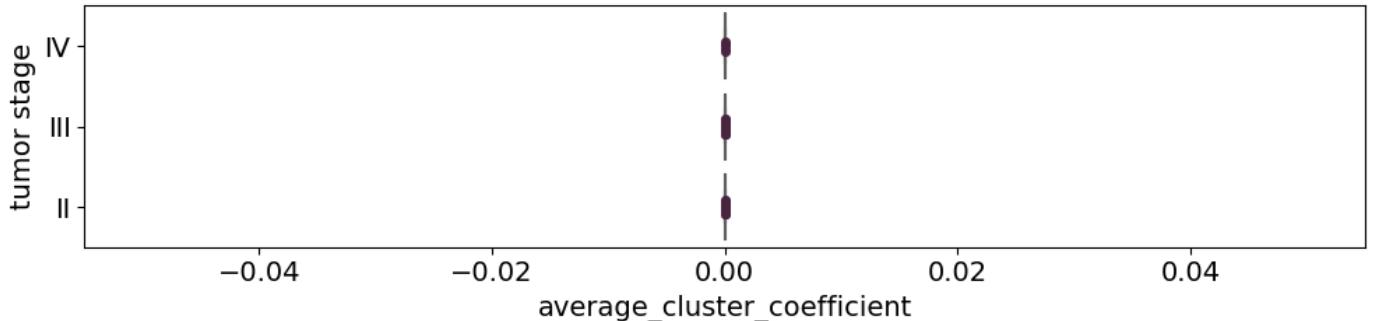
Boxplot of standard\_deviation\_weight by Tumor stage  
CD45RO positive cells and EMST graph



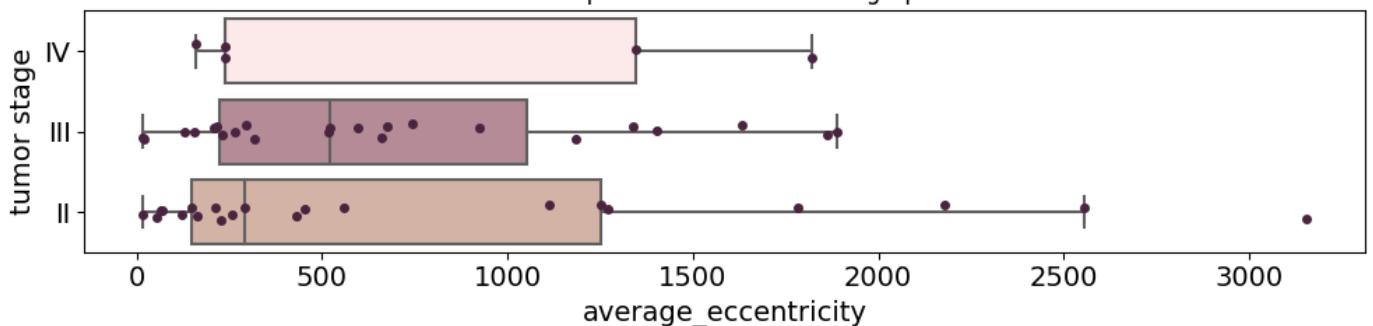
Boxplot of total\_weight by Tumor stage  
CD45RO positive cells and EMST graph



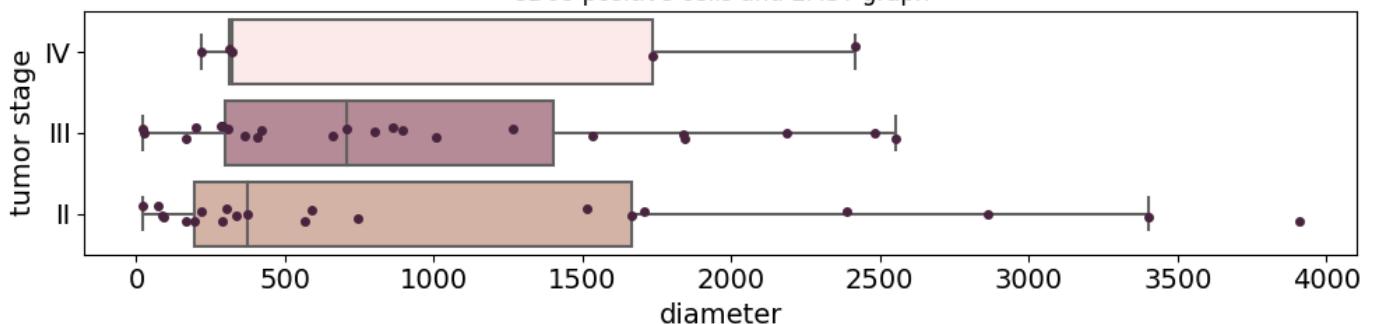
Boxplot of average\_cluster\_coefficient by Tumor stage  
CD68 positive cells and EMST graph



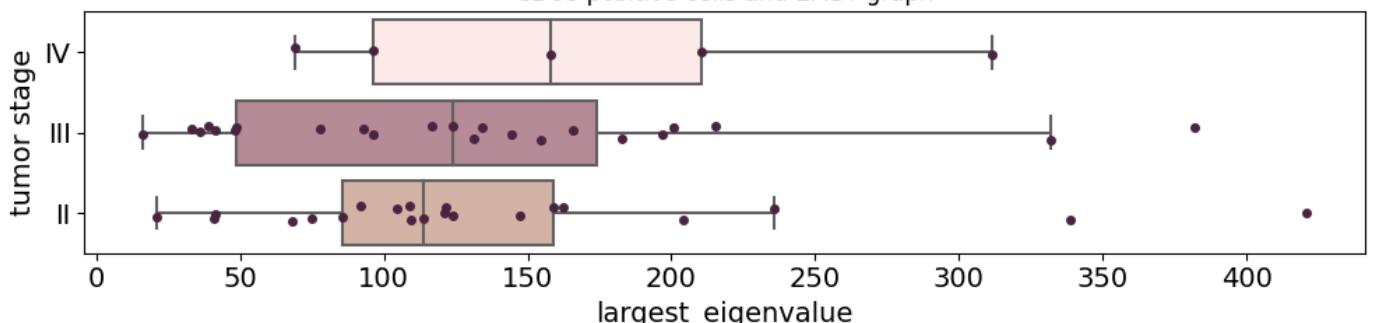
Boxplot of average\_eccentricity by Tumor stage  
CD68 positive cells and EMST graph



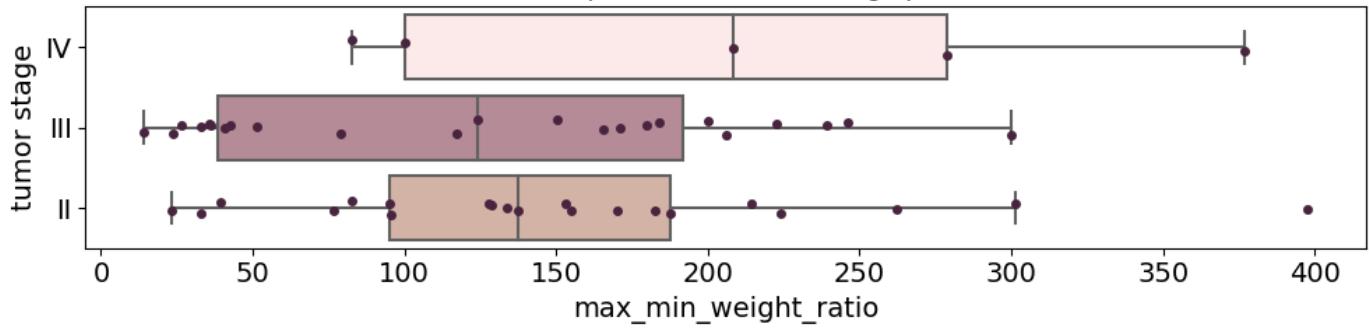
Boxplot of diameter by Tumor stage  
CD68 positive cells and EMST graph



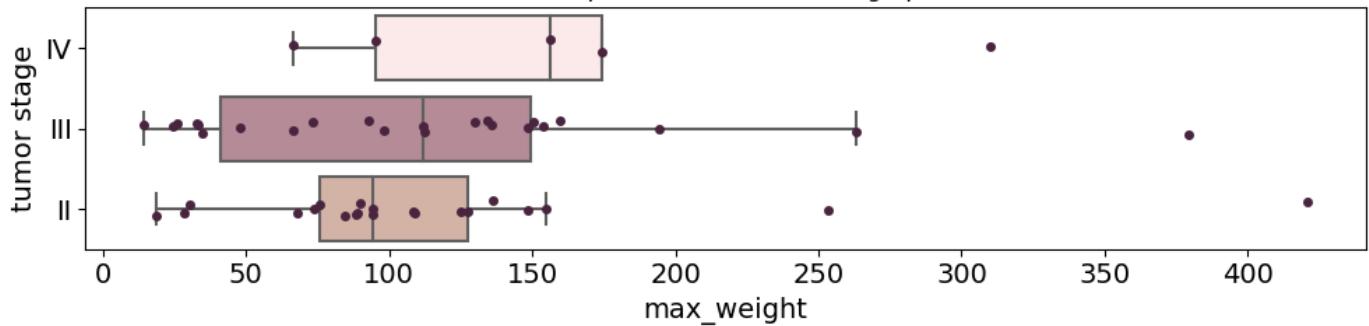
Boxplot of largest\_eigenvalue by Tumor stage  
CD68 positive cells and EMST graph



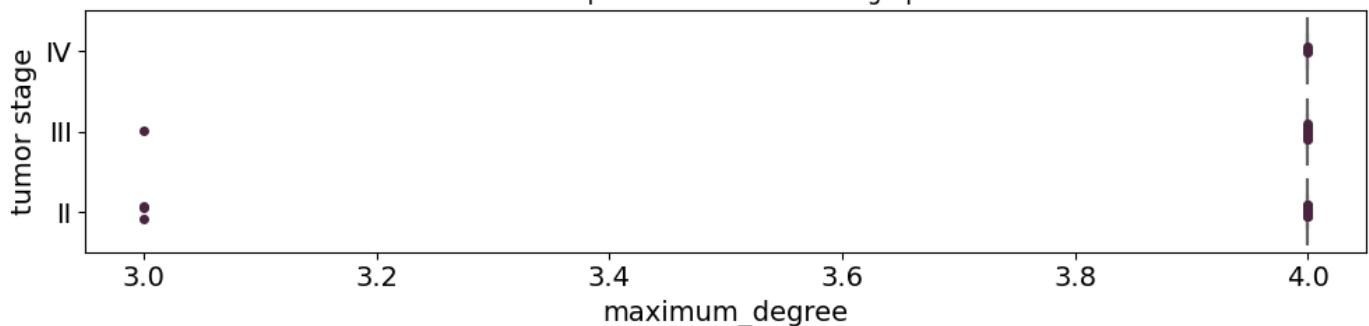
Boxplot of max\_min\_weight\_ratio by Tumor stage  
CD68 positive cells and EMST graph



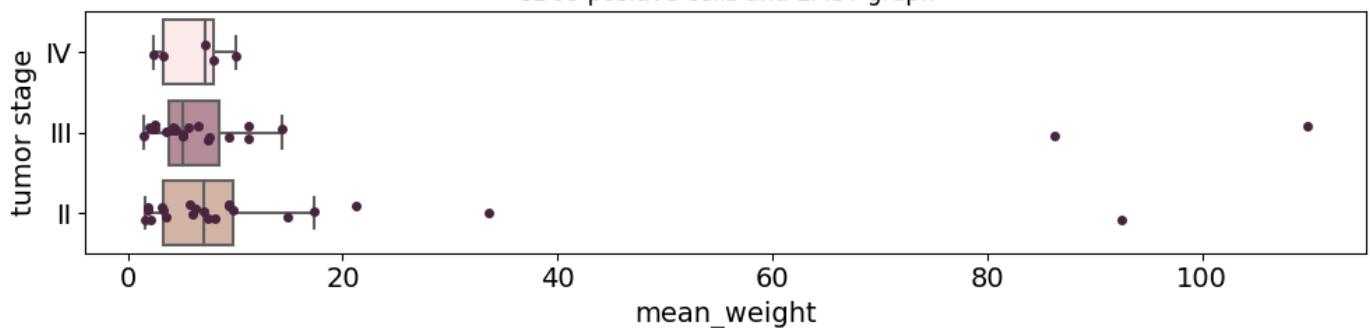
Boxplot of max\_weight by Tumor stage  
CD68 positive cells and EMST graph



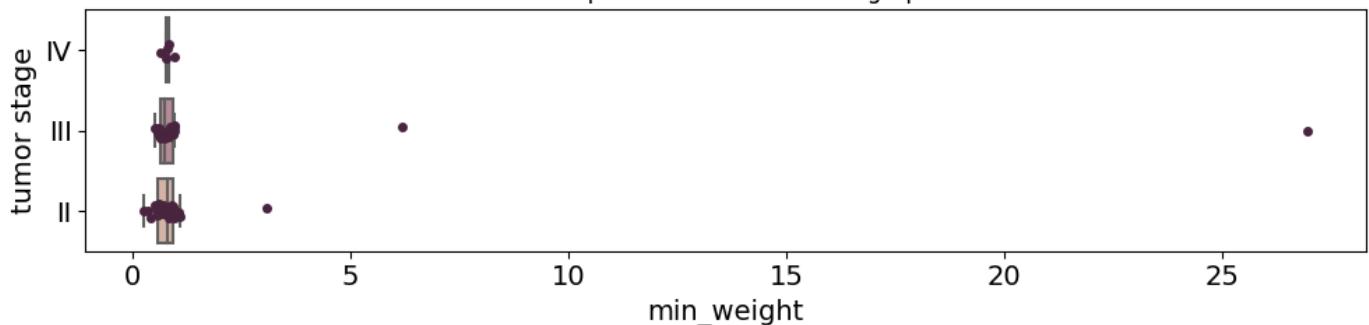
Boxplot of maximum\_degree by Tumor stage  
CD68 positive cells and EMST graph



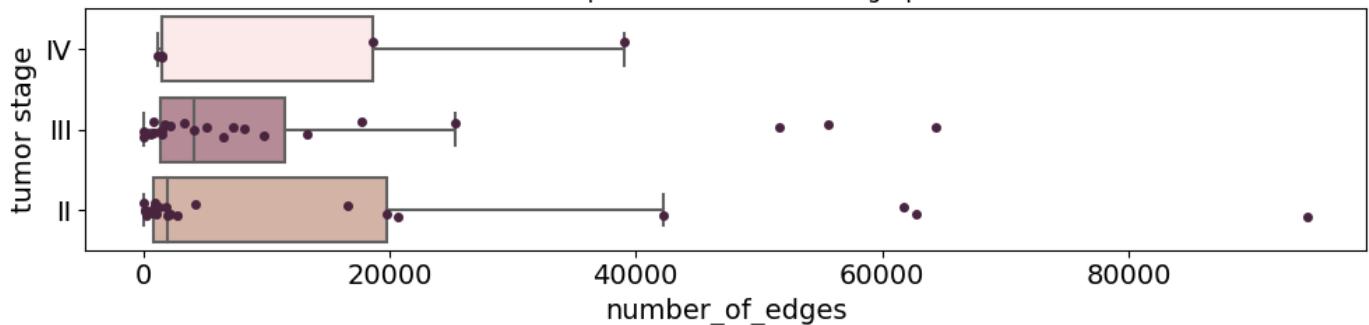
Boxplot of mean\_weight by Tumor stage  
CD68 positive cells and EMST graph



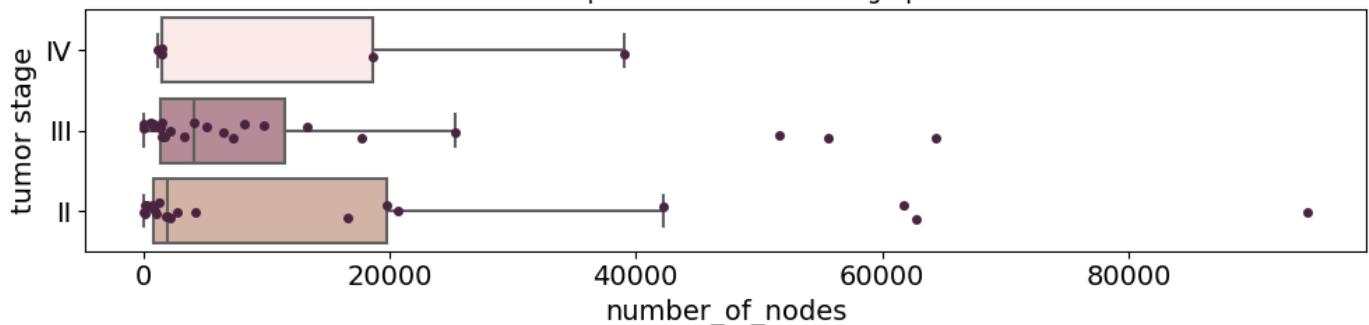
Boxplot of min\_weight by Tumor stage  
CD68 positive cells and EMST graph



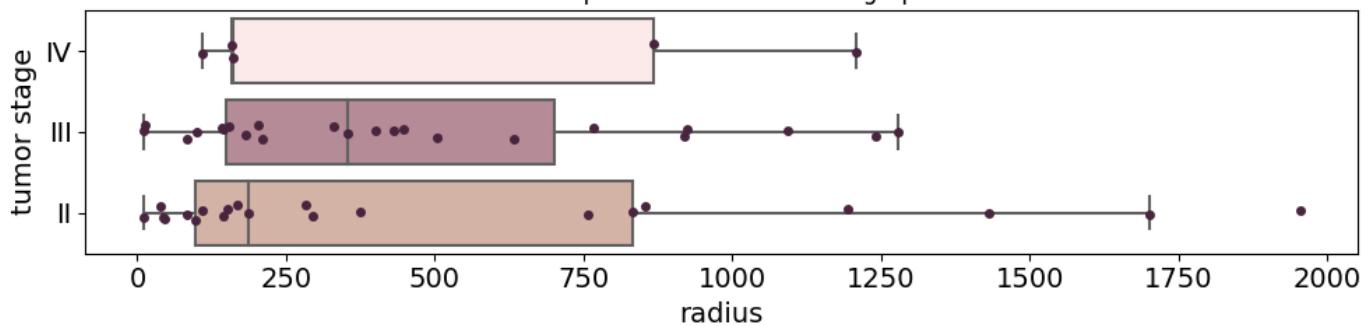
Boxplot of number\_of\_edges by Tumor stage  
CD68 positive cells and EMST graph



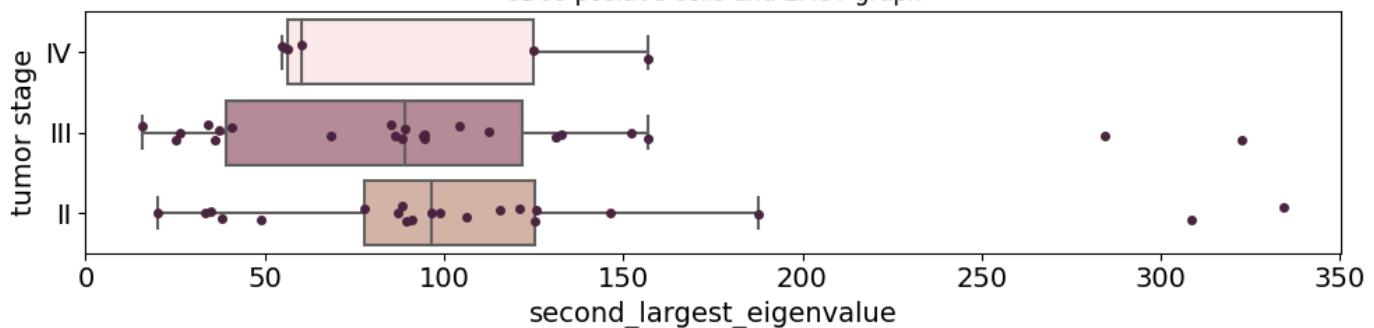
Boxplot of number\_of\_nodes by Tumor stage  
CD68 positive cells and EMST graph



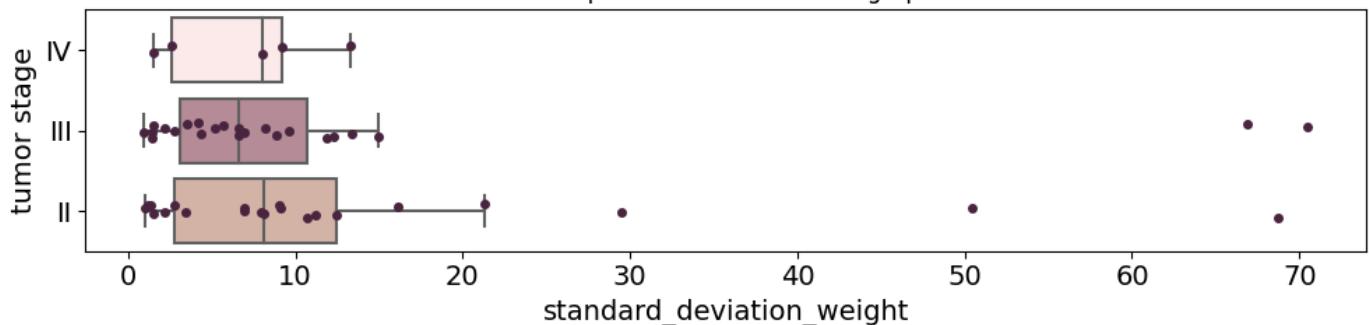
Boxplot of radius by Tumor stage  
CD68 positive cells and EMST graph



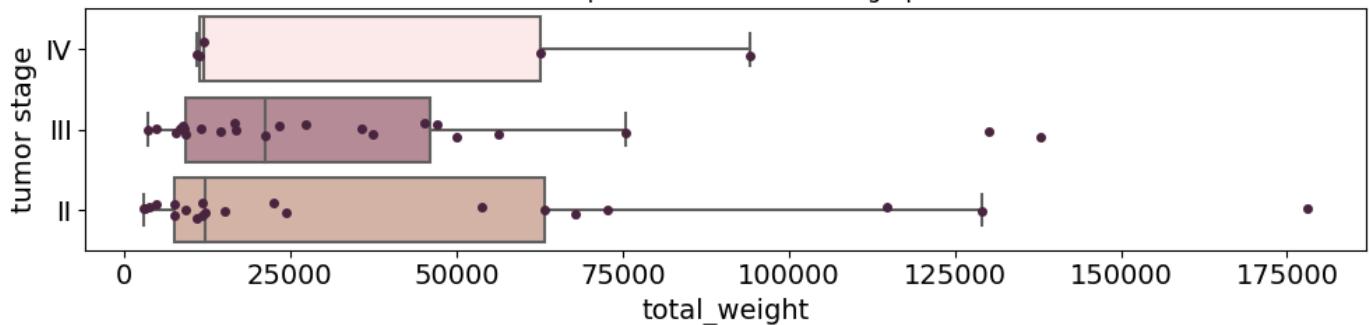
Boxplot of second\_largest\_eigenvalue by Tumor stage  
CD68 positive cells and EMST graph



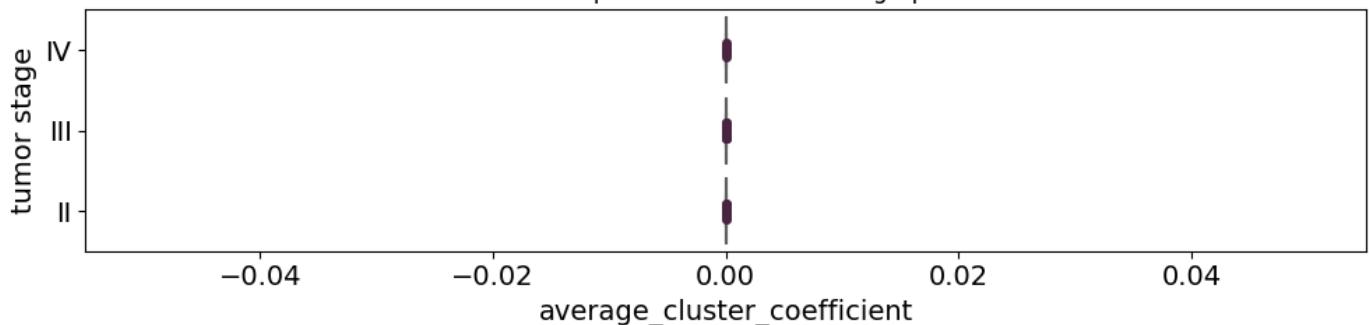
Boxplot of standard\_deviation\_weight by Tumor stage  
CD68 positive cells and EMST graph



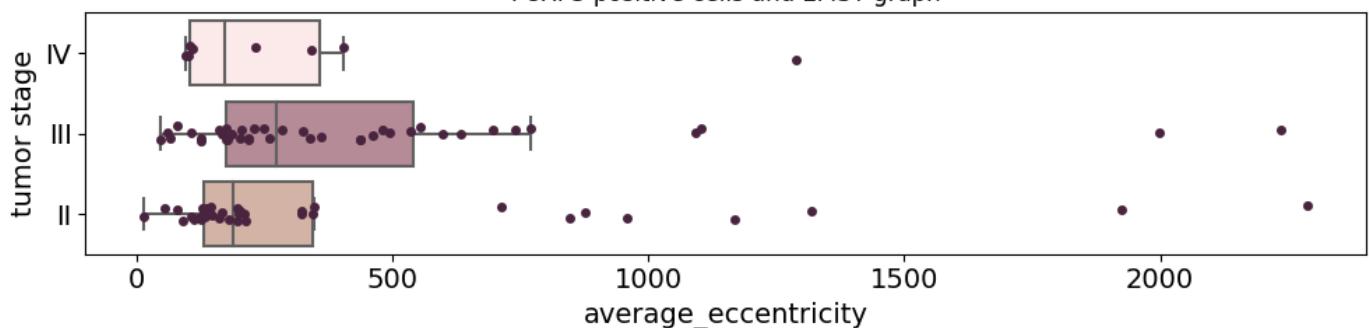
Boxplot of total\_weight by Tumor stage  
CD68 positive cells and EMST graph



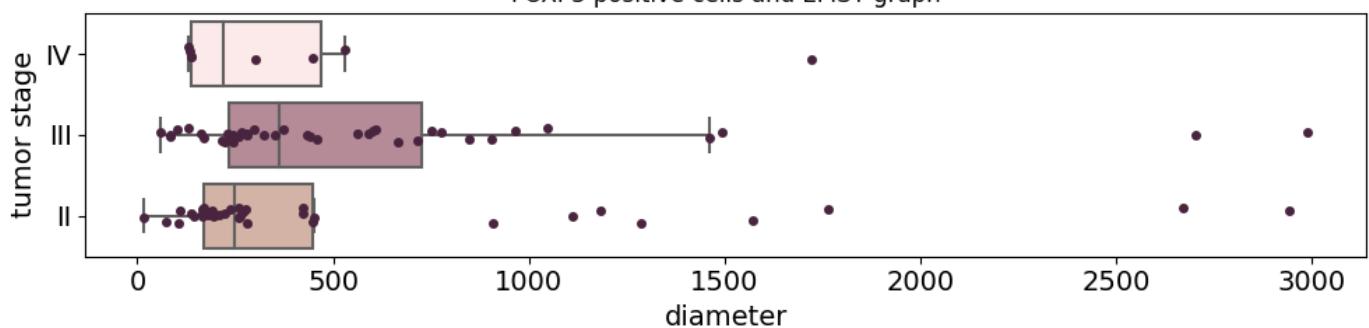
Boxplot of average\_cluster\_coefficient by Tumor stage  
FOXP3 positive cells and EMST graph



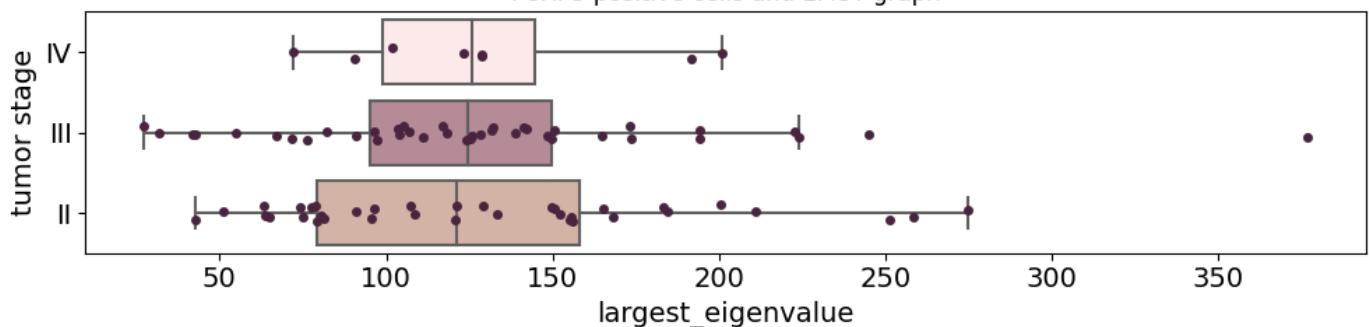
Boxplot of average\_eccentricity by Tumor stage  
FOXP3 positive cells and EMST graph



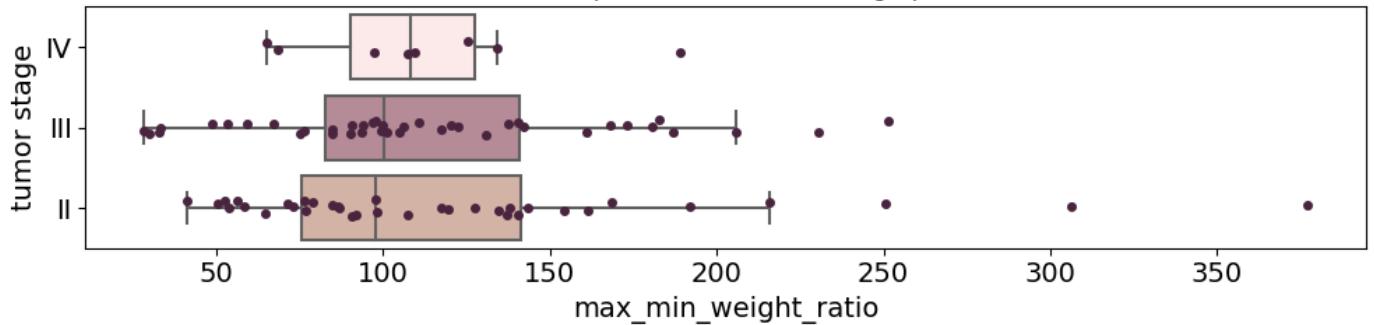
Boxplot of diameter by Tumor stage  
FOXP3 positive cells and EMST graph



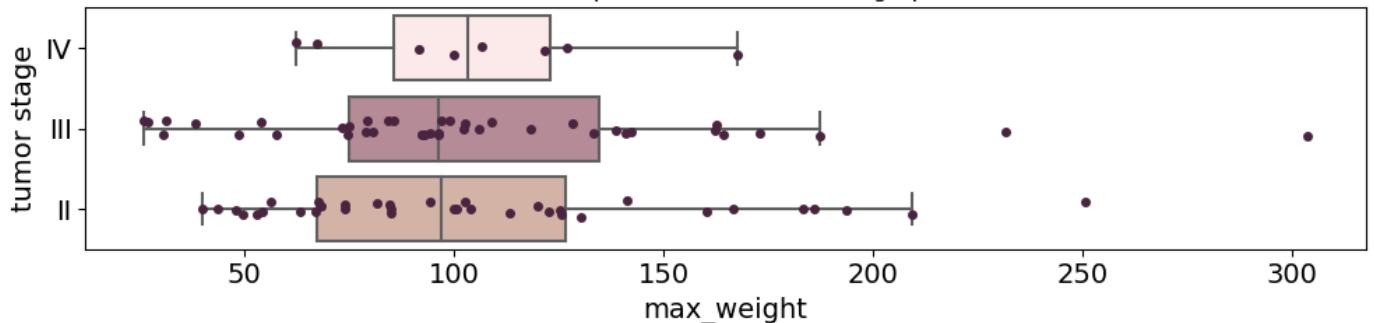
Boxplot of largest\_eigenvalue by Tumor stage  
FOXP3 positive cells and EMST graph



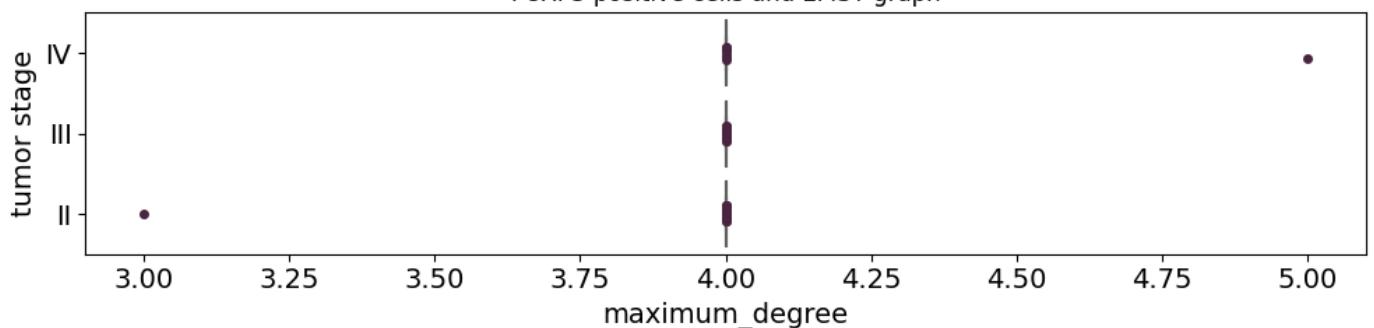
Boxplot of max\_min\_weight\_ratio by Tumor stage  
FOXP3 positive cells and EMST graph



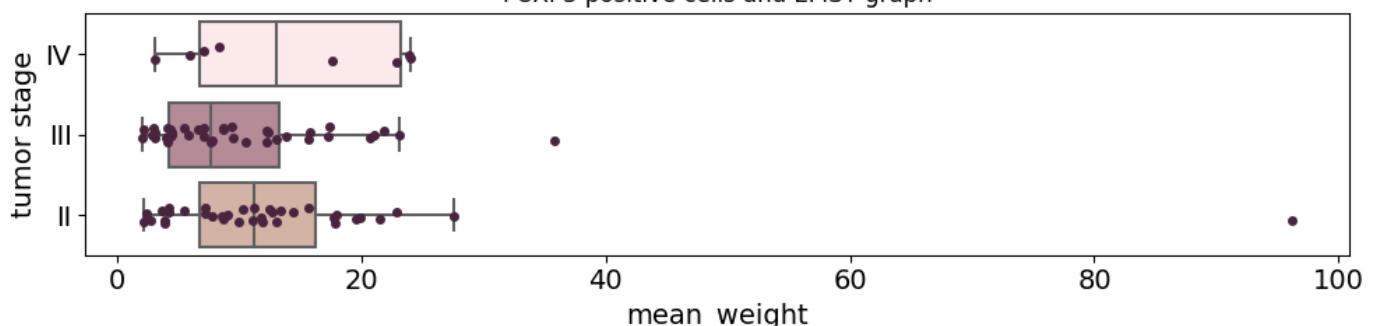
Boxplot of max\_weight by Tumor stage  
FOXP3 positive cells and EMST graph



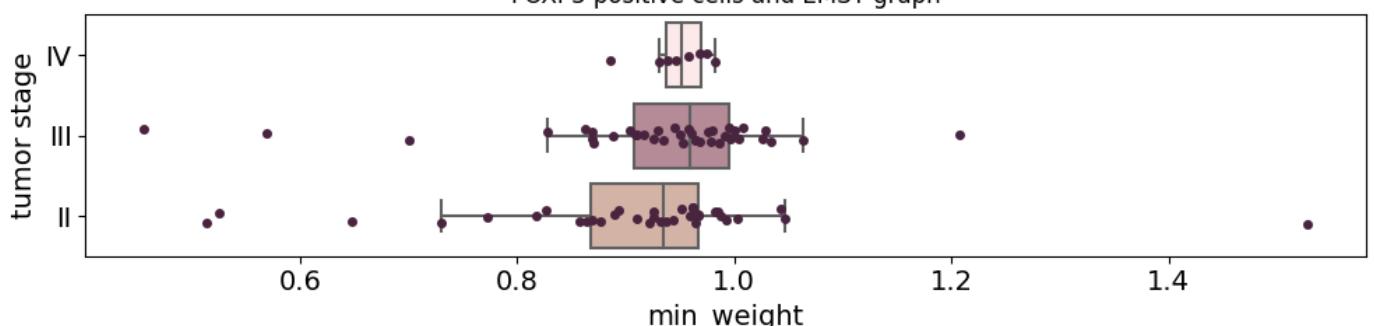
Boxplot of maximum\_degree by Tumor stage  
FOXP3 positive cells and EMST graph



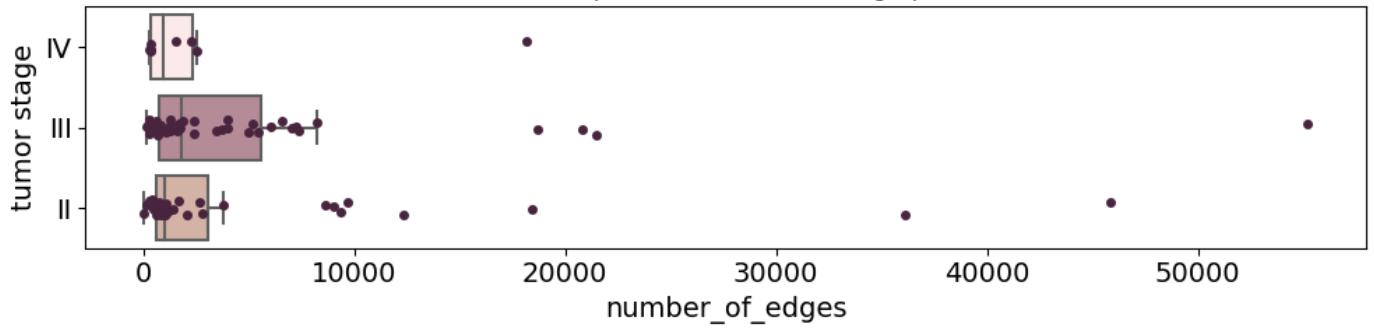
Boxplot of mean\_weight by Tumor stage  
FOXP3 positive cells and EMST graph



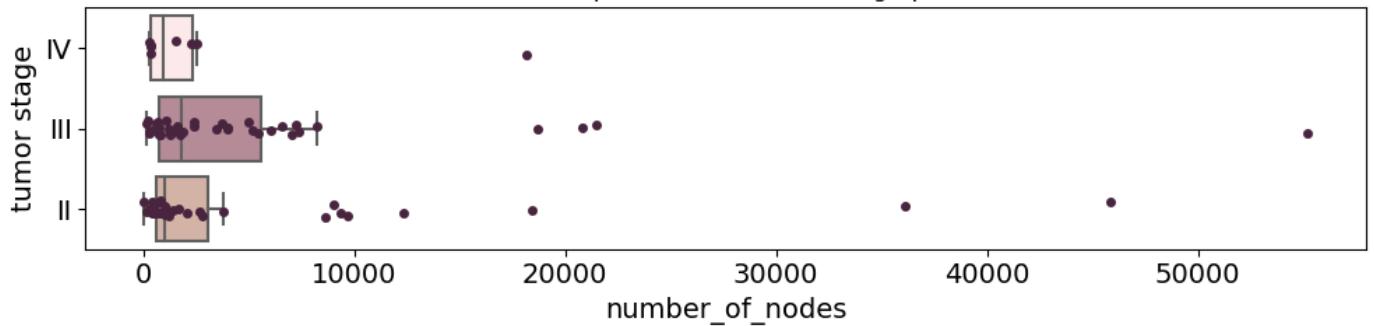
Boxplot of min\_weight by Tumor stage  
FOXP3 positive cells and EMST graph



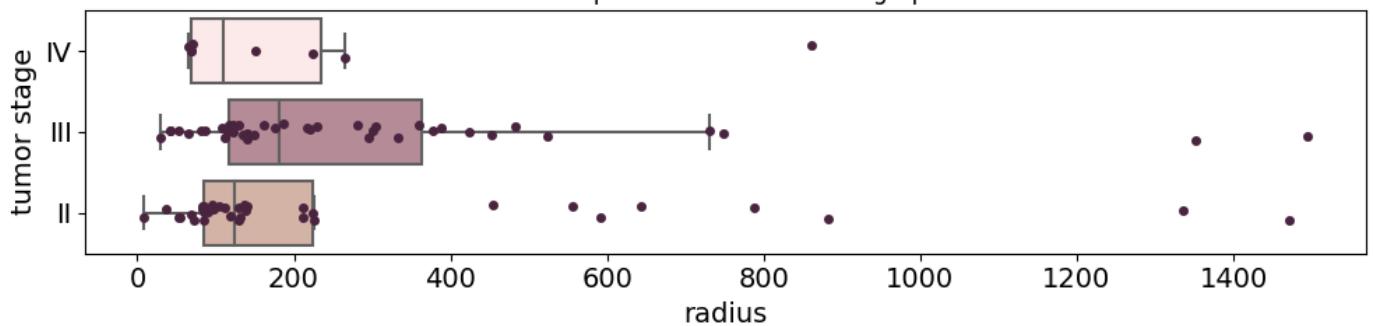
Boxplot of number\_of\_edges by Tumor stage  
FOXP3 positive cells and EMST graph



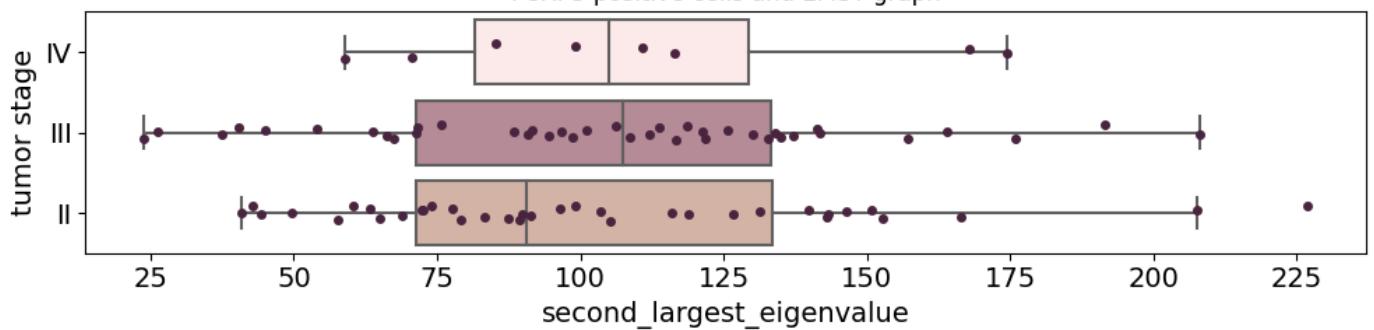
Boxplot of number\_of\_nodes by Tumor stage  
FOXP3 positive cells and EMST graph



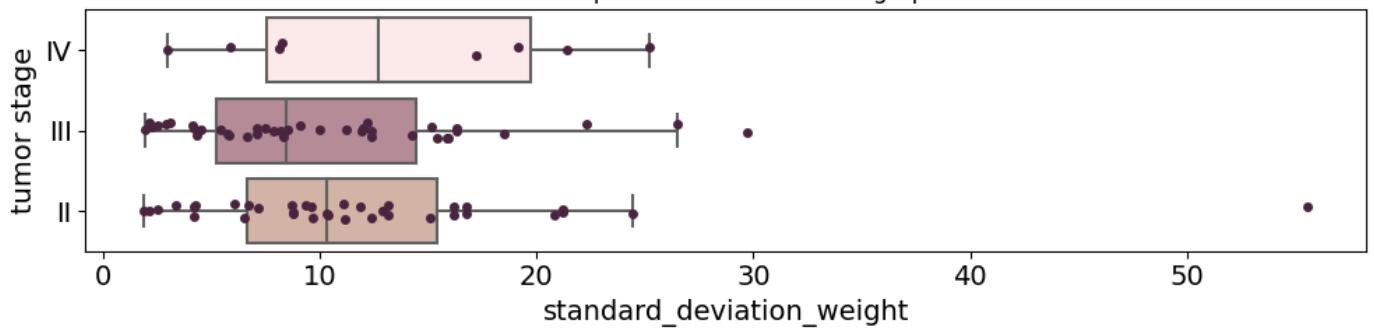
Boxplot of radius by Tumor stage  
FOXP3 positive cells and EMST graph



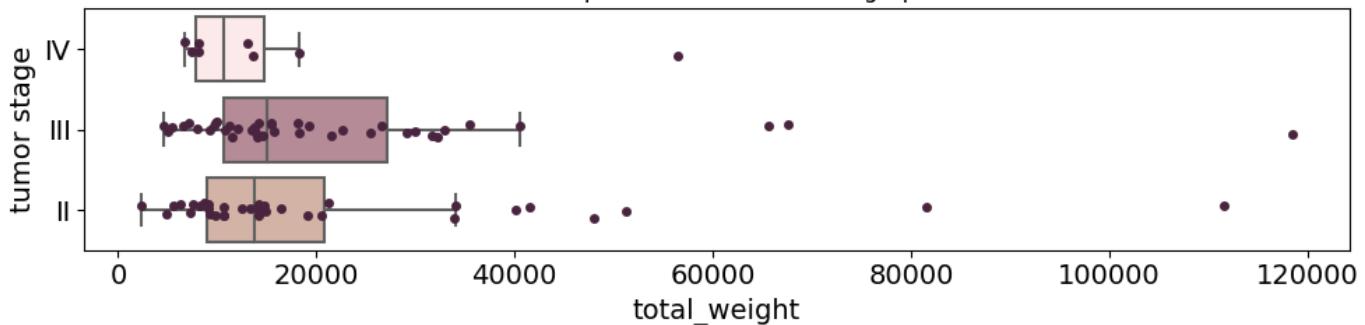
Boxplot of second\_largest\_eigenvalue by Tumor stage  
FOXP3 positive cells and EMST graph



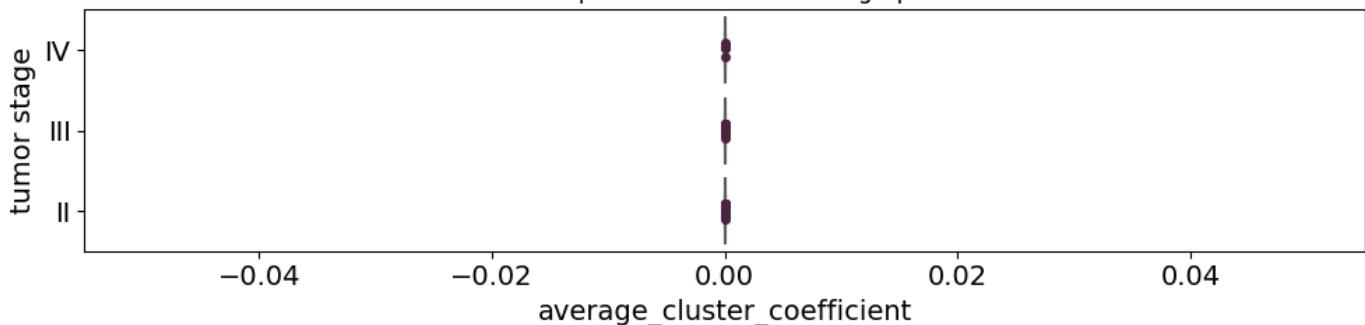
Boxplot of standard\_deviation\_weight by Tumor stage  
FOXP3 positive cells and EMST graph



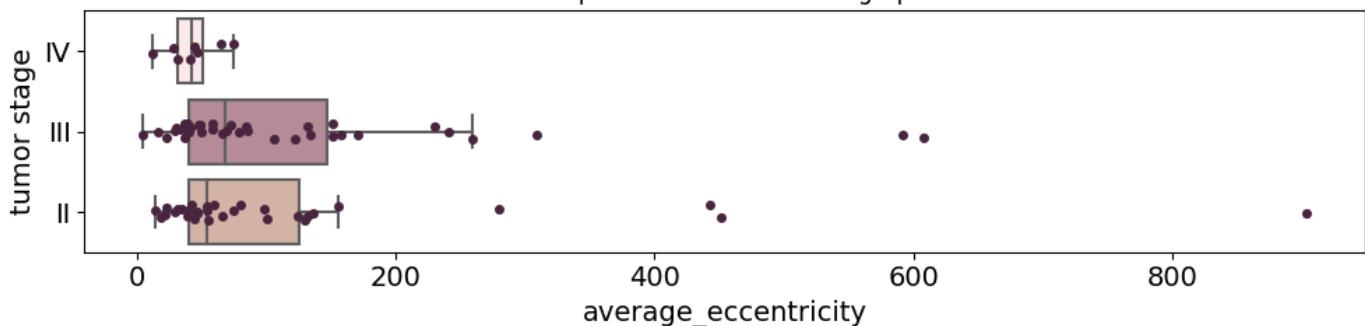
Boxplot of total\_weight by Tumor stage  
FOXP3 positive cells and EMST graph



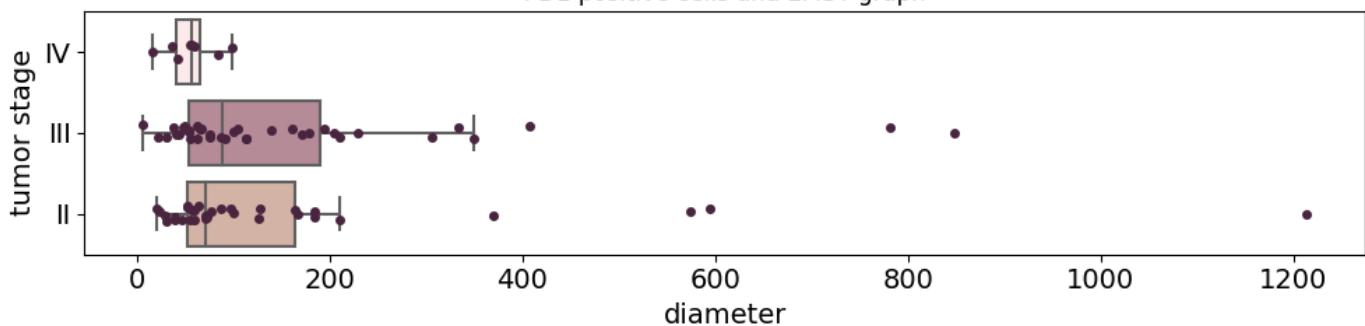
Boxplot of average\_cluster\_coefficient by Tumor stage  
PD1 positive cells and EMST graph



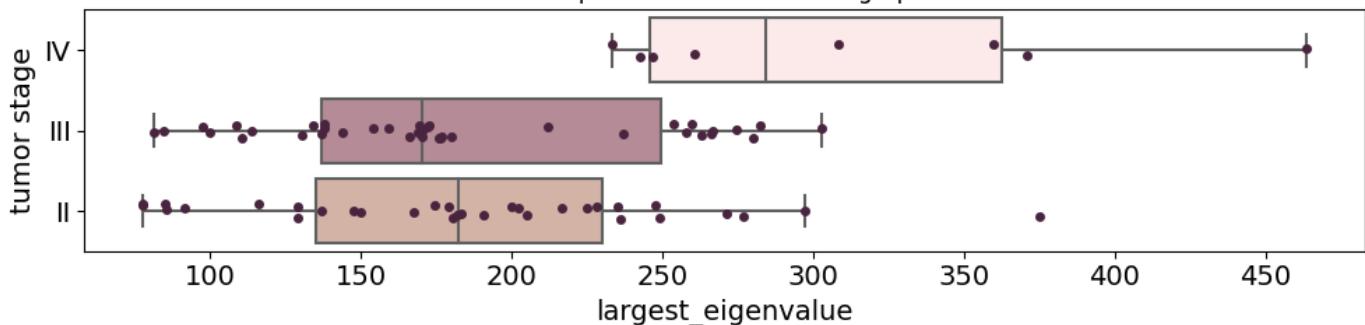
Boxplot of average\_eccentricity by Tumor stage  
PD1 positive cells and EMST graph



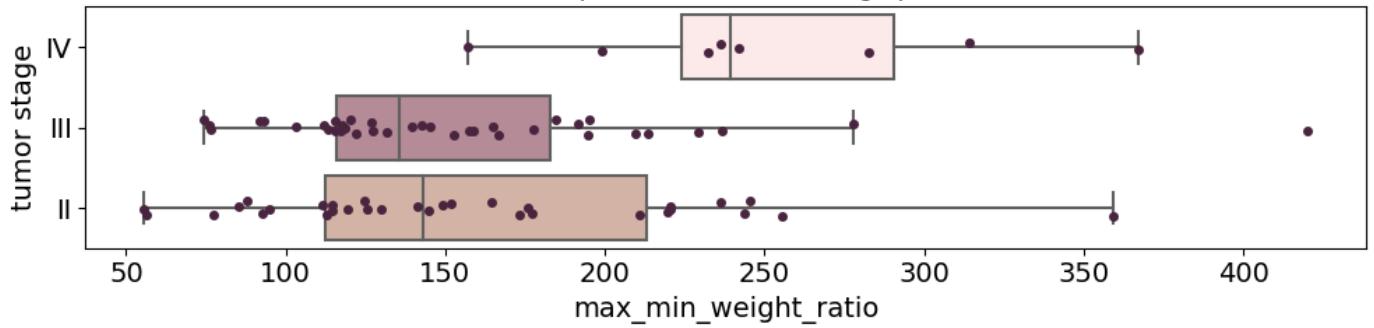
Boxplot of diameter by Tumor stage  
PD1 positive cells and EMST graph



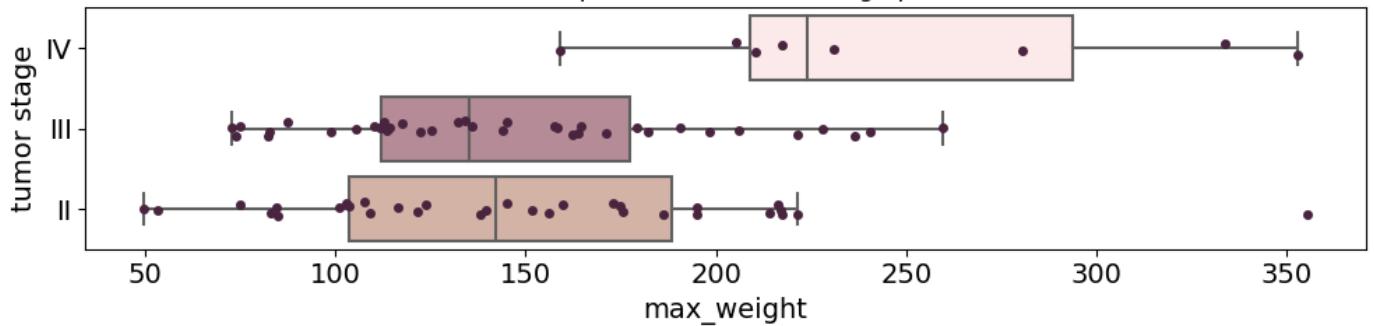
Boxplot of largest\_eigenvalue by Tumor stage  
PD1 positive cells and EMST graph



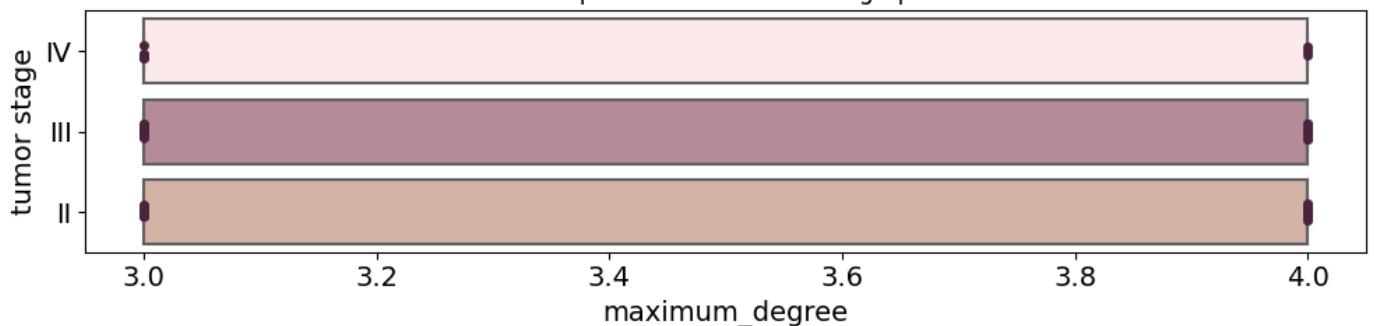
Boxplot of max\_min\_weight\_ratio by Tumor stage  
PD1 positive cells and EMST graph



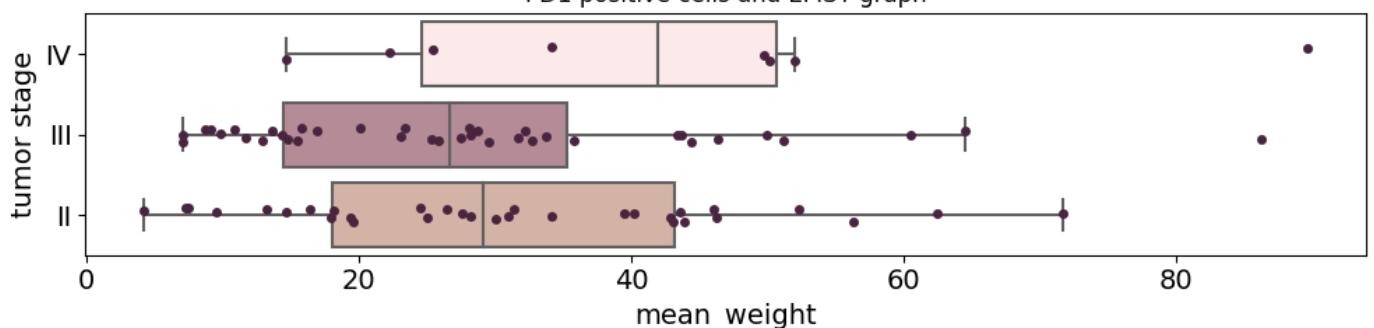
Boxplot of max\_weight by Tumor stage  
PD1 positive cells and EMST graph



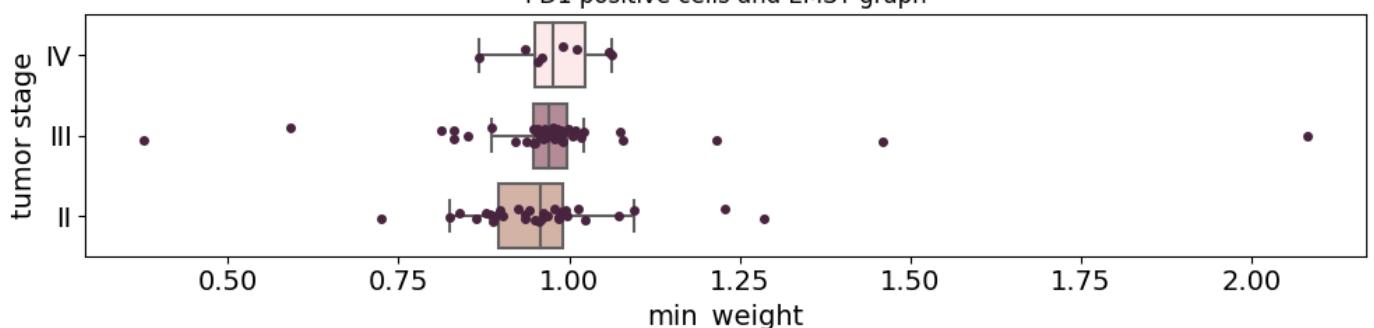
Boxplot of maximum\_degree by Tumor stage  
PD1 positive cells and EMST graph



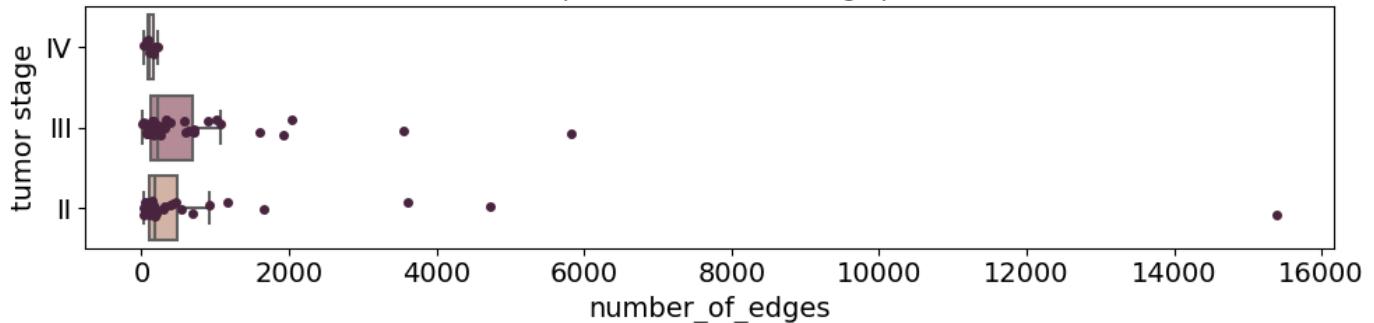
Boxplot of mean\_weight by Tumor stage  
PD1 positive cells and EMST graph



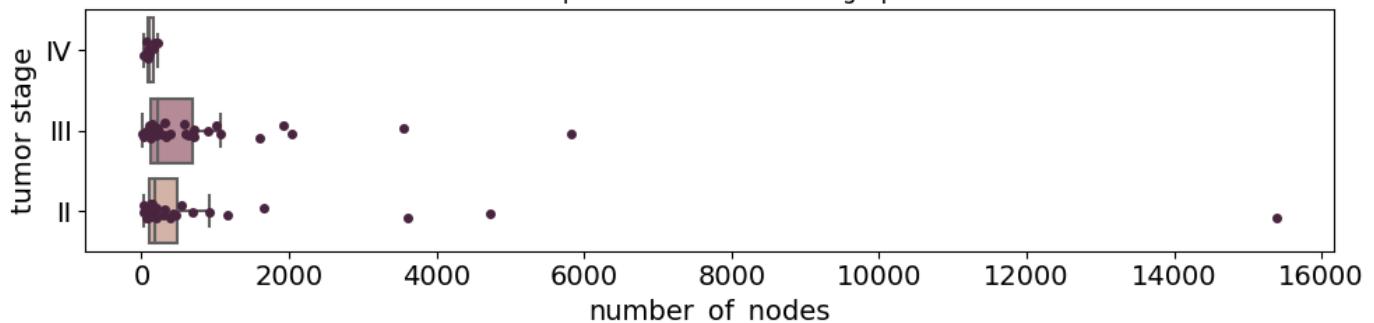
Boxplot of min\_weight by Tumor stage  
PD1 positive cells and EMST graph



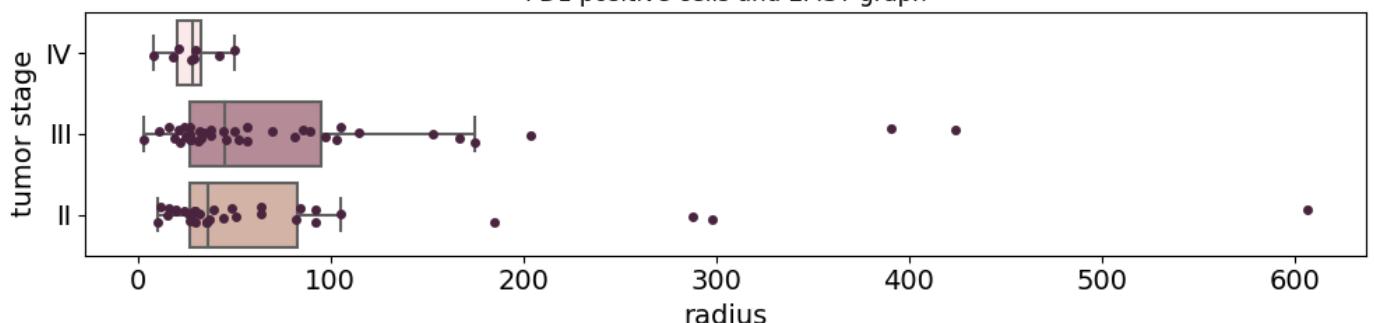
Boxplot of number\_of\_edges by Tumor stage  
PD1 positive cells and EMST graph



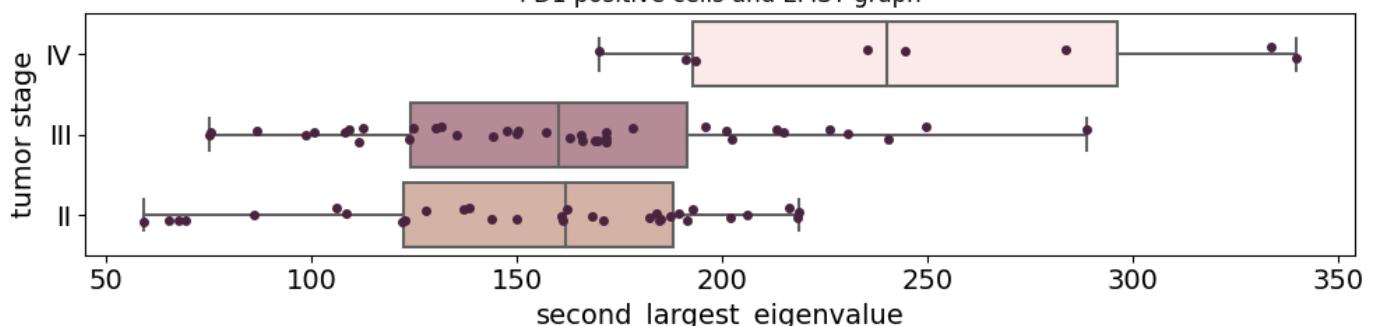
Boxplot of number\_of\_nodes by Tumor stage  
PD1 positive cells and EMST graph



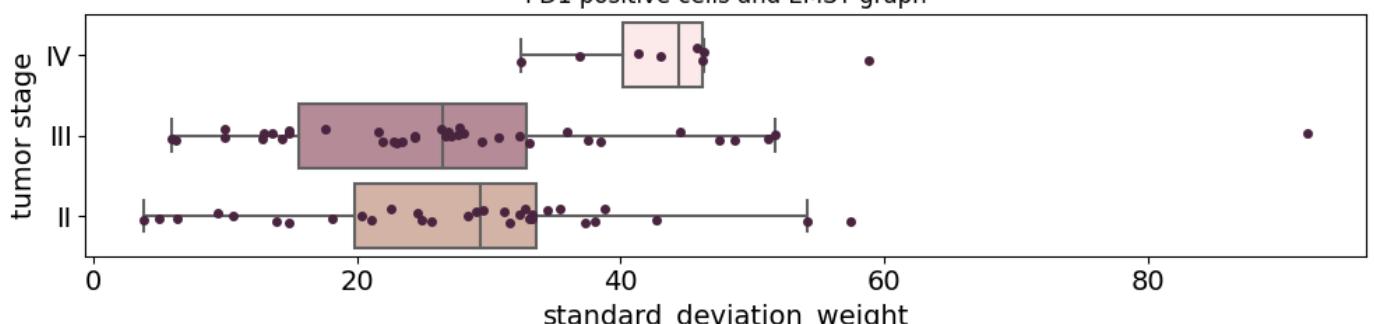
Boxplot of radius by Tumor stage  
PD1 positive cells and EMST graph



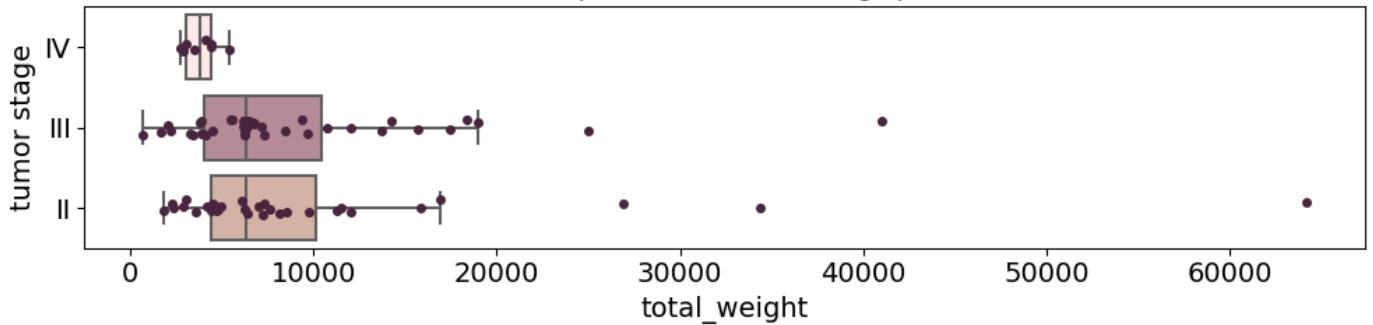
Boxplot of second\_largest\_eigenvalue by Tumor stage  
PD1 positive cells and EMST graph



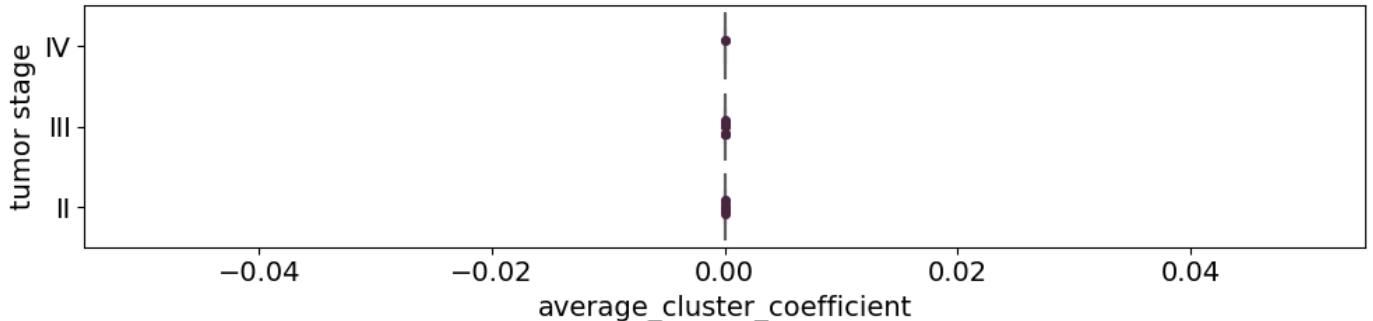
Boxplot of standard\_deviation\_weight by Tumor stage  
PD1 positive cells and EMST graph



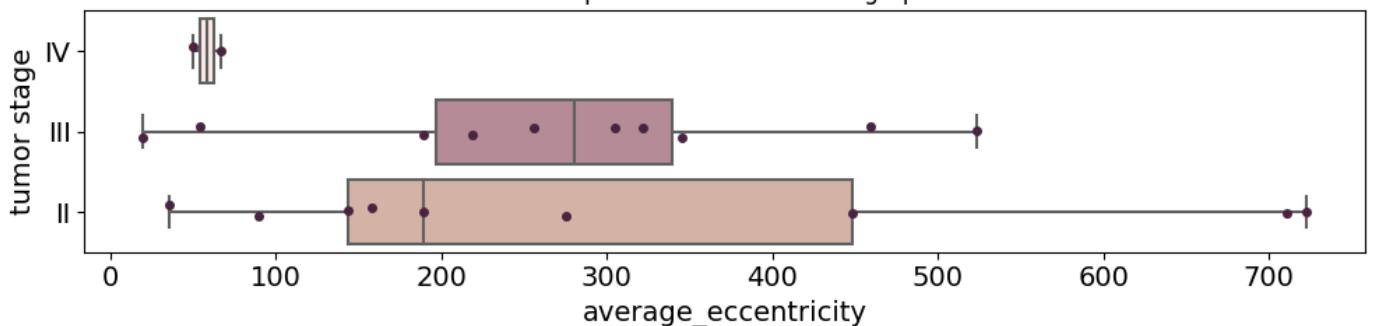
Boxplot of total\_weight by Tumor stage  
PD1 positive cells and EMST graph



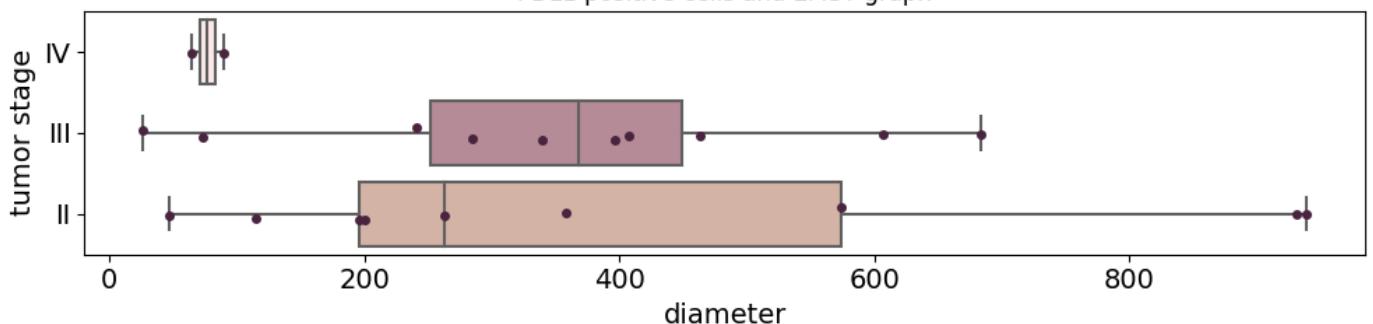
Boxplot of average\_cluster\_coefficient by Tumor stage  
PDL1 positive cells and EMST graph



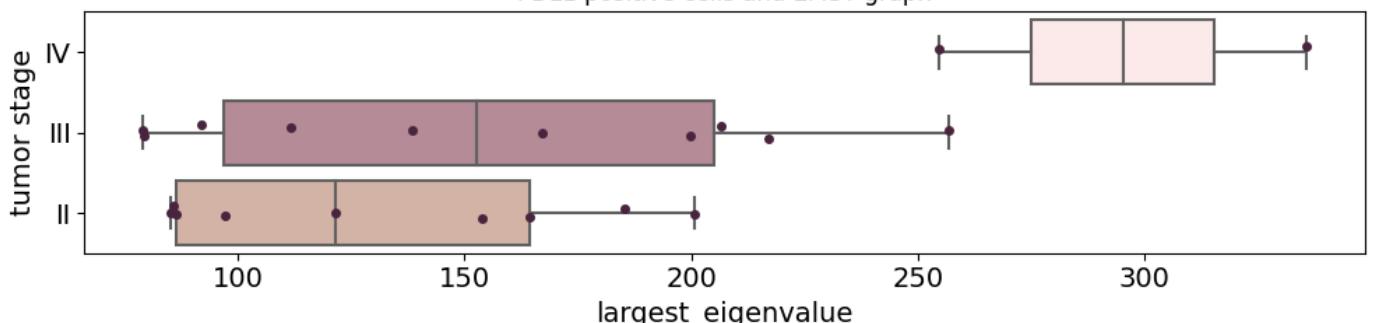
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PDL1 positive cells and EMST graph



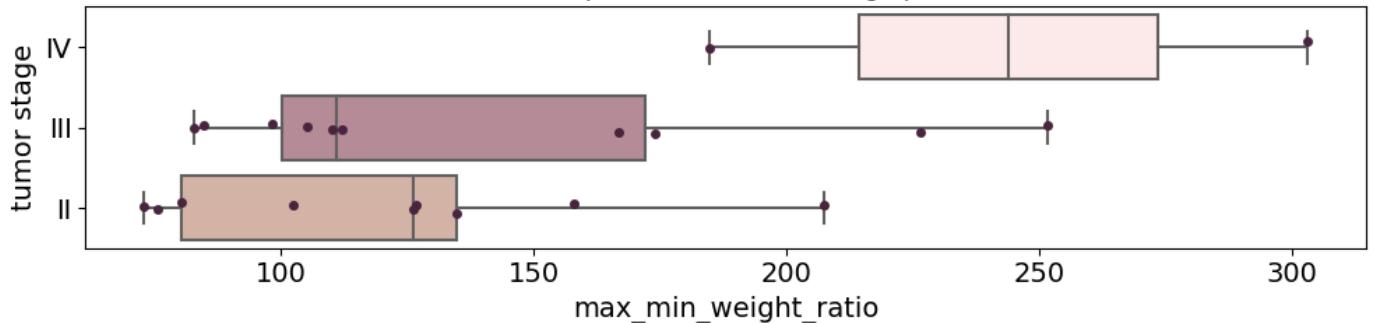
Boxplot of diameter by Tumor stage  
PDL1 positive cells and EMST graph



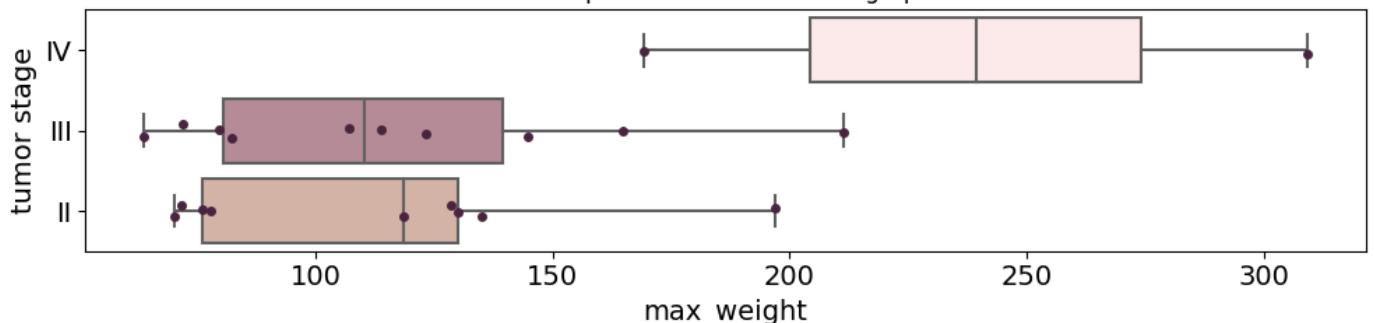
Boxplot of largest\_eigenvalue by Tumor stage  
PDL1 positive cells and EMST graph



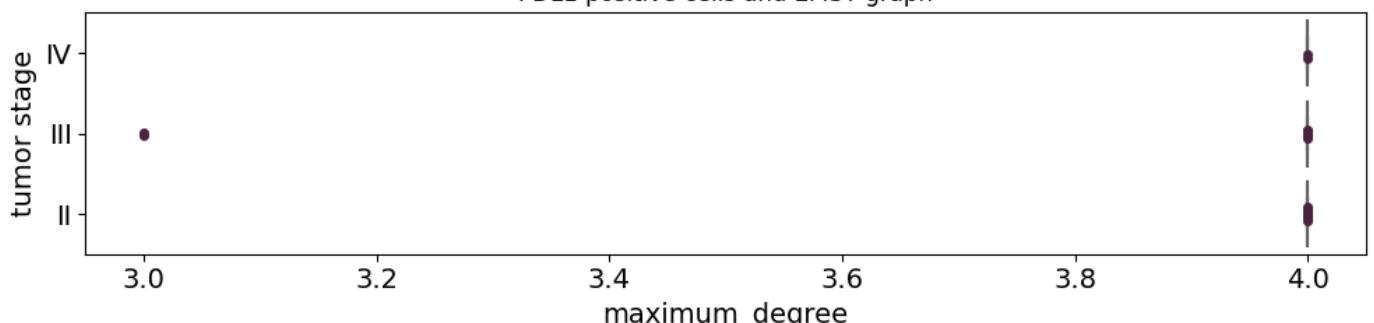
Boxplot of max\_min\_weight\_ratio by Tumor stage  
PDL1 positive cells and EMST graph



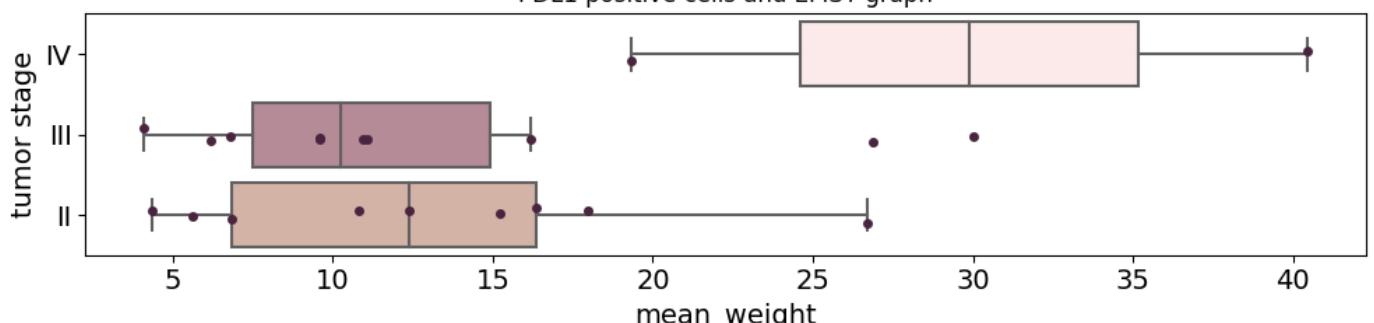
Boxplot of max\_weight by Tumor stage  
PDL1 positive cells and EMST graph



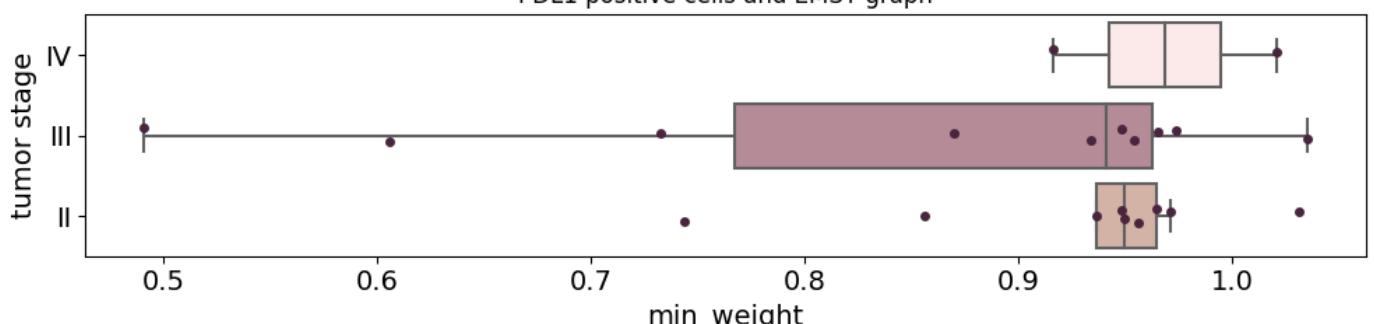
Boxplot of maximum\_degree by Tumor stage  
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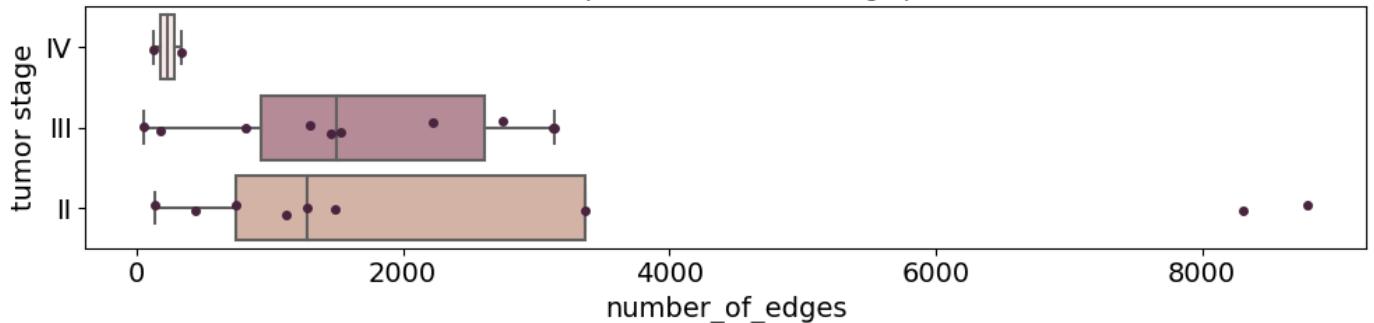
Boxplot of mean\_weight by Tumor stage  
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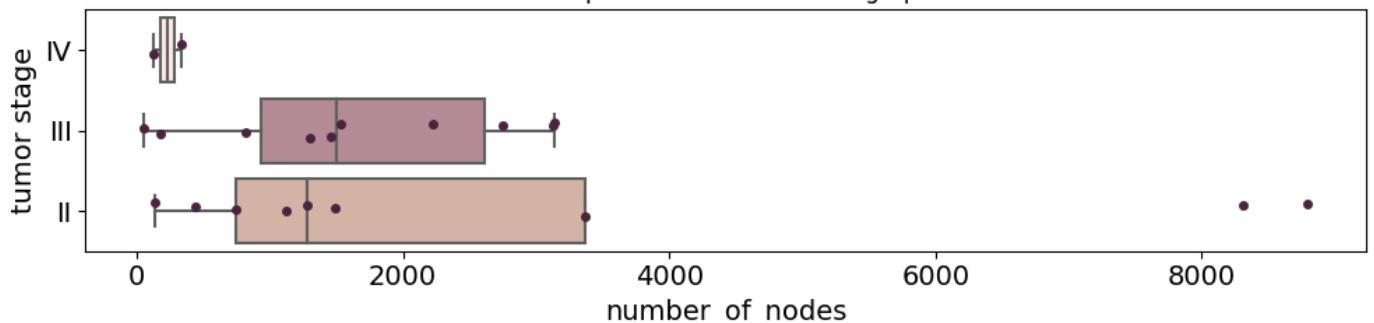
Boxplot of min\_weight by Tumor stage  
PDL1 positive cells and EMST graph



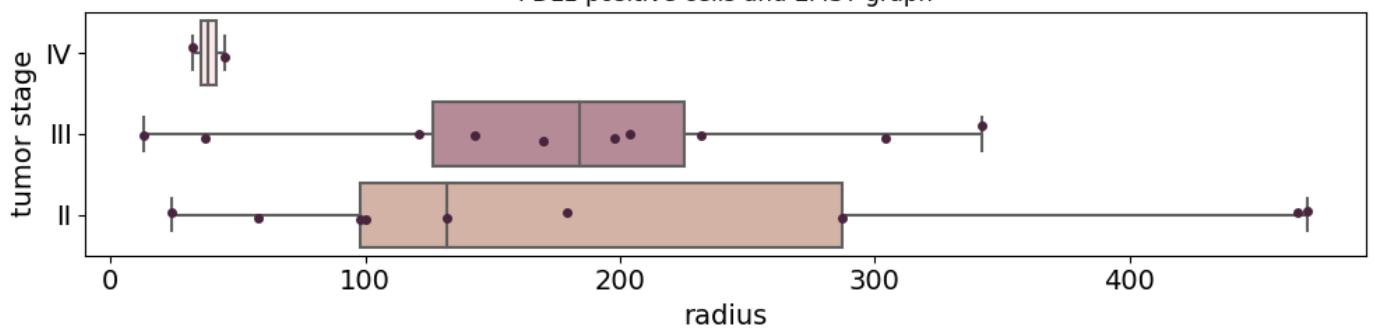
Boxplot of number\_of\_edges by Tumor stage  
PDL1 positive cells and EMST graph



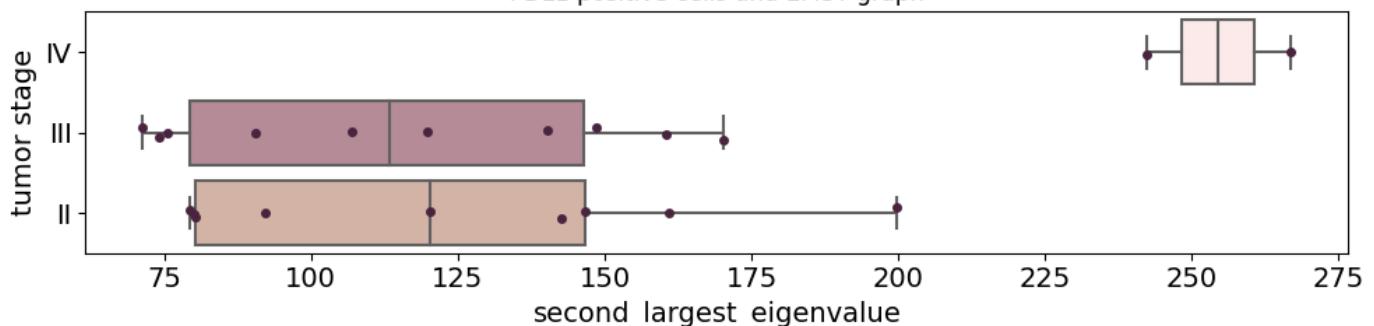
Boxplot of number\_of\_nodes by Tumor stage  
PDL1 positive cells and EMST graph



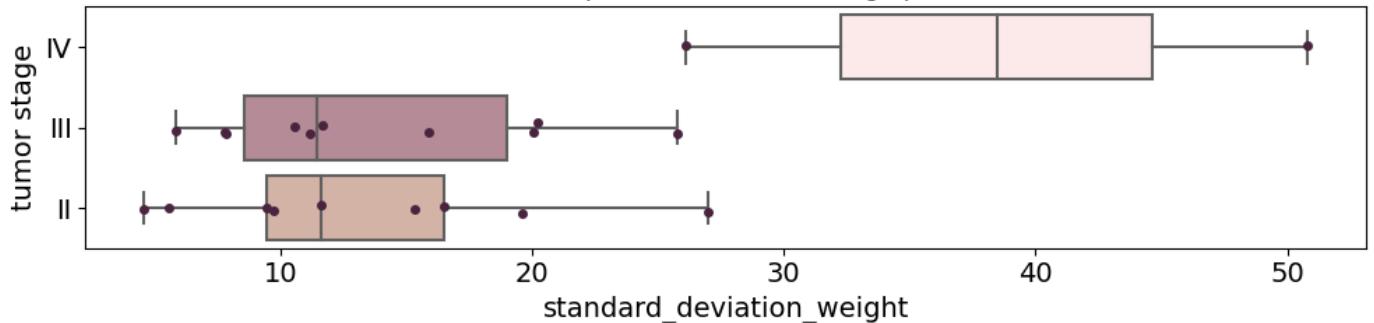
Boxplot of radius by Tumor stage  
PDL1 positive cells and EMST graph



Boxplot of second\_largest\_eigenvalue by Tumor stage  
PDL1 positive cells and EMST graph



Boxplot of standard\_development\_weight by Tumor stage  
PDL1 positive cells and EMST graph



Boxplot of total\_weight by Tumor stage  
PDL1 positive cells and EMST graph

