



Fig. 5. Whole femur shape prediction results for different disease progression degrees.

5 Supplementary Material for Paper No. 4076

5.1 Architecture

1. PointNet: used official implementation of autoencoder by the authors at <https://github.com/charlesq34/pointnet-autoencoder>.
2. DGCNN: used autoencoder version modified from the authors at <https://github.com/antao97/dgcnn.pytorch>.
3. SnowflakeNet: used official implementation of autoencoder by the authors at <https://github.com/AllenXiangX/SnowflakeNet>
4. Proposed model: **Network:** All dense layers in the model (Figure 1.d) are implemented using ReLU activations and 256 channels per layer. Embedding layers within index encoding and clinical context-aware modules are set to 32 channels. **Hyperparameters:** a) learning rate: 1×10^{-4} with CosineAnnealingWarmRestarts scheduler; b) batch size: 4 for proposed methods and 16 for PCNs; c) epochs: 400; d) λ : 10; e) GPU: NVIDIA GeForce RTX A6000; f) optimizer: AdamW optimizer.

5.2 Results

We visualize the whole femur prediction of several representative cases, shown in Figure 5. Full numeric results are shown in Table 2.

Table 2. Comparative analysis was performed on the average evaluation metrics for point predictions using various methods. The settings for the criteria follow those outlined in Table 1. Results are presented for all 367 cases, as well as for each OA grade difference group. GE and GE + CCA represent our proposed methods. For each grade difference group, the best prediction values are highlighted in bold.

Grade Diff.	Method	Metrics						
		P2F(mm)↓	CD L1↓	CD L2↓	HD↓	HD95↓	F-score↑	EMD↓
All Cat.	N-D*	1.426	4.166	5.015	9.975	4.949	0.477	4.998
	PointNet	1.813	4.751	5.571	13.314	5.12	0.273	11.656
	DGCNN	1.834	4.766	5.718	11.474	5.648	0.344	5.331
	Snowflake	1.892	4.708	5.471	12.373	4.944	0.269	9.747
	GE	1.466	4.052	4.814	9.841	4.584	0.441	4.896
367 Cases	GE + CCA	1.403	3.957	4.689	9.375	4.484	0.454	4.824
	N-D*	0.910	2.966	3.386	6.031	3.006	0.633	3.563
	PointNet	1.707	4.455	5.189	13.471	4.559	0.297	10.84
	DGCNN	1.676	4.289	5.080	10.187	4.873	0.391	4.788
	Snowflake	1.789	4.430	5.092	12.449	4.377	0.289	8.823
46 Cases	GE	1.265	3.514	4.143	8.899	3.770	0.496	4.113
	GE + CCA	1.100	3.297	3.858	7.815	3.450	0.549	3.855
	N-D*	0.958	3.102	3.612	7.199	3.355	0.568	3.992
	PointNet	1.667	4.383	5.104	12.95	4.516	0.293	11.581
	DGCNN	1.537	4.032	4.740	9.979	4.494	0.385	4.633
59 Cases	Snowflake	1.710	4.280	4.925	11.85	4.235	0.294	9.201
	GE	1.105	3.296	3.827	7.905	3.499	0.507	4.253
	GE + CCA	1.007	3.141	3.627	7.521	3.258	0.535	4.044
	N-D*	1.419	4.124	4.970	10.109	4.889	0.461	4.946
	PointNet	1.768	4.667	5.453	12.96	4.991	0.275	11.616
222 Cases	DGCNN	1.808	4.689	5.612	11.253	5.501	0.341	5.202
	Snowflake	1.849	4.614	5.339	12.007	4.767	0.270	9.675
	GE	1.411	3.913	4.627	9.482	4.367	0.443	4.739
	GE + CCA	1.381	3.886	4.598	9.347	4.369	0.449	4.772
	N-D*	2.783	7.427	9.297	18.051	9.944	0.247	8.501
38 Cases	PointNet	2.420	6.150	7.431	15.819	7.477	0.208	12.925
	DGCNN	2.616	6.888	8.564	16.541	9.163	0.239	7.776
	Snowflake	2.547	6.243	7.525	15.205	7.734	0.203	12.087
	GE	2.573	6.630	8.181	15.96	8.433	0.265	7.697
	GE + CCA	2.478	6.371	7.792	14.15	8.212	0.250	7.464
222 Cases	N-D*	2.091	5.852	7.473	14.345	8.377	0.292	6.897
	PointNet	1.919	5.066	5.915	12.101	5.404	0.213	13.08
	DGCNN	2.178	5.625	6.908	13.402	6.915	0.250	6.327
	Snowflake	1.976	5.026	5.849	12.819	5.517	0.200	10.687
	GE	1.845	5.058	6.160	12.232	6.301	0.301	6.093
2 Cases	GE + CCA	2.017	5.258	6.359	12.333	6.303	0.255	5.821

* Direct comparison between the ground truth of normal and diseased laterals.