Supplementary

Table 1. Image Classification Performance with Various Sample Rates and Center Fraction. Numbers in bold represent the upper bound.

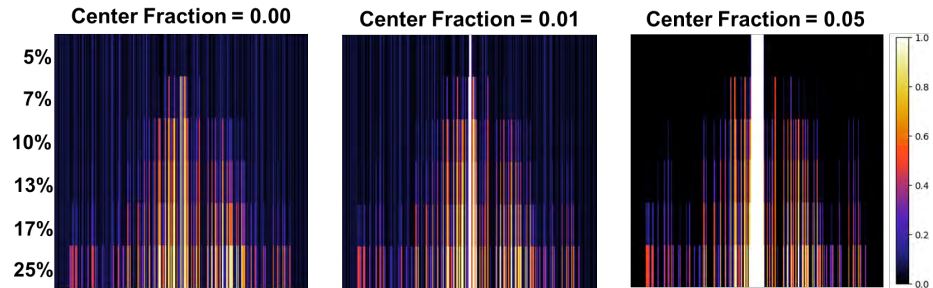| Center Fraction	0.00						0.01						0.05					
AUC↑																		
Sample Rate	5%	7%	10%	13%	17%	25%	5%	7%	10%	13%	17%	25%	5%	7%	10%	13%	17%	25%
Oracle	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**		**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**	**0.819**
Undersampled	0.666	0.689	0.710	0.736	0.745	0.756	0.729	0.761	0.789	0.764	0.776	0.783	0.752	0.751	0.747	0.745	0.743	0.749
Recon Classifier	0.586	0.612	0.648	0.647	0.652	0.687	0.782	0.786	0.774	0.773	0.752	0.778	0.798	0.813	0.829	0.835	0.838	0.836
Policy Reconstruction	0.583	0.806	0.829	0.844	0.841	0.837	0.757	0.808	0.817	0.826	0.827	0.813	0.789	0.818	0.833	0.829	0.827	0.831
Policy Classifier	0.666	0.777	0.775	0.781	0.785	0.791	0.717	0.789	0.785	0.784	0.775	0.794	0.752	0.755	0.739	0.742	0.741	0.743
RECALL↑																		
Sample Rate	5%	7%	10%	13%	17%	25%	5%	7%	10%	13%	17%	25%	5%	7%	10%	13%	17%	25%
Oracle	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**	**0.816**
Undersampled	0.592	0.636	0.655	0.699	0.699	0.694	0.592	0.655	0.728	0.680	0.704	0.723	0.636	0.636	0.626	0.621	0.621	0.641
Recon Classifier	0.243	0.311	0.388	0.379	0.408	0.510	0.762	0.772	0.767	0.762	0.733	0.791	0.748	0.791	0.840	0.854	0.869	0.869
Policy Reconstruction	0.228	0.850	0.893	0.917	0.908	0.888	0.699	0.835	0.859	0.884	0.888	0.854	0.728	0.816	0.859	0.854	0.845	0.854
Policy Classifier	0.592	0.699	0.694	0.709	0.718	0.738	0.544	0.714	0.709	0.709	0.694	0.709	0.636	0.646	0.617	0.621	0.621	0.626
SPECIFICITY↑																		
Sample Rate	5%	7%	10%	13%	17%	25%	5%	7%	10%	13%	17%	25%	5%	7%	10%	13%	17%	25%
Oracle	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**	**0.822**
Undersampled	0.740	0.741	0.765	0.774	0.791	0.817	0.866	0.866	0.851	0.848	0.848	0.843	0.869	0.865	0.869	0.869	0.864	0.857
Recon Classifier	0.928	0.914	0.907	0.916	0.895	0.864	0.801	0.799	0.781	0.783	0.771	0.764	0.849	0.834	0.818	0.815	0.807	0.804
Policy Reconstruction	0.938	0.763	0.765	0.770	0.774	0.785	0.815	0.780	0.774	0.768	0.766	0.771	0.850	0.821	0.807	0.804	0.810	0.808
Policy Classifier	0.740	0.854	0.856	0.853	0.851	0.843	0.890	0.864	0.861	0.860	0.856	0.852	0.869	0.864	0.862	0.862	0.861	0.861

Fig. 1. k-space preference for reconstruction task as a function of sample rate (vertical axis downward) and for 3 center fraction scenarios. Colorbar indicates the possibility of being sampled.