



Deep learning based Feature Selection Study

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To DO List

➤ Last Week

- Related Works Study and Implementation
- 갑상선 연구 보고 : 세그멘테이션 정보 활용 실험 보고

➤ This Week

- Related Works Study and Implementation
- 갑상선 연구 보고 : Coronal -> Axial 등의 순서로 실험
- 산학협력프로젝트 : 계획 보고

Papers

Chen, Jianbo, et al. "Learning to explain: An information-theoretic perspective on model interpretation." *International Conference on Machine Learning*. PMLR, 2018.

Yoon, Jinsung, James Jordon, and Mihaela van der Schaar. "INVASE: Instance-wise variable selection using neural networks." *International Conference on Learning Representations*. 2018.

Schwab, Patrick, and Walter Karlen. "Cxplain: Causal explanations for model interpretation under uncertainty." *arXiv preprint arXiv:1910.12336* (2019).

Jethani, Neil, et al. "Have We Learned to Explain?: How Interpretability Methods Can Learn to Encode Predictions in their Interpretations." *International Conference on Artificial Intelligence and Statistics*. PMLR, 2021.

Panda, Pranoy, Sai Srinivas Kancheti, and Vineeth N. Balasubramanian. "Instance-wise Causal Feature Selection for Model Interpretation." *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2021.

Implementation Progress

- **Modular Design:** INVASE -> CAM -> L2X, CXPlain, Real-X
- INVASE: Reproducibility issue with existing INVASE implementation (Tensorflow 1.X -> Pytorch)
=> Re-Implementation

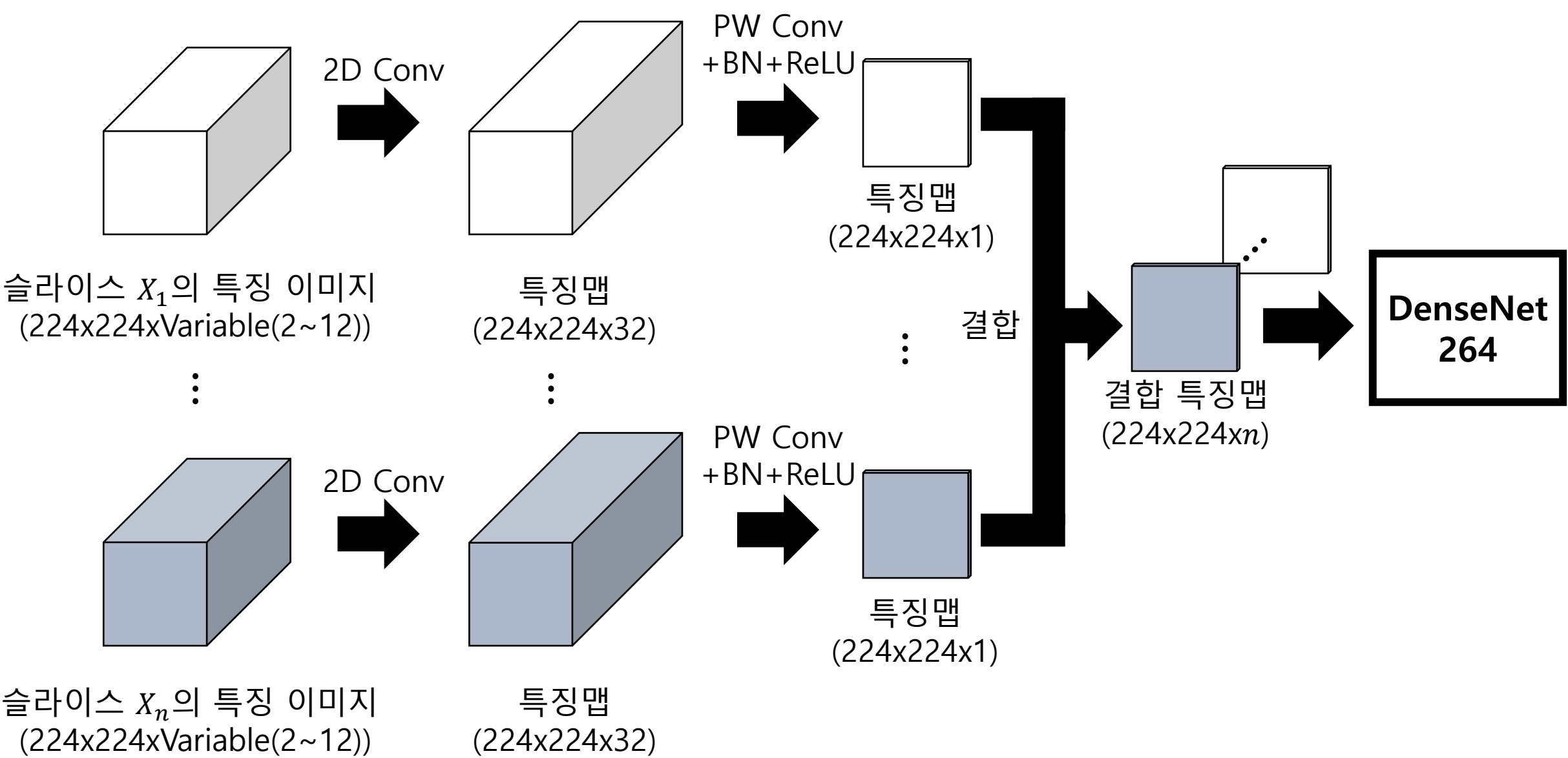
갑상선 연구 : 10회 반복 (AUPRC 기준 내림차순)

Table . Metrics with 95% confidence interval (▼/△ indicates that the corresponding method is **significantly worse** than the best model written in bold based on paired t-test at 5% significance level).

Model	AUROC			AUPRC			Accuracy			F1 Score			Sensitivity TP/(TP+FN)			Specificity TN/(TN+FP)			Precision TP/(TP+FP)		
	Average	95% CI Lower Upper	p-value	Average	95% CI Lower Upper	p-value	Average	95% CI Lower Upper	p-value	Average	95% CI Lower Upper	p-value	Average	95% CI Lower Upper	p-value	Average	95% CI Lower Upper	p-value	Average	95% CI Lower Upper	p-value
co2	0.706	0.653 0.760	0.106	0.381	0.316 0.445		0.78	0.696 0.863		0.362	0.291 0.433		0.476	0.347 0.605	0.003 (**▼)	0.825	0.715 0.934		0.351	0.240 0.461	
ax2, ax3, ax4	0.734	0.684 0.784		0.375	0.272 0.477	0.867	0.718	0.615 0.821	0.293	0.342	0.272 0.412	0.515	0.55	0.405 0.695	0.027	0.737	0.604 0.871	0.246	0.269	0.186 0.352	0.035 (*▼)
ax1, ax2, ax3, ax4, ax5	0.715	0.657 0.773	0.42	0.361	0.257 0.465	0.676	0.732	0.572 0.891	0.505	0.331	0.261 0.400	0.285	0.496	0.310 0.683	0.016 (*▼)	0.764	0.562 0.966	0.494	0.308	0.242 0.375	0.386
lt, rt	0.686	0.589 0.783	0.218	0.361	0.243 0.480	0.651	0.569	0.439 0.699	0.011	0.314	0.230 0.398	0.117	0.691	0.589 0.793	0.241	0.553	0.399 0.708	0.008 (**▼)	0.22	0.137 0.304	0.009 (**▼)
rt	0.723	0.667 0.778	0.743	0.342	0.260 0.424	0.371	0.601	0.460 0.742	0.009 (**▼)	0.327	0.281 0.373	0.304	0.708	0.540 0.876	0.286	0.579	0.393 0.765	0.008 (**▼)	0.244	0.173 0.315	0.078
co2, co3	0.718	0.673 0.763	0.454	0.33	0.286 0.373	0.126	0.701	0.599 0.802	0.203	0.335	0.297 0.373	0.318	0.586	0.426 0.746	0.066	0.718	0.581 0.856	0.187	0.272	0.202 0.342	0.092
co1, co2, co3	0.689	0.640 0.739	0.087	0.323	0.262 0.384	0.184	0.747	0.653 0.840	0.562	0.332	0.279 0.385	0.441	0.489	0.350 0.628	0.004 (**▼)	0.783	0.656 0.910	0.559	0.303	0.211 0.396	0.416
co1, co2	0.663	0.604 0.723	0.039	0.321	0.246 0.397	0.262	0.533	0.319 0.747	0.04 (*▼)	0.288	0.234 0.342	0.1	0.627	0.438 0.817	0.081	0.511	0.238 0.785	0.042 (*▼)	0.234	0.139 0.329	0.153
ax3	0.689	0.632 0.746	0.117	0.309	0.211 0.408	0.089	0.648	0.463 0.832	0.141	0.305	0.206 0.404	0.253	0.586	0.363 0.810	0.128	0.649	0.405 0.894	0.137	0.247	0.124 0.371	0.059
lt	0.666	0.581 0.751	0.204	0.305	0.219 0.391	0.125	0.506	0.323 0.689	0.007 (**▼)	0.292	0.244 0.339	0.099	0.728	0.554 0.902	0.502	0.469	0.237 0.702	0.007 (**▼)	0.218	0.135 0.300	0.042 (*▼)
ax5	0.676	0.617 0.734	0.104	0.285	0.219 0.351	0.031 (*▼)	0.706	0.588 0.823	0.22	0.334	0.292 0.375	0.432	0.545	0.398 0.691	0.013 (*▼)	0.723	0.569 0.876	0.18	0.284	0.195 0.373	0.268
co1, co3	0.648	0.603 0.692	0.017	0.271	0.214 0.327	0.008 (**▼)	0.668	0.478 0.858	0.255	0.209	0.117 0.301	0.021	0.429	0.154 0.703	0.026 (*▼)	0.695	0.435 0.954	0.31	0.196	0.121 0.271	0.063
ax4	0.656	0.576 0.737	0.113	0.263	0.178 0.347	0.034 (*▼)	0.698	0.539 0.856	0.33	0.299	0.235 0.362	0.139	0.479	0.279 0.679	0.012 (*▼)	0.723	0.519 0.927	0.342	0.271	0.188 0.354	0.2
ax1	0.591	0.527 0.656	0.001 (**▼)	0.226	0.166 0.286	0.001 (**▼)	0.588	0.375 0.800	0.082	0.231	0.170 0.292	0.004 (**▼)	0.505	0.238 0.773	0.051	0.59	0.306 0.874	0.1	0.234	0.101 0.367	0.15
ax2	0.615	0.531 0.699	0.05	0.223	0.158 0.288	0.008 (**▼)	0.591	0.412 0.770	0.076	0.284	0.241 0.328	0.082	0.587	0.385 0.789	0.048	0.584	0.355 0.812	0.07	0.231	0.148 0.314	0.144
co3	0.577	0.521 0.633	0.003 (**▼)	0.219	0.157 0.280	0.004 (**▼)	0.479	0.265 0.692	0.013 (*▼)	0.215	0.155 0.275	0.008 (**▼)	0.62	0.348 0.891	0.19	0.45	0.164 0.737	0.018 (*▼)	0.149	0.090 0.208	0.011 (*▼)
co1	0.562	0.527 0.596	0 (**▼)	0.152	0.123 0.181	0 (**▼)	0.355	0.201 0.508	0.001 (**▼)	0.245	0.205 0.286	0.005 (**▼)	0.791	0.671 0.911		0.288	0.097 0.480	0.001 (**▼)	0.149	0.118 0.180	0.001 (**▼)

CI, confidence interval; *: p-value < 0.05; **: p-value < 0.01

갑상선 연구 : 모델 설계



추후 진행 방향

- CO2, AX1~5, LT, RT 다시 조합 생성해서 실험
- 모델 개선 : 각 슬라이스별 컨볼루션 연산 독립적으로 수행 (Fully Connected Layer 전까지)

산학프로젝트

- 어제부로 아직 선정 내용 전달받지 못함.
- 요구 실적 :
 - SW 등록 3건
 - 국제 학술대회 논문 2편
 - 국내 특허출원 2건

산학프로젝트

- **SW 등록 3건(1~2월)**

- 기계 데이터를 위한 멀티모달 학습 연구 : 아성이 SW 제작, 태원이 등록 실무
- 보안 텍스트 데이터 분석을 위한 딥러닝 기법 연구 : 건일이 SW 제작, 수정이 등록 실무
- 임베디드 AI 기반 Scene Text Recognition 연구 : 건일이 SW 제작, 수정이 등록 실무

- **국제 학술대회 논문 2편 + 국내 특허출원 2건(6~8월)**

- 취향에 맞는 음악 추천을 위한 음악 장르 분류 프로젝트 : 아성+성현 KCI 논문 후속작(논문 1편 + 특허 1건)
- 의료 영상 분석을 위한 XAI 연구 : 상혁 졸업 논문 후속작(논문 1편 + 특허 1건)