

Makine Öğrenmesi Tabanlı Kardiyovasküler Sistemin Parametre Tahminlemesi (CVS-ANN)



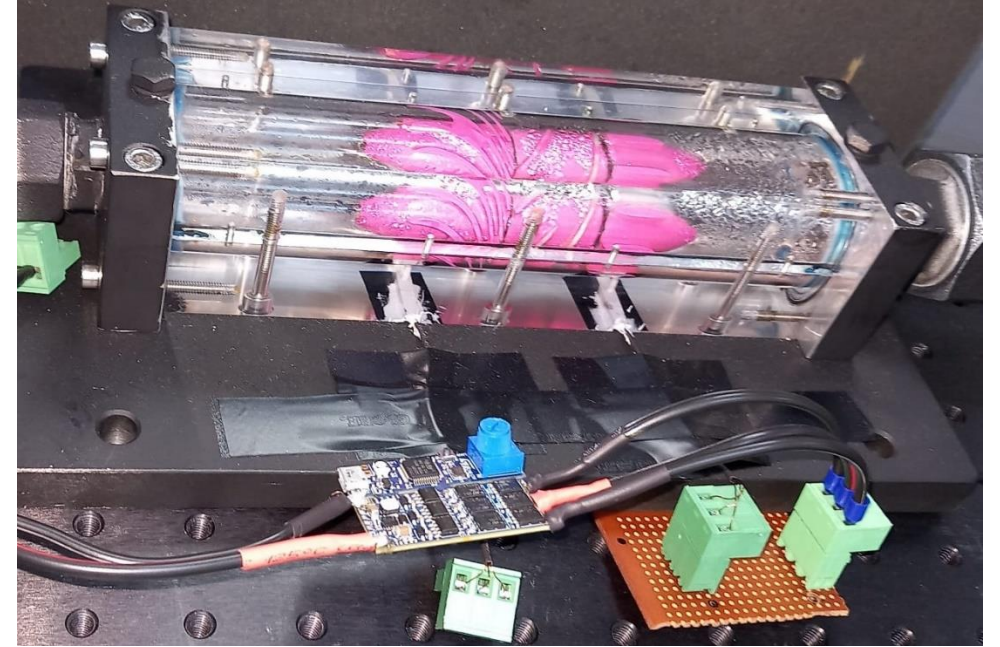
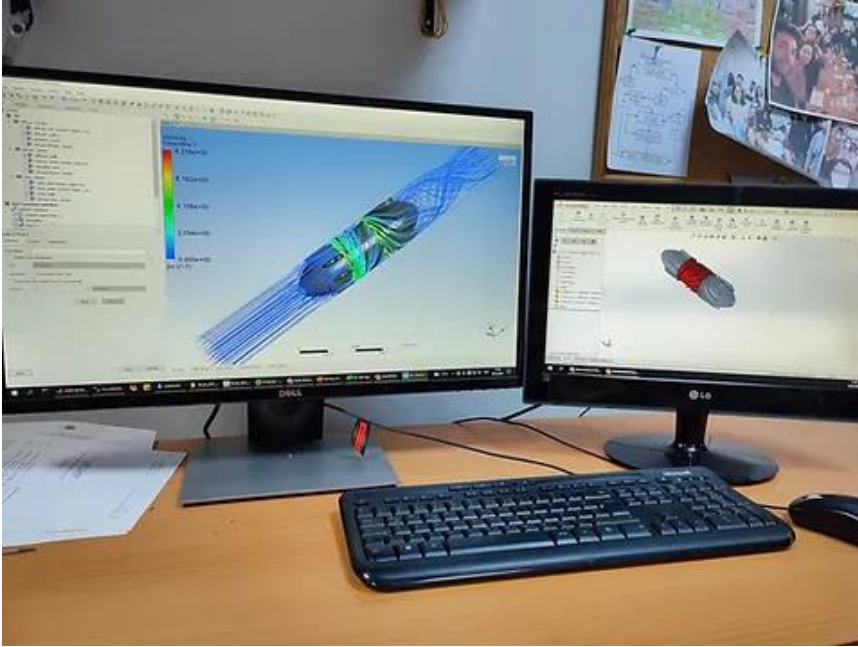
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Pompa Dizaynı Hesaplamalı Akışkanlar Dinamiği

Sol Karıncık Destek Pompası (LVAD)



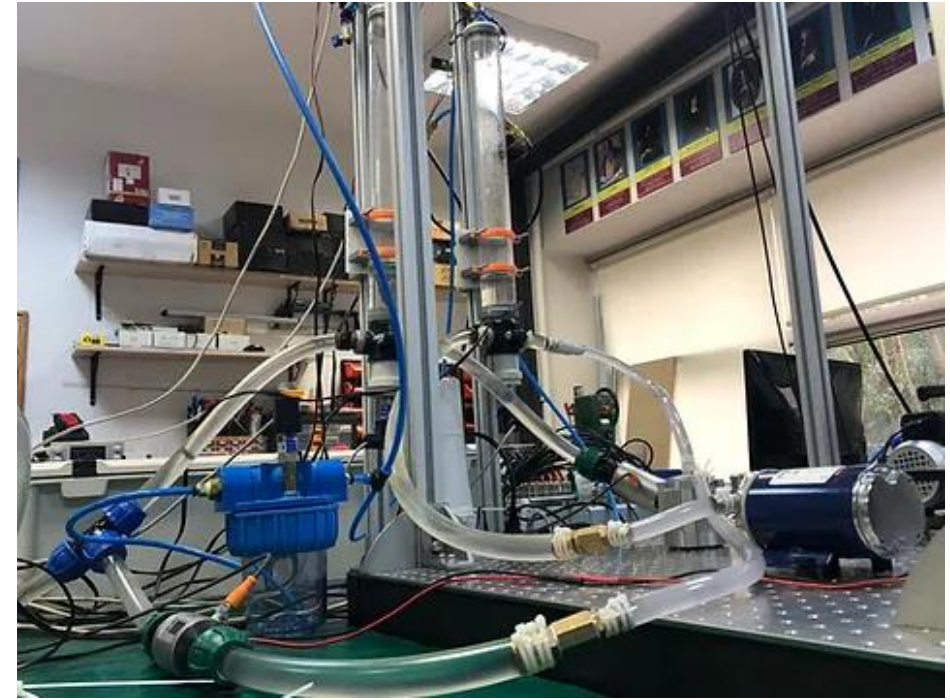


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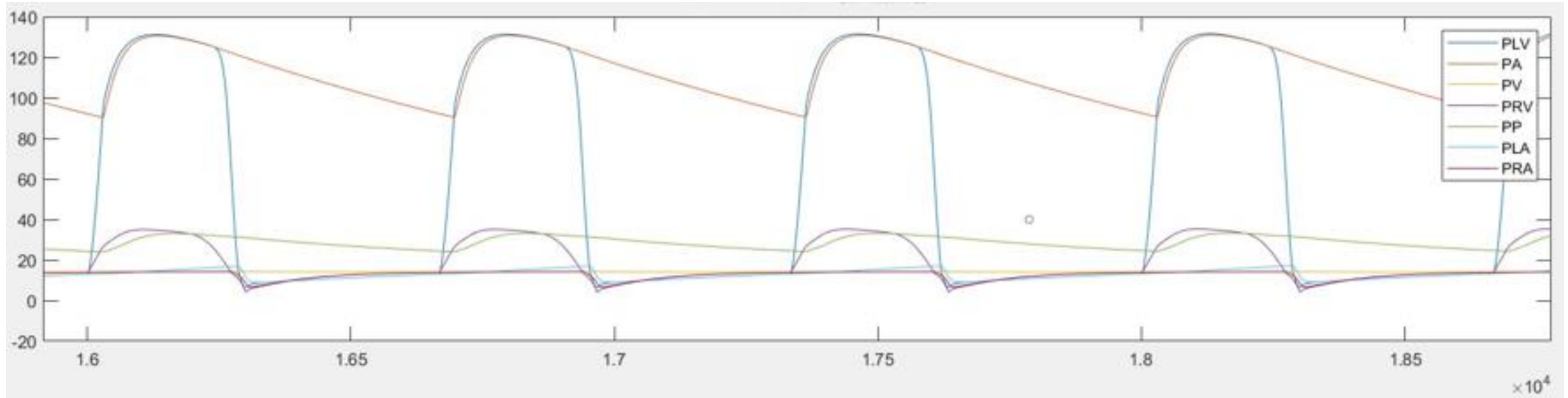
- Parçacık Hızı Görüntüleme



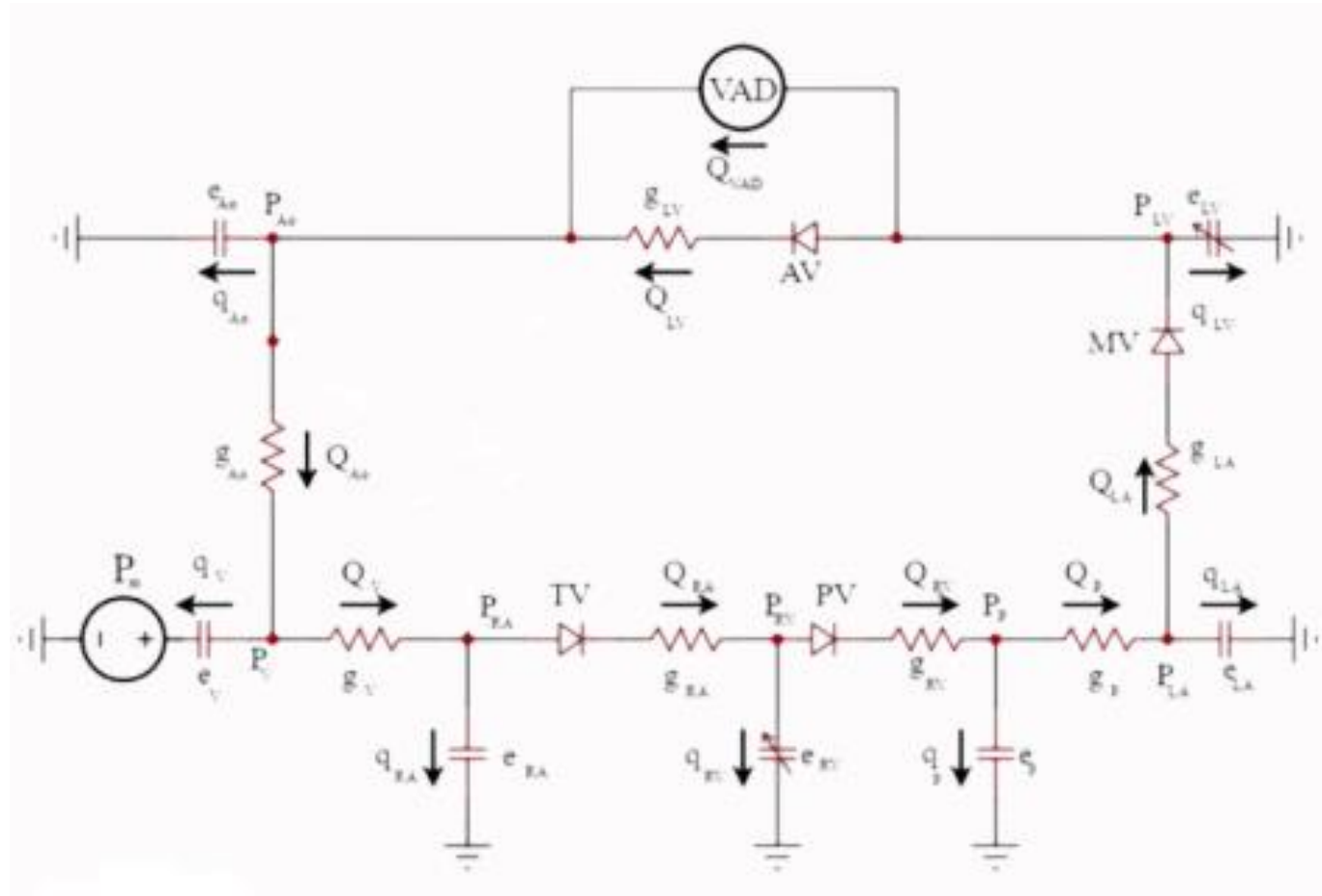
- Kalp Benzetim Devresi



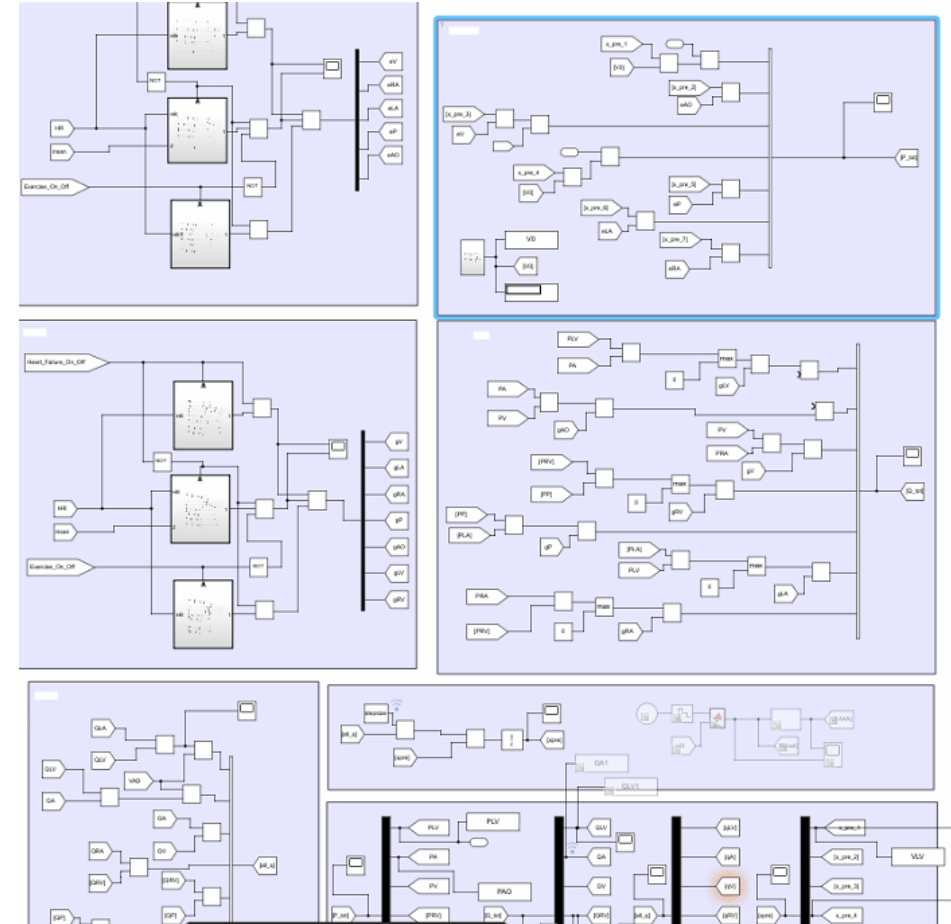
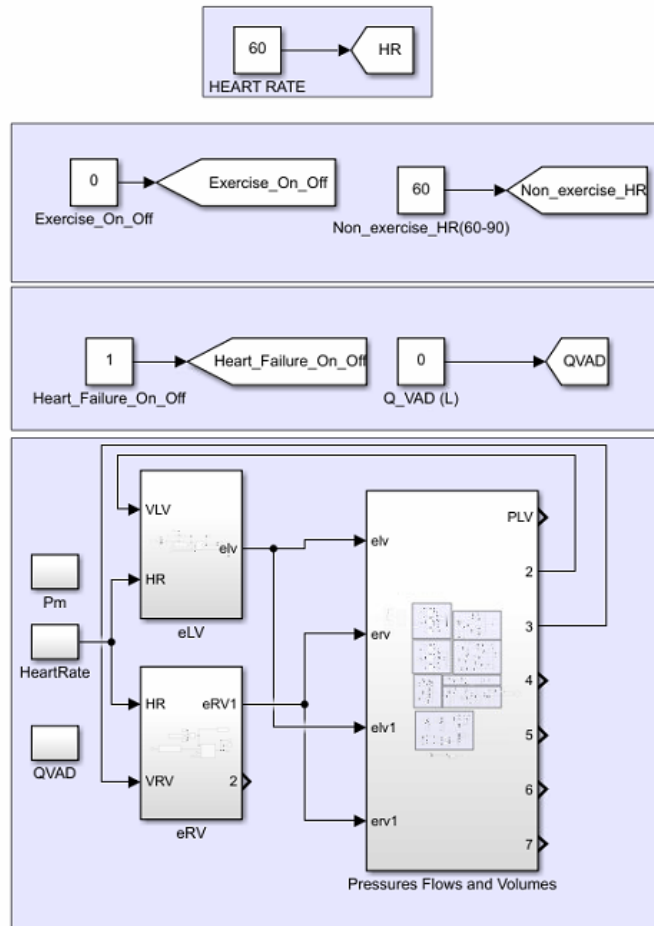
CVS Referans Basınçlar



CVS Numerik Sistem



Kardiyovasküler Sistem SIMULINK



Kardiyovasküler Sistem MATLAB

```

314 %% Pressure Equations
315 - A =Volume(k-1,1:7);
316 - PLV = elv*(A(1)-V0_LV);
317 - PA = eA*A(2);
318 - PV = eV*(A(3))+PM;
319 - PRV = erv*(A(4)-V0_RV);
320 - PP = eP*A(5);
321 - PLA = eLA*A(6);
322 - PRA = eRA*A(7);
323 %% Flow Equations
324 - QLV = max(0, (PLV-PA)*gLV);
325 - QA = (PA-PV)*gA;
326 - QV = (PV-PRA)*gV;
327 - QRV = max(0, (PRV-PP)*gRV);
328 - QP = (PP-PLA)*gP;
329 - QLA = max(0, (PLA-PLV)*gLA);
330 - QRA= max(0, (PRA-PRV)*gRA);
331
332 %% State Equations
333 - qLV = QLA-QLV;
334 - qA = QLV-QA;
335 - qRV = QRA-QRV;
336 - qP = QRV-QP;
337 - qLA = QP-QLA;
338 - qV = QA-QV;
339 - qRA= QV-QRA;
340

```

```

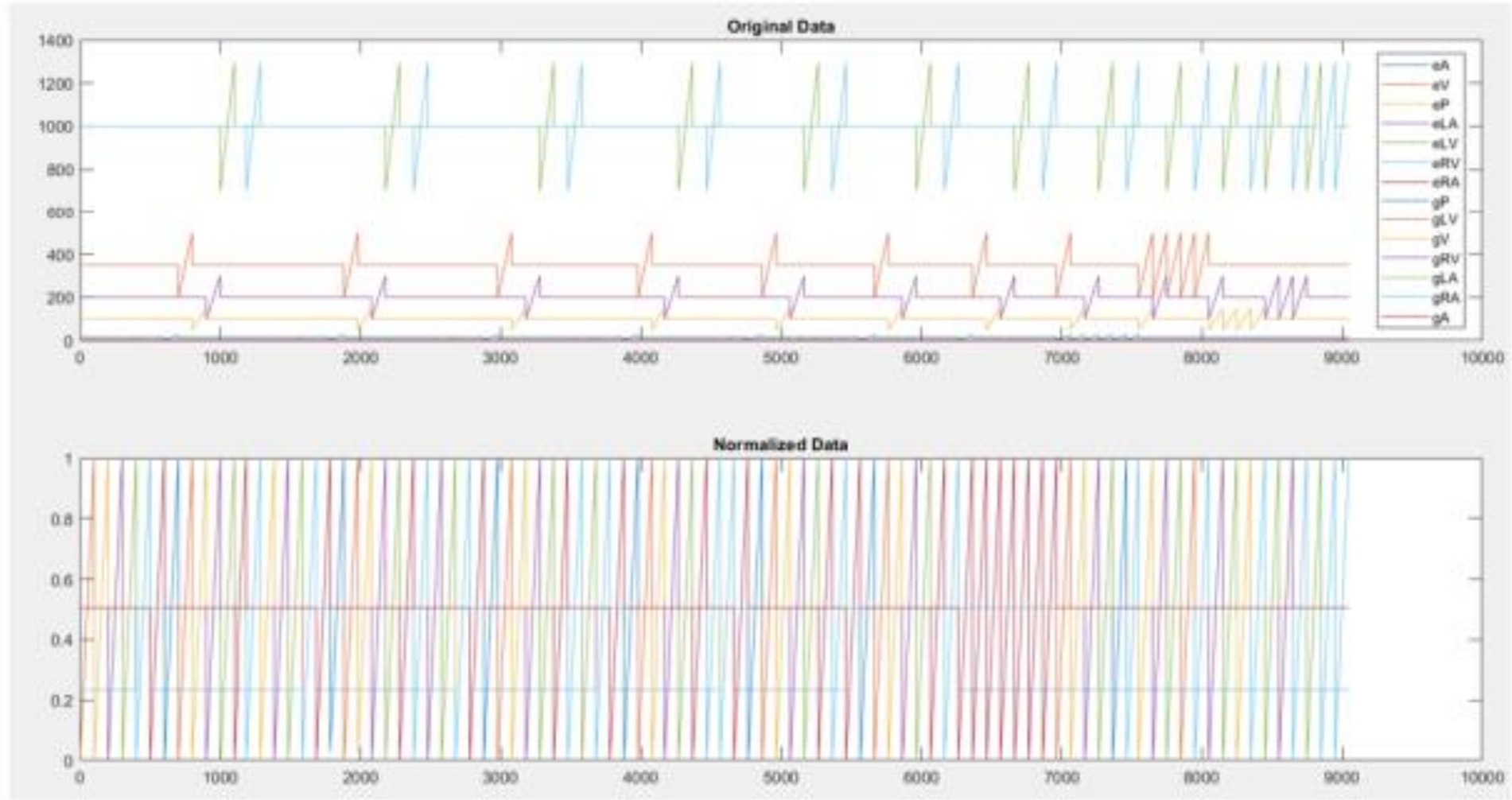
367 %% V min , Pressure of V min
368 - VLV = Volume(:,1);
369 - PLV = P(:,1);
370
371 - VLV_min = min(VLV(Steady_state_time_2:Steady_state_time_1));
372 - k_min = find(VLV(Steady_state_time_2:Steady_state_time_1)== VLV_min);
373 - k_min = k_min + Steady_state_time_2;
374 - PLV_VLV_fmin = PLV(k_min);
375
376 - P_es = max(PLV_VLV_fmin);
377 - k_es = find(VLV==VLV_min & PLV==P_es);
378 - P_bf = min(PLV_VLV_fmin);
379 - k_pbf = find(PLV==P_bf) -1;
380 - P_bf = PLV(k_pbf);
381
382
383 - k_bf = find(VLV==VLV_min & PLV==P_bf); % index of begin filling
384
385 %% V max, Pressure of V max
386 - VLV_max = max(VLV(Steady_state_time_2:Steady_state_time_1));
387 - k_max = find(VLV(Steady_state_time_2:Steady_state_time_1)==VLV_max);
388 - k_max = k_max + Steady_state_time_2;
389
390 - PLV_VLV_fmax = PLV(k_max);
391 - P_ed = min(PLV_VLV_fmax);
392 - k_ed = find(VLV==VLV_max & PLV==P_ed); % index of end diastole

```

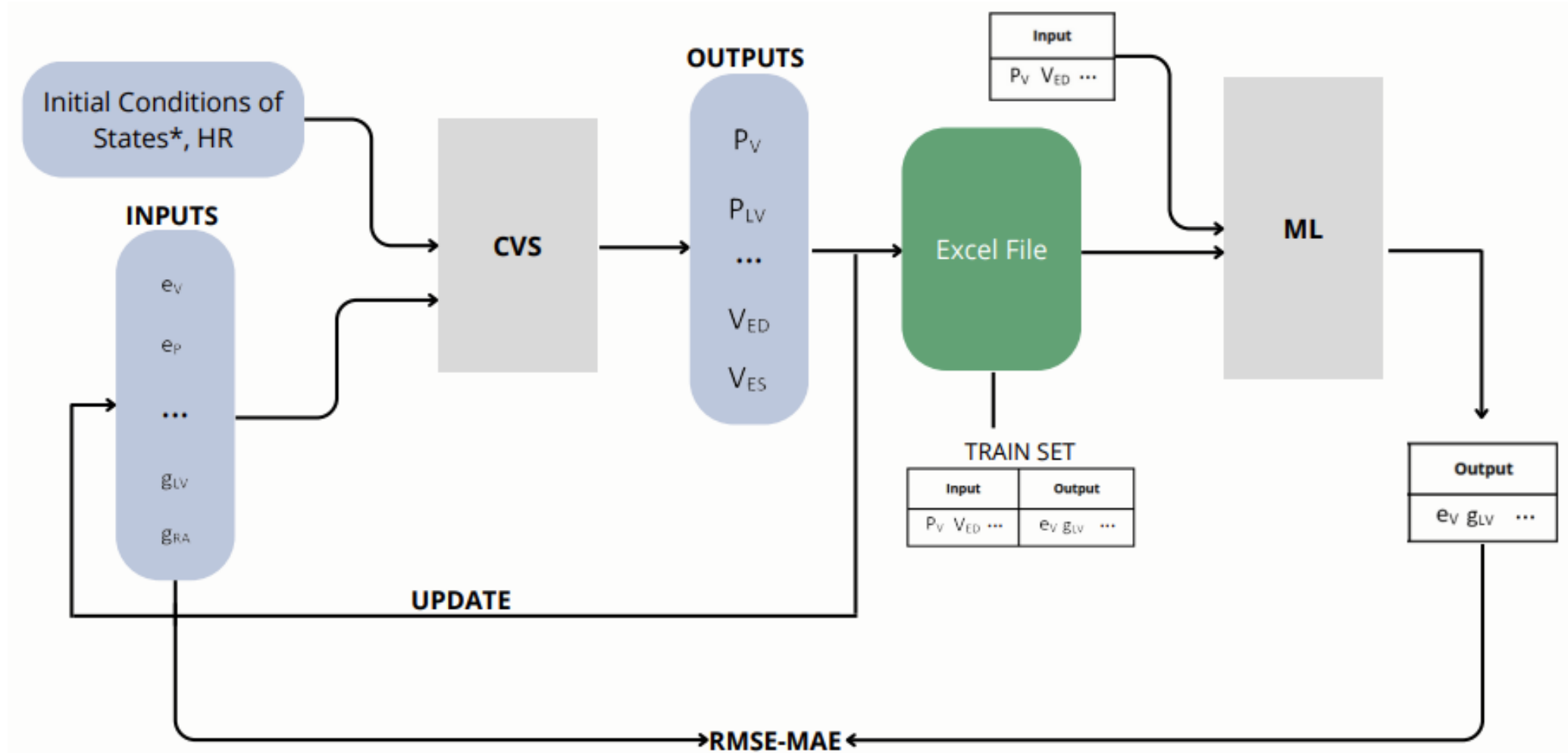
Dataset

INPUTS										OUTPUTS					
	ED			ES			LV			Elastances			Admittances		
	P_{LV}	P_V	...	P_{LV}	P_V	...	EDV	ESV	SV	e_v	e_p	...	g_{LV}	g_{RA}	...
1.	20,4	18,2	...	90,7	8,66	...	40	154	114	0,0034	0,15	...	305	750	...
2.	20,8	18,5	...	93,6	9,45	...	42	159	117	0,0038	0,19	...	308	754	...
...
9000	34,4	32,5	...	127	22,2	...	50	174	124	0,005	0,22	...	350	850	...

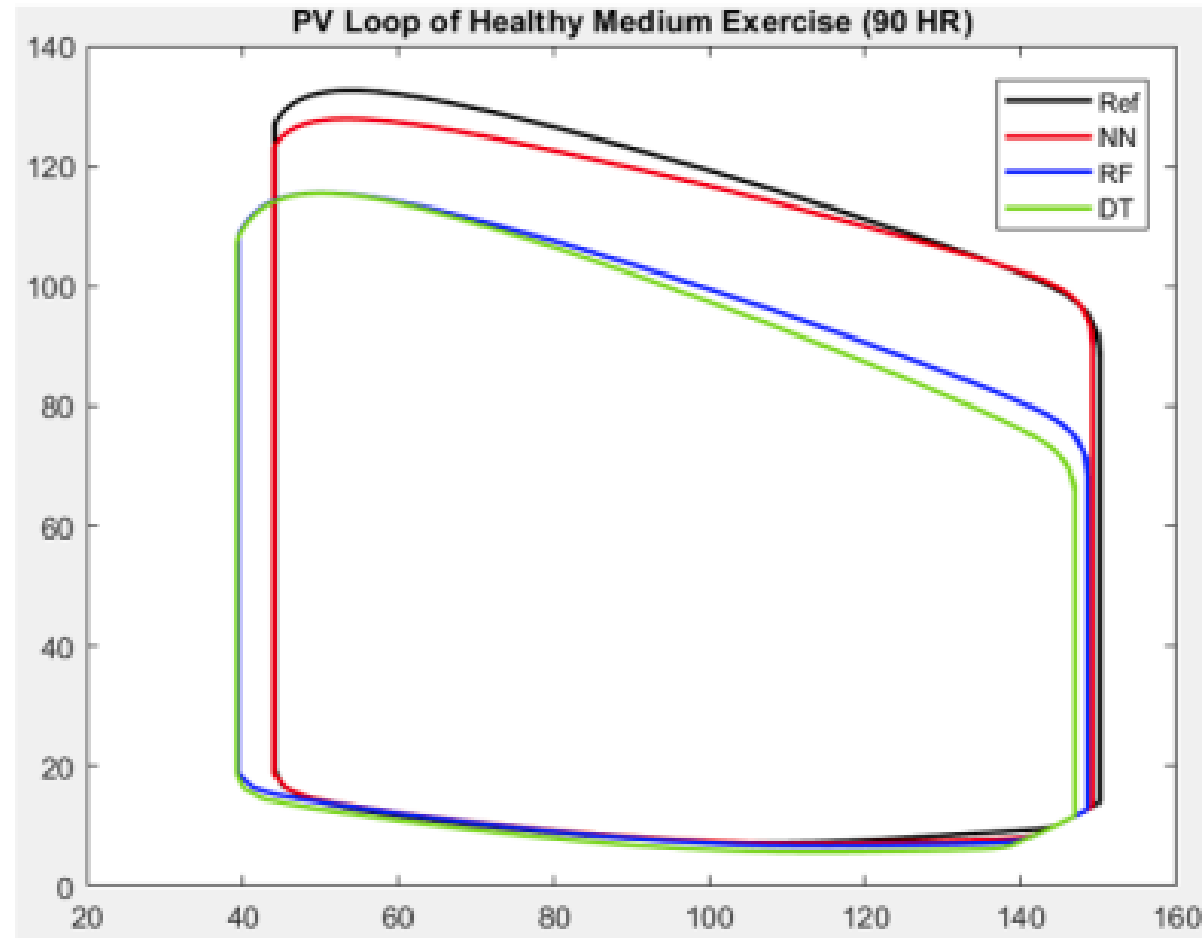
Data ön işleme MATLAB



Metot Machine Learning Toolbox



Çıktılar



Gelecekteki Planlar

- İlaç etkileri
- Tıp Eğitimi
- Tanı & Teşhis
- Fizyolojik Sistem Mekanizmaları

Teşekkürler



Doç. Dr. A. Kamuran
KADIPAŞAOĞLU.



Melisa ÖZAKÇAKAYA

Dinlediđiniz için teŖekkürler

Q&A – 5min

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