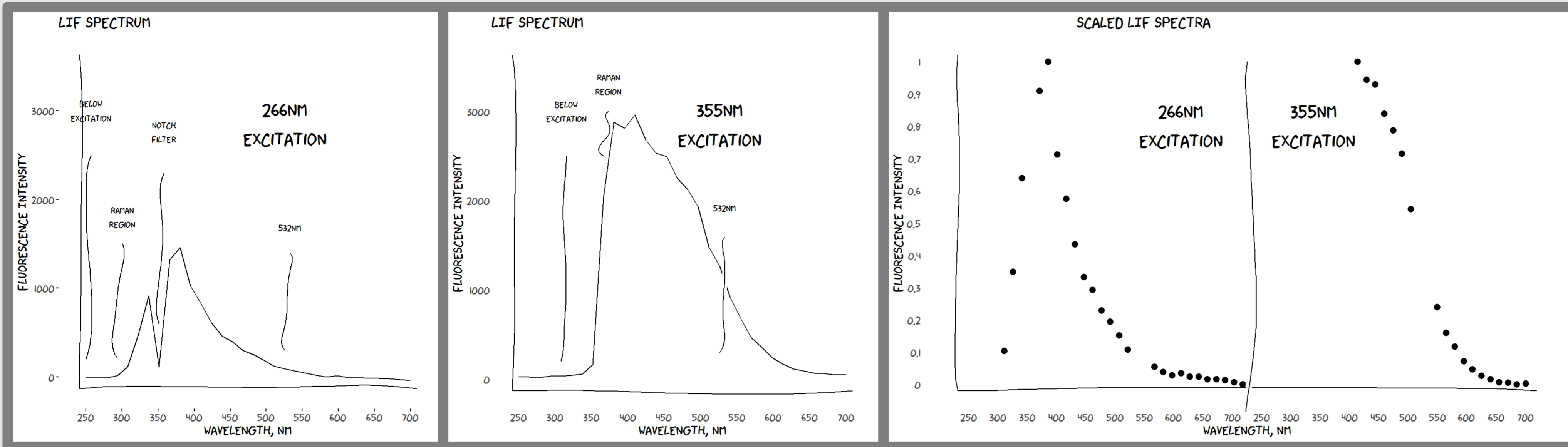
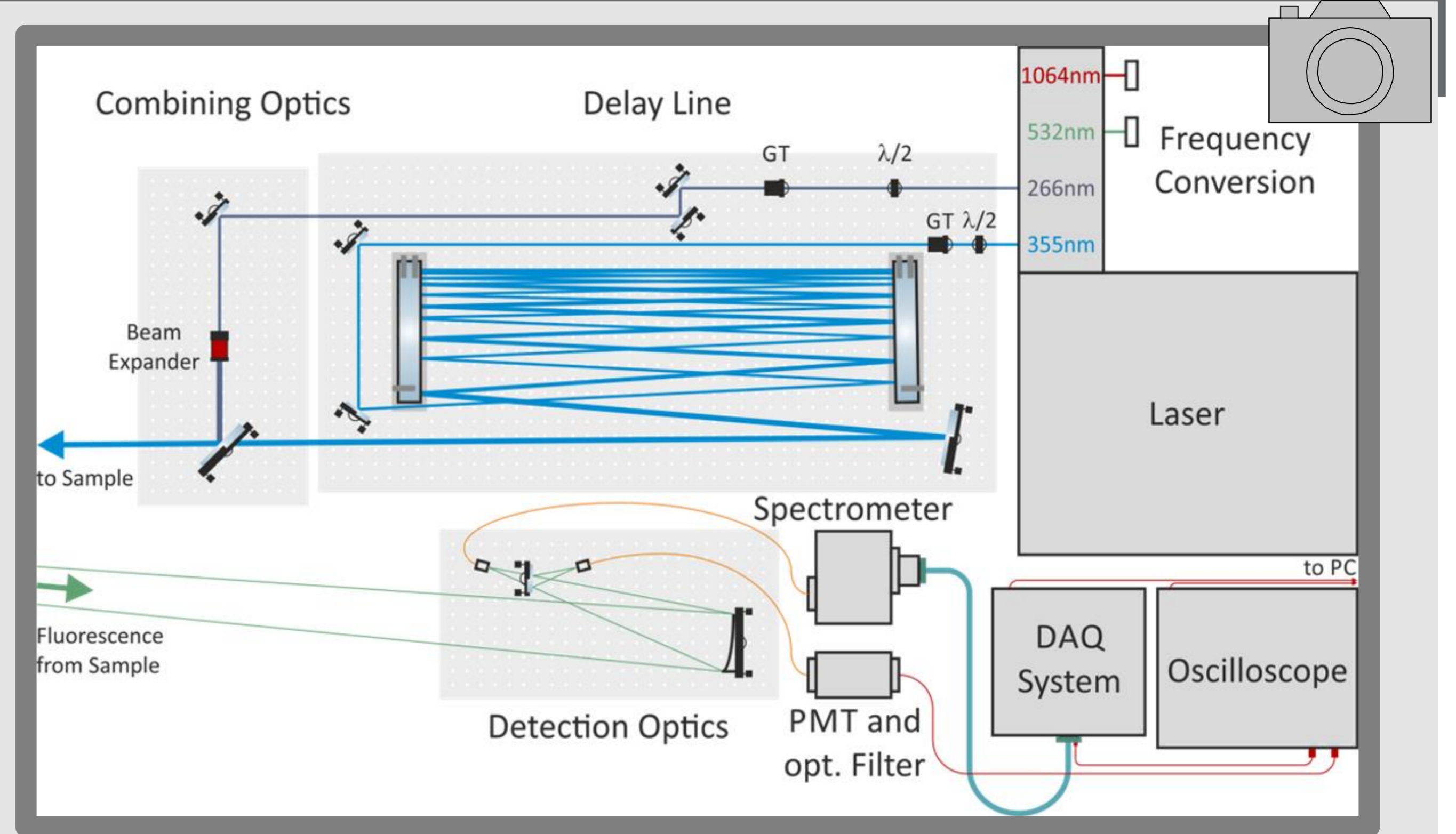
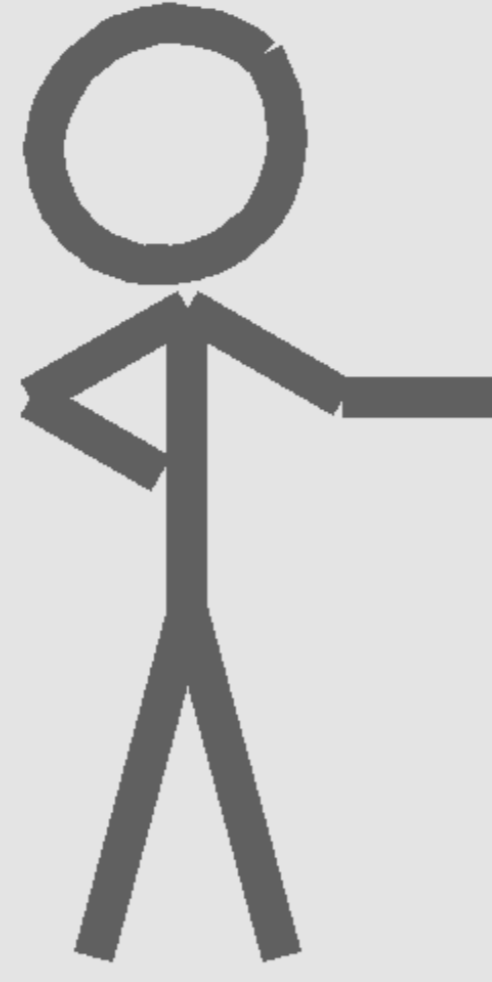


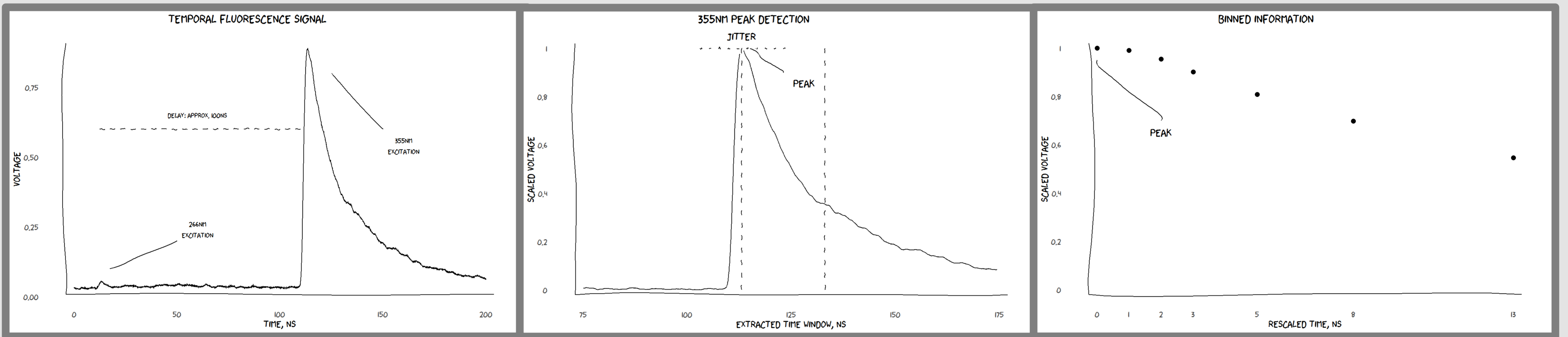
# FAST STANDOFF INVESTIGATION OF CHEMICAL AND BIOLOGICAL SAMPLES USING LASER INDUCED FLUORESCENCE SIGNALS, MACHINE LEARNING AND AN INTERACTIVE INTERFACE

## OVERVIEW:

LASER INDUCED FLUORESCENCE (LIF) USED TO DISTINGUISH PURE SUBSTANCES FROM A DISTANCE OF 22 M  
 SIMULTANEOUSLY EMITTED LASER PULSES (266 & 355 NM)  
 TEMPORALLY SHIFTED BY TWO TILTED MIRRORS  
 PULSE WIDTH: 0.7 NS, ENERGY: 0.01-200 μJ, RATE: 100 HZ  
 TRAINING OF DIFFERENT CLASSIFICATION ALGORITHMS  
 AUTOMATIC CLASSIFICATION IN 3-4 S  
 ACCURACY OVER 95%  
 OPTIONAL SCALING OR AVERAGING  
 CONTINUOUS MEASUREMENTS POSSIBLE  
 MORE THAN 40 SUBSTANCES IN DATABASE  
 G.U.I. WITH SIMPLE AND DETAILED RESULTS



27 SUBSTANCES  
 500 SPECTRA PER SUBSTANCE  
 43 SPECTRAL FEATURES  
 7 TEMPORAL FEATURES



## METHOD: NEURAL NETWORK

SPECTRAL CLASSIFICATION			TEMPORAL CLASSIFICATION		
ACCURACY:	BACTERIA	CHEMICALS	ACCURACY:	BACTERIA	PLANTS
0.9979			0.7813		
BACTERIA	1124	1	BACTERIA	872	138
CHEMICALS		999	CHEMICALS	96	827
PLANTS	4	1	PLANTS	200	112
		1245			938

COMBINED CLASSIFICATION		
ACCURACY:	BACTERIA	PLANTS
0.9998		
BACTERIA	1124	1
CHEMICALS		1000
PLANTS	2	1
		1247

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Substance	ANN	C5.0	RFO	SVM
Diesel	87	57	70	82
Motoroel	9	43	26	9
MicrococcusLuteus	2	0	4	0
BacillusThuringiensis	1	0	0	0
Petroleum	1	0	0	0