Supplementary Information

Supplementary Methods:

Concepts and Keywords

1. PTSD:

    1. stress disorders, post-traumatic/

    2. (PTSD or PTSI or PTSS or ((posttraumatic or post traumatic or combat or trauma*) adj1 (growth or stress* or neurosis or neuroses or nightmare*)) or ((traumatic) adj (stress disorder* or stress symptom* or stress injur*)) or shell shock* or shellshock*).mp.

2. Artificial intelligence:

    (Artificial intelligence or AI or computer-assisted or image classification or image analysis or computer vision or deep learning or machine learning or natural language processing or NLP).mp.

    (Algorithm* AND computer*)?

3. Diagnosis/ Prediction

    sensitiv*.mp. OR specificity.mp. Or diagnos*.mp. OR di.fs. Or predict*.mp.

DB1: Ovid MEDLINE(R) ALL <1946 to October 17, 2022>

1 stress disorders, post-traumatic/ 39597

2 (PTSD or PTSI or PTSS or ((posttraumatic or post traumatic or combat or trauma*) adj1 (growth or stress* or neurosis or neuroses or nightmare*)) or (traumatic adj (stress disorder* or stress symptom* or stress injur*)) or shell shock* or shellshock*).mp. 52069

3 1 or 2 61030

4 artificial intelligence/ or machine learning/ or deep learning/ or supervised machine learning/ or support vector machine/ or unsupervised machine learning/ or sentiment analysis/ 81411

5 (Artificial intelligence or AI or computer-assisted or image classification or image analysis or computer vision or deep learning or machine learning or natural language processing or NLP or Neural Network or speech recognition or pattern recognition or classification algorithm or support vector machine or random forest or classifier).mp. 647808

6 4 or 5 647851

7 (sensitiv* or specificity or diagnos*).mp. or di.fs. or predict*.mp. 8904558

8 3 and 6 and 7 578

DB2: Embase <1974 to 2022 October 17> (OVID Interface)

1 exp posttraumatic stress disorder/ 74094

2 (PTSD or PTSI or PTSS or ((posttraumatic or post traumatic or combat or trauma*) adj1 (growth or stress* or neurosis or neuroses or nightmare*)) or (traumatic adj (stress disorder* or stress symptom* or stress injur*)) or shell shock* or shellshock*).mp. 87248

3 1 or 2 87365

4 machine learning/ or exp artificial neural network/ or automated pattern recognition/ or automatic speech recognition/ or exp back propagation/ or bayesian learning/ or exp classification algorithm/ or classifier/ or exp feature detection/ or feature extraction/ or exp "feature learning (machine learning)"/ or learning algorithm/ or network learning/ or random forest/ or semi supervised machine learning/ or supervised machine learning/ or exp support vector machine/ or unsupervised machine learning/ 224796

5 (Artificial intelligence or AI or computer-assisted or image classification or image analysis or computer vision or deep learning or machine learning or natural language processing or NLP or Neural Network or speech recognition or pattern recognition or classification algorithm or support vector machine or random forest or classifier).mp. 1525871

6 4 or 5 1537810

7 (sensitiv* or specificity or diagnos*).mp. or di.fs. or predict*.mp. 11020734

8 3 and 6 and 7 992

9 limit 8 to conference abstracts 176

10 8 not 9 816

DB3: APA PsycInfo <1806 to October Week 2 2022>

1 posttraumatic stress disorder/ or "stress and trauma related disorders"/ or complex ptsd/ or desnos/ or posttraumatic stress/ or traumatic experiences/ 39992

2 (PTSD or PTSI or PTSS or ((posttraumatic or post traumatic or combat or trauma*) adj1 (growth or stress* or neurosis or neuroses or nightmare*)) or (traumatic adj (stress disorder* or stress symptom* or stress injur*)) or shell shock* or shellshock*).mp. 65069

3 1 or 2 65586

4 machine learning/ or artificial intelligence/ or exp machine learning algorithms/ or exp "pattern recognition (computer science)"/ or exp artificial neural networks/ or exp neural networks/ or exp text analysis/ 58297

5 (Artificial intelligence or AI or computer-assisted or image classification or image analysis or computer vision or deep learning or machine learning or natural language processing or NLP or Neural Network or speech recognition or pattern recognition or classification algorithm or support vector machine or random forest or classifier).mp. 128629

6 4 or 5 154635

7 (sensitiv* or specificity or diagnos* or predict*).mp. 1052949

8 3 and 6 and 7 535

DB4: Scopus

Results: 1129

Date searched: Oct 18, 2022

TITLE-ABS-KEY(PTSD or PTSI or PTSS or ((posttraumatic or post-traumatic or combat or trauma*) W/1 (growth or stress* or neurosis or neuroses or nightmare*)) or (traumatic W/1 (stress-disorder* or stress-symptom* or stress-injur*)) or shell-shock* or shellshock*) AND TITLE-ABS-KEY(Artificial-intelligence or AI or computer-assisted or image-classification or image-analysis or computer-vision or deep-learning or machine-learning or natural-language-processing or NLP or Neural-Network or speech-recognition or pattern-recognition or classification-algorithm or support-vector-machine or random-forest or classifier) AND TITLE-ABS-KEY(sensitiv* or specificity or diagnos* or predict*)

DB5: IEEE

Searched Oct 18, 2022

"Post traumatic stress disorder" and "machine learning" and diagnosis - 7 results

"Post traumatic stress disorder" and "machine learning" and predict* - 8 results

"Post traumatic stress disorder" and "deep learning" and predict* - 1 results

"Post traumatic stress disorder" and "deep learning" and diagnosis - 2 results

"Post traumatic stress disorder" and "artificial intelligence" and diagnosis - 7 results

"Post traumatic stress disorder" and "artificial intelligence" and predict* - 10 results

DB6: Engineering Village (formerly compendex)

Searched Oct 18, 2022

Results: 93

SUBJECT/TITLE/ABSTRACT : (PTSD or traumatic-stress-disorder* or traumatic-stress-symptom* or traumatic-stress-injur* or shell-shock* or shellshock*)

AND

SUBJECT/TITLE/ABSTRACT : (Artificial-intelligence or AI or computer-assisted or image-classification or image-analysis or computer-vision or deep-learning or machine-learning or natural-language-processing or NLP or Neural-Network or speech-recognition or pattern-recognition or classification-algorithm or support-vector-machine or random-forest or classifier)

AND

SUBJECT/TITLE/ABSTRACT : (sensitiv* or specificity or diagnos* or predict*)

Supplementary Table 1:

	Diagnostic Method	Data Source	Best ML Model	Performance Metrices	Predictive Features	Sample Size	Validation Method
Banerjee et al. (44)	Clinical Interviews	TIMIT Speech	DL	ACC: 0.7499	Acoustic features	168 for speech	LOOCV
		Corpus and				and 26 for PTSD	
		PTSD					
		Speech Corpus				diagnosis	
Marmar et al. (45)	Clinical Interviews	veteran	RF	ACC: 0.891	Quality of speech	129 samples (52	cross-validation
				AUC: 0.954		PTSD and	
						77 HC)	
He et al.(46)	Clinical Interviews	Heterogenous	product score	With threshold = 0:	Text mining results	300 with 150	15 fold CV
			model	SEN: 0.85,SPE: 0.78	Bag of words	PTSD and 150	
				ACC: 0.82		non-PTSD	
Schultebraucks et al. (47)	Clinical Interviews	trauma witness	DL	AUC: 0.90, PRE: 0.84	video-based marker,	81 patients	10 fold CV
				RECALL: 0.84 ,F1: 0.83	audio-based marker,		
					facial features		
Gupata et al. (48)	Clinical Interviews	TIMIT and FEMH	XGB	TIMIT: ACC: 0.975,	Prosodic features,	not mentioned	not mentioned
		dataset,		SPE: 0.952, SEN: 0.945	excitation features,		
		heterogenous		RECALL: 0.938	vocal tract features		
				FEHM: ACC: 0.9629,			
				SPE:0.9353, SEN: 0.927			
				RECALL: 0.904			
Sawalha et al. (49)	Clinical Interviews	AVEC-19 corpus,	RF combined	ACC: 0.804, AUC: 0.80	Semantic features	275 participants	5 fold CV

		Veterans (105	Vader semantic	F1 for control: 0.85	Binning different	(188 HC and 87	
		females)	analyzer	F1 for target: 0.72	words,	PTSD)	
			outperforms the		23 bins are the best		
			rest				
Breen et al. (42)	Neuroimaging (EEG)	Trauma witness	SVM	ACC: 0.8	subjective and	60 participants	LOOCV
					objective	(20 PTSD, 20 TE	
					sleep, neutral	and 20 HC)	
					declarative memory		
					, and metabolite		
					variables.		
Shim et al. (36)	Neuroimaging (EEG)	Heterogenous	SVM	ACC: 0.8 ,SEP: 0.8627	P300 signal	90 participants	LOOCV
				SEN: 0.7179		(51 PTSD and 39	
						healthy)	
Kim et al. (37)	Neuroimaging (EEG)	Heterogenous	Riemannian	ACC: 0.7309 ,SEN:	EEG source	81 participants	10 fold CV
			geometry-based	0.6872 SPE: 0.7714	covariance	(39 HC and 42	
			classifier	,AUC:0.7970		PTSD)	
Park et al. (38)	Neuroimaging (EEG)	Heterogenous	Elastic net	ACC: 0.9121	EEG parameters in	223patients (95	10 fold CV
					each	healthy control	
					frequency band	and 128 PTSD)	
Terpou et al. (39)	Neuroimaging (EEG)	Heterogeneous	SVM	with alpha band	microstate-based	122 participants	10 fold CV
				ACC:0.76 ,SEN:0.79	segmentation of	(61 PTSD and 61	
				SPE:0.74 ,AUC:0.75	various frequencies	HC)	
Shim et al. (40)	Neuroimaging (EEG)	Heterogenous	SVM	ACC: 0.8661	PSDs were extracted	135 participants	LOOCV
				AUC: 0.93	from 6 frequency bands	(77 PTSD and 58	

						HC)	
Li et al. (41)	Neuroimaging (EEG)	firefighters	Light GBM	AUC: 0.93	EEG signals	1107 participants	5 fold CV
			model. Gradient	SEN and SPE >0.85	startle potentiation feat,		
			boosting		generalization feat,		
			decision tree		fear extinction feat		
					,stimulus feat		
Tahmasian et al. (43)	Neuroimaging (EEG)	veteran	SVM	ACC:0.916	Subjective or	64 participants	LOOCV
				SEN:0.93, SPE:0.903	objective	(32 PTSD, 32	
					sleep assessment	HC)	
Georgopoulos et al. (23)	Neuroimaging	veteran	LDA	ACC >0.9	SNI	324 veterans	cross-validation
	(MEG)						
Gong et al. (24)	Neuroimaging (MRI)	Disaster	SVM	PTSD vs HC: 91%	grey and white	140 (50 PTSD, 50	LOOCV
		witness		PTSD vs TE: 67%	matter	TE, 40 HC)	
Nicholson et al. (25)	Neuroimaging (MRI)	Heterogenous	Multiclass	Balanced ACC:0.9163	resting-state mALFF,	181 participants	LOOCV
			Gaussian Process		amygdala complex	(81 PTSD, 49	
			Classification		connectivity maps	PTSD+DS, 51 HC)	
Harricharan et al. (26)	Neuroimaging (MRI)	Heterogenous	multiclass	ACC > 0.80 for HC,	anterior insula and	184 participants	LOOCV
			Gaussian process	PTSD,	posterior insula	(84 PTSD, 49	
			classification	and PTSD + DS		PTSD+DS, 51 HC)	
Zhang et al. (27)	Neuroimaging (MRI)	Trauma witness	SVM	ACC: 0.8919	GMV, ALFF, and	57 participants:	LOOCV
				AUC 0.90	regional homogeneity	17 PTSD, 20 TE	

						and 20 HC	
Zhang et al. (28)	Neuroimaging	veteran (all male)	SVM	AUC: 0.90	MEG frequency bands	44 veterans (23	10 fold
	(MEG)				(alpha, gamma...)	PTSD and 21 HC)	
Zilcha-Mano et al. (29)	Neuroimaging (MRI)	Heterogenous	SVM	ACC: 0.706	ECN, SN	179 participants	10 fold CV
				AUC 0.87		(51 PTSD, 52	
						PTSD+MD and	
						76TEHCs)	
Shahzad et al. (30)	Neuroimaging (MRI)	Veterans	ANN	Left brain : ACC: 0.8004,	the amygdala,	28 individuals	5 fold CV
				AUC: 0.877, SPE:	hippocampus, and	with 14 PTSD and	
				0.8122 SEN: 0.7771	medial prefrontal cortex	14 HC	
				Right brain : ACC: 0.9302,	in the left, right, and		
				AUC: 0.98, SPE: 0.9694	both hemispheres.		
				SEN: 0.8933			
				Both brains : ACC: 0.9412,			
				AUC: 0.984, SPE: 0.9103			
				SEN: 0.9942			
Yang et al. (31)	Neuroimaging (MRI)	trauma witness	Deep learning	ACC:0.712	Brain functioning groups	86 participants	10 fold CV
				SEN: 0.597	Frontoparietal areas	(33 PTSD, 53 HC)	
				SPE: 0.827			
James et al. (32)	Neuroimaging	Veteran	LDA	ACC: 100%	SNI	121 veterans	LOOCV
	(MEG)	(all female)					

Nicholson et al. (33)	Neuroimaging (MRI)	Heterogenous	MKL	ACC: 0.8	real-time fMRI	29 patients (14	LOOCV
				AUC: 0.85	neurofeedback, Brain	PTSD 15 HC)	
					regions		
Zhu et al. (34)	Neuroimaging (MRI)	trauma witness	DL	ACC: 0.80	Brain structures: CEN,	217 participants	5 fold CV
				SEN: 0.809	SN, DMN…	(91 PTSD and 126	
				SPE: 0.792		HC)	
Saba et al. (35)	Neuroimaging (MRI)	heterogeneous	KNN and SVM	KNN train-vali-test ACC:	brain regions: Prec TM	24 patients (14	validation set
				(96.6%, 94.8%, 98.5%)	HC Amyg MPFC	PTSD 14 HC)	
				SVM train-vali-test ACC:			
				(93.7%, 95.2%, 99.2%)			
Tylee et al. (58)	Other: Blood	veterans	SVM	biomarker panel based on	peripheral blood	50 patients (25	10 fold CV
				20 exons attained ACC:0.9	biomarkers, exons	PTSD and 25 HC)	
Gavrilescu et al. (59)	Other: Facial Action	Heterogenous	AAM+SVM+FFNN	ACC: 0.902	Facial expression	128 Caucasians	not mentioned
					recording	with 17 PTSD	
Lekkas et al. (60)	Other: GPS	trama witness (all	XGB	AUC:0.816	daily time spent away	185 women	10 fold CV
		female)		SEN:0.743	and maximum		
				SPE:0.80	distance traveled from		
				ACC:0.771	home		
Zafari et al. (61)	Other: Medical record or	Heterogenous	RF	ACC:0.99, SPE:1.0,	patient demographics,	154118 patients	10 fold CV

	personal record			SEN:0.78, F:0.78,	medical conditions, and		
				AUC:0.89	financial conditions		
Gagnon-Sanschagrin et al. (63)	Other: Medical record or personal record	IBM MarketScan Commercial Subset	RF	AUC: 0.75	Personal medical records	2124496 patients	not mentioned
Ismail et al. (62)	Other: social media	trauma witness	CNN	ACC: 0.9129	Social media keywords	Not mentioned	5 fold CV
Kessler et al. (50)	Self-report	Trauma witness	Superlearner	AUC: 0.96	Personal experiences	47466 surveys	10 fold CV
	questionnaires						
Karstoft et al. (53)	Self-report	veteran	SVM	Pre-deployment :	Personal conditions	561 veterans	10 fold CV
	questionnaires			AUC: 0.84			
				Post-deployment:			
				AUC: 0.88			
He et al. (57)	Self-report	Heterogeneous	product score	PSM: ACC: 0.82 , SPE:	n-gram. Verbal features,	300 with 150	10 fold CV
	questionnaires	(mean age of 30.06	model	0.81 , AUC: 0.94	text mining	PTSD and 150 non-	
		; 65%females)				PTSD	
Portugal et al. (51)	Self-report	COVID-19 Health	SVM	Regression model	Predefined questions to	437 participants	5 fold and 2 fold
	questionnaires	workers(73.2%		NMSE = 0.90 for 5 fold ;	access		
		female, mean age		NMSE = 0.96 for 2 fold			
		of 39.5 with SD of					
		10.8)					

Campbell et al. (54)	Self-report	veteran	DT	ACC: 0.9	Combat Experiences	3212 veterans	validation set
	questionnaires				Scale items	(217 PTSD)	
Kim et al. (55)	Self-report	firefighter	SVM	ACC: 0.89, PER: 0.89	ICE-R, CESD, Suicide	2705 participants	10 fold CV
	questionnaires			RECALL: 0.89, F1: 0.89	Accident (SBQ-R), and		
				Support vectors: 20	Alcohol Drinking Scale		
					(AUDITK).		
Orovas et al. (52)	Self-report	Trauma witness	MLP	For PTSD group:	Demographics, prenatal	469 women	10 fold CV
	questionnaires			PRE: 0.83, RECALL: 0.89	health variables, mental		
				SPE: 0.98, ACC: 0.929	health variables…		
Bartal et al. (56)	Self-report	postpartum	DL(Transformer)	AUC: 0.75, F1: 0.76	semantic features (NLP)	1127 WOMEN (86	10 fold CV
	questionnaires	women		SEN: 0.8, SPE: 0.7		PTSD)	

Table 1: Selected information of included studies[1]

[1] Citation refers to the main manuscript. Abbreviations: EEG: Electroencephalogram; GPS: Global Positioning System; SVM: Support Vector Machine; GBM: Gradient Boosting Model; NB: Naive Bayes; DL: Deep Learning; RF: Random Forest; DT: Decision Tree; MLP: Multilayer Perceptron; XGB: Extreme Gradient Boosting; CNN: Convolutional Neural Network; LSTM: Long Short-term Memory; LDA: Linear Discriminate Analysis; KNN: K-nearest Neighbours; PCA: Principal Component Analysis; AAN: Active Appearance Models; FFNN: Feedforward Neural Network; SMO: Sequential Minimal Optimization; GRU: Gated Recurrent Unit; EE: Easy Ensembles; ACC: Accuracy; AUC: Area Under ROC Curve; SPE: Specificity; SEN: Sensitivity; PRE: Precision; PLV: Phase Locking Values; QEEG: Quantitative EEG; PSDs: Power Spectrum Densities; FC: Functional Connectivities; PSG: Polysomnogram MFCC: Mel-frequency Cepstral Coefficients; ALFF: Amplitude of Low-frequency Fluctuations; GMV: Gray Matter Volume; GM: Gray Matter; WM: White Matter; MEG: Magnetoencephalography; ECN: Executive Control Network; SN: Salience Network; DMN: Default Mode Network. LIWC: Linguistic Inquiry and Word Count; POF: Pattern of life; NLP: Natrual Language Processing; MD: Major Depression; HC: Healthy Controls; TE/TEC: Trauma Exposed Controls; LOOCV: Leave-one-out Cross-validation.