

FEV Signature Solutions

Safe Artificial Intelligence

FEV.io

We develop, integrate and monitor your safe AI systems

FEV offers

- ▶ ISO/PAS 8800 compliant development
- ▶ Guideline for AI in safety-critical applications – quick check to determine safety relevant process gaps
- ▶ Safety focused neural network training – reducing safety-relevant misclassifications of neural networks
- ▶ Transparent and verifiable AI-architectures – enhancing decision accuracy and transparency with hierarchical classification

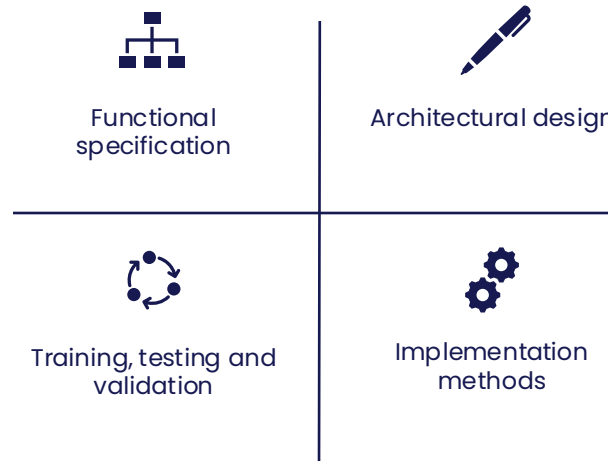
Why FEV

- ▶ Technical expertise in AI safety, approved by industry partners and independent research institutes
- ▶ Patent-applied AI classification and training methods
- ▶ Proven framework for AI safety and explainability
- ▶ Domain-independent solutions adaptable to various industries
- ▶ Seamless integration with existing AI-driven systems



Method: Guideline for AI in safety-critical applications

QUICK CHECK TO DETERMINE SAFETY RELEVANT PROCESS GAPS



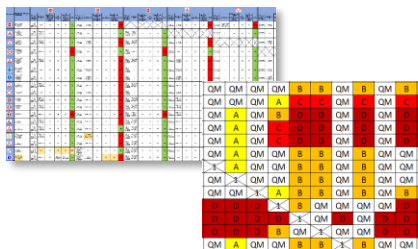
➤ Publicly available:
<https://tinyurl.com/FEVetamax>



- Guideline for development and deployment of AI in safety-critical applications
- Approved by independent research institutes
- Consists of 15 golden rules
- Covers complete lifecycle
- Domain independent
- Reduces aversion to implement AI
- Support ISO/PAS 8800 implementation

Method: Safety focused neural network training

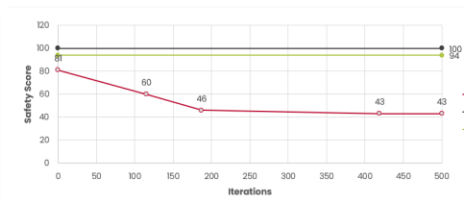
REDUCING SAFETY RELEVANT MISCLASSIFICATIONS OF NEURAL NETWORKS



1. Performing AI specific hazard and risk analysis and generating a risk matrix with application specific safety weights

ASIL	QM	A	B	C	D
Safety weights	1	4	8	16	32
Training weights	3.6	16.4	1.0	9.5	28.0
No. of misclassifications	3	2	2	1	0
Safety score summands	3	8	16	16	0

2. Start training process optimizing the safety score which is based on the safety weights and the number of misclassifications



3. Variation of training weights sets and iteration of trainings to determine the parameters with the best safety score

ASIL	QM	A	B	C	D
Safety weights	1	4	8	16	32
Training weights	3.6	16.4	1.0	9.5	28.0
No. of misclassifications	3	2	2	1	0
Safety score summands	3	8	16	16	0

4. Choosing the training weight set of the neural network with the best safety score and use the argumentation for the safety case

ACCURACY 89.8%

SAFETY SCORE 43

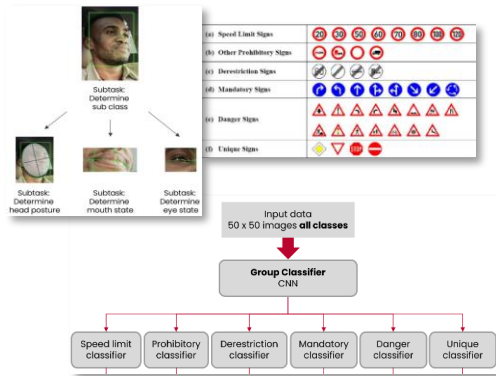

Patent application
SAFETY FOCUSED
NEURAL NETWORK
TRAINING
Hans Böhme
Amai Rivas Manchola
DE 10 2024 131 875.9

- Addresses how to specify safety requirements
- Safety Score KPI enables the quantification of safety in compliance with ISO/PAS 8800
- Derive specific safety requirements for the training of neural networks
- Reduction of safety-critical misclassifications
- Solution is flexibly adaptable to any AI classification task

Method: Transparent and verifiable AI-architectures

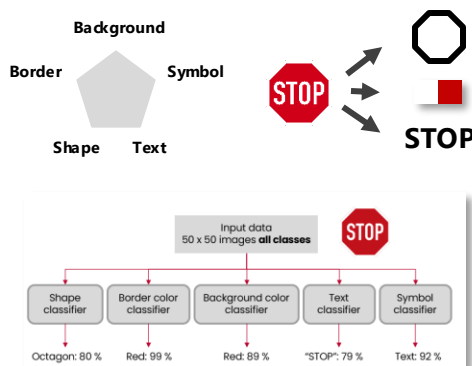
ENHANCING DECISION ACCURACY AND TRANSPARENCY WITH HIERARCHICAL CLASSIFICATION

Option A: Object group architecture



1. Divide classes in subgroups, with specialized sub-classifiers based on **visual similarities**
2. Add „rejection“ class, a confidence threshold and perform rule enhanced classification
3. Optimize the parameters of the neural networks towards the best safety score

Option B: Feature specialization architecture



1. Divide classes in subgroups, with specialized sub-classifiers based on **geometric features**
2. Each sub-classifier focuses on a single geometric feature
3. Optimize the parameters of the neural networks towards the best safety score



Patent application
AI TRAFFIC SIGN
CLASSIFICATION WITH
SYNTHETIC TRAINING
DATA
Enrico Astfalk
DE 10 2023 125 032.9



Patent application
PARALLEL AI TRAFFIC
SIGN DETECTION BASED
ON FEATURES
Amai Rivas Manchala
Alexander Weiß
Enrico Astfalk
DE 10 2024 004 064.1

- Addresses specification gap in ISO/PAS 8800 regarding architecture
- Focus on AI explainability and decision making
- Self-correcting behavior and enhanced system decision making
- Robust handling of uncertain inputs
- Solution is flexibly adaptable to any AI classification task
- Safety Score KPI enables the quantification of safety in compliance with ISO/PAS 8800

Solution scope

SAFE ARTIFICIAL INTELLIGENCE

Process development and optimization	Competence build-up	Feasibility studies	AI engineering services	AI lifecycle management
Process definition	Employee education	Concept studies	Functional specification	Resource planning
Tool development	Employee certification	State-of-the-art research	AI hazard analysis and risk assessment	AI safety and security management
Template creation	Competence management	Market research	AI system and safety concepts	AI field observation
Optimization strategies	Consulting services	Technology comparison	Dataset creation	Performance evaluation
Partner network	Knowledge management	Business model development	AI safety case creation	Safety and security assessments

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