Comenius University Bratislava
Faculty of Mathematics, Physics and Informatics

THESIS ASSIGNMENT

Name and Surname:	Bc. Alex Haščík
Study programme:	Applied Computer Science (Single degree study, master II. deg., full time form)
Field of Study:	Computer Science
Type of Thesis:	Diploma Thesis
Language of Thesis:	English
Secondary language:	Slovak

Title: Tool Routing for Resource-Constrained LLM Agents

Annotation: This thesis explores methods for improving the tool-routing capabilities of AI agents built on small, resource-constrained language models. Current agentic systems often rely on large models to select from a wide range of available tools -- a capability that degrades significantly when model size is reduced. The work investigates lightweight approaches to tool routing, including candidate narrowing and confidence-based fallback mechanisms, evaluated on established benchmarks for agentic performance.

Aim: The goals of this thesis include (but are not limited to):
- Reviewing the current state-of-the-art in tool-routing strategies for agentic LLM systems, with a focus on approaches suitable for small, resource-constrained models.
- Investigating lightweight methods to improve routing accuracy without relying on larger model backends.
- Exploring evaluation frameworks and benchmarks for assessing the tool-use capabilities of small language models.
- Conducting an empirical analysis of the trade-offs between model size, routing performance, and task success rates.

Literature:
Mu, J., et al. "Attention-MoA: Small Models Beating Frontier Models Through Better Harness Design." arXiv:2601.16596.
Liu, X., et al. "FLARE: Lookahead Planning Helps Small Models." arXiv:2601.22311.
Chen, Y., et al. "GraphPlanner: Learned Routing for Multi-Agent Systems." arXiv:2604.23626.
Smith, A., et al. "SkillsBench: A Benchmark for Evaluating Real-World Agentic Capabilities." arXiv:2602.12670.

Supervisor:	Mgr. Marek Šuppa
Department:	FMFI.KAI - Department of Applied Informatics
Head of department:	doc. RNDr. Tatiana Jajcayová, PhD.
Assigned:	13.12.2025
Approved:	13.12.2025

prof. RNDr. Roman Ďurikovič, PhD.
Guarantor of Study Programme

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Student Supervisor