Summary and References

Search issues revisited

Lessons learned

List of references

SEARCH MATTERS

Problem size

May be considerable for some NLP tasks

(symbolic machine translation)

May be even overwhelming in specific ones

(statistical machine translation, especially for advanced language models)

Search techniques beneficial

Clever techniques may achieve huge savings

(lexical interpretation - Hunter Gatherer)

Clever organization may make heterogeneous search spaces manageable

(text planning, orchestrating subprocesses in sentence planning)

SEARCH STRATEGIES

Degrees of dependences/independences

    Splitting the problem (Hunter Gatherer, syntactic generation)

    Assume indepdendence where reasonable and

        add features to capture crucial cases of dependence (probabilistic parsing)

    Recognize dominances among alternative choices

    Transform the linguistic problem into an abstract one

        where efficient procedures exist (e.g., constraint problem)

Discover search space properties

    Associate relevant properties with "observables"

        (semantically-based readings with word frequencies in parsing)

SEARCH ORGANIZATION

Representation techniques

    Compact representations exploiting commonalities

        (stochastic generation, involved feature strcutures)

    Efficient data structures (e.g., bit vectors, structure sharing)

Process organization

    Off-line precompilation of static information

        (taxonomic relations and inferences, for diverse uses)

Order of operations

    Aim at quick refutation – machines rather achieve disproves than proofs

        (unification)

    Adding cheap tests (unification, text planning)

SOME EXPERIENCES

1. Adaptation of methods search needed

Straightforward re-use may result in ineffective processing

(syntactic parsing with unification grammars for generation)

2. Self-organizing control structures typically not effective

Blackboard architecture must be enhanced with explicit knowledge

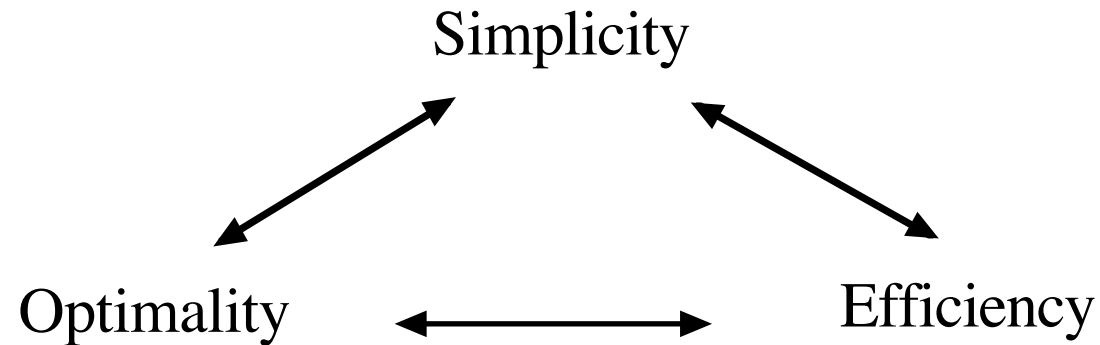**(experience with orchestrating sentence planning tasks)**

3. System architecture organization

Use opportunistic control structures that exploit task specificities

when the general proble is too hard

(genre-specific revisions in text planning)

FUNDAMENTAL TRADE-OFFS

Simplicity

Optimality   Efficiency

Compensative relations (up to certain degrees)

Most simple search techniques are

either inefficient or

lead to suboptimal solutions

Search technques can either stress efficiency or optimality

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