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THE QUEST FOR COHERENCE IN JUDICIAL REASONING. TWO APPROACHES FOR REPRESENTING CASES IN CONSTRAINT SATISFACTION FRAMEWORK

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Abstract. There are two fundamentally distinct approaches towards modeling of legal reasoning – the top-down and bottom-up approaches. The main difference lies in the method of acquiring the elements which consequently constitute the model. This paper aims to compare the approaches as regards the resulting model represented in the coherence as constraint satisfaction network. At first the top-down approach is applied to the Court of Justice European Union case of *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v. Ministerstvo kultury ČR* and the resulting model is presented and briefly assessed. The very same case is then modeled using the bottom-up approach. While both models that have been created differ quite significantly they display surprisingly similar features. Both models suggest that the court provides the interpretation of key terms without grounding it in the provisions of authoritative texts. Thus, it either seems to be the case that there is a large portion of implicit reasoning both models fail to express or that the reasoning of the court is actually not grounded in authoritative text.

Key-words. Coherence, constraint satisfaction, top-down, bottom-up, legal reasoning.

1. Introduction

The present paper is an extension of our previous work presented in Araszkiewicz and šavelka[1], in which we focused on the problem of the tension between the application of top-down and bottom-up strategy in representation of legal reasoning. The juxtaposition of these two

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approaches is by no means a new phenomenon in research on AI. Traditionally, the former technique insists on the use of algorithms and formal logical frameworks, while the latter – on employment of such tools as neural networks and evolutionary computation. As regards the first approach, the structure is given at the outset and the data is ordered according to this structure. In the second case, the order should emerge from the initial set of data.

We attempt to represent judicial reasoning in a chosen case by means of constraint satisfaction networks. The choice of this general framework for our presentation is motivated, first, by the conviction that coherence is the key factor as regards justification of legal reasoning, and second, by the assumption that Thagard's conception of coherence as constraint satisfaction[2] is a plausible and inspiring proposal. We attempt to show that this general framework allows for application of both top-down and bottom-up strategies for representing judicial reasoning. The structure of the paper is as follows. First, we discuss briefly the methods for representation of reasoning in AI and Law research and we outline Thagard's conception of coherence as constraint satisfaction and characterize it from the point of view of the abovementioned distinction. Second, we present the case to be represented and motivate our choice. In the third part the case is represented by means of Coherence Model of Legal Argumentation (CMLA), that is, the top-down constraint satisfaction technique. Fourth, we represent the case in a constraint network constructed along with bottom-up strategy. In the last part we compare the results and present conclusions stemming from the analysis.

2. The Top-Down vs. Bottom Up Method in AI and Law. Coherence as Constraint Satisfaction

Although the distinction between top-down and bottom-up approach is present in the research on AI and Law, it is obvious from the literature that the former dominates the latter. Some plausible causes of such situation are the following: (1) important tradition of formal-logical approach to the representation of legal reasoning[3]; (2) the emphasis on general and universal features in legal reasoning as presented in

[2] The detailed exposition can be found in P. THAGARD, *Coherence in Thought and Action*, MIT Press, Cambridge, London, 2000.

[3] Cf. C. ALCHOURRÓN, E. BULYGIN, *Normative Systems*, Springer, Wien, New York, 1972; U. KLUG, *Juristiche Logik*, Berlin-Göttingen-Heidelberg, 1958.

classical theories of legal argumentation[4]; (3) the necessity to account for logical structure of the law in order to represent it in programming languages[5]; (4) the emergence of rich systems of non-classical logic designed to account for important peculiarities of legal reasoning[6]; and (5) the emergence of abstract argumentation frameworks[7] and their application to legal reasoning[8]. The choice of the top-down method, very natural in the context of Rule Based Reasoning (RBR), is also very common in the field of Case Based Reasoning (CBR) (to mention abstract concepts of factors and/or dimensions[9]) and in the theory construction approach (abstract concepts of elements of the case base and of the theory constructors)[10]. The use of the tools typically employed in the "engineering" sub-branch of the general AI research, like neural networks, is not very common in the field of AI and Law[11] and it is often criticized and skeptically looked at[12].

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[4] Cf. R. ALEXY, *A Theory of Legal Argumentation. The Theory of Rational Discourse as Theory of Legal Justification*, (trans. R. ADLER, N. MACCORMICK), Oxford: Clarendon Press, /1st German ed. 1978/, 1989; A. PECZENIK, *On Law and Reason*, 2nd ed., Springer, (1st ed. 1989), Kluwer Academic Publishers, Dordrecht/Boston/London, 2008.

[5] Cf. M. SERGOT, F. SADRI, R. KOWALSKI, F. KRIWACZEK, P. HAMMOND, H.T. CORY, 1986. *The British Nationality Act as a Logic Program*, *Communications ACM* 29, 1986, pp. 370-386.

[6] Cf. J.C. HAGE, *Reasoning with Rules*, Kluwer Academic Publishers, Dordrecht, 1997; H. PRAKKEN, *Logical Tools for Modelling Legal Argument. Study of Defeasible Reasoning in Law*, Kluwer Academic Publishers, Dordrecht, 1997.

[7] Cf. P. DUNG, *On the acceptability of arguments and its fundamental role in nonmonotonic reasoning, logic programming and n-person games*, in: *Artificial Intelligence*, 77, 1995, pp. 321-357.

[8] Cf. H. PRAKKEN, G. SARTOR, *A Dialectical Model of Assessing Conflicting Arguments in Legal Reasoning*, in: *Artificial Intelligence and Law* 4, 1996, pp. 331-368.

[9] Cf. V. ALEVEN, *Teaching Case-Based Argumentation Through a Model and Examples*. PhD diss., University of Pittsburgh Graduate Program in Intelligent Systems, 1997; K. D. ASHLEY, *Modelling Legal Argument. Reasoning with Cases and Hypotheticals.* MIT Press, Cambridge, Mass, 1990.

[10] Cf. T. BENCH-CAPON, G. SARTOR, *A model of legal reasoning with cases incorporating theories and values*, in: *Artificial Intelligence* 150, 2003, pp. 97-143.

[11] But cf. J. ZELEZNIKOW, A. STRANIERI, *The split-up system: Integrating neural networks and rule based reasoning in legal domain*, in: *Proceedings of the Fifth*

In last few decades the view that (the degree of) justification of legal reasoning stems from the degree of its coherence gained much attention in the field of legal theory[13] and simultaneously, a precise account of the concept of coherence as constraint satisfaction has been developed by a cognitive scientist and philosopher Paul Thagard[14]. This conception has been referred to in AI and Law research, too[15]. The question is whether it is more suitable to represent legal reasoning according to top-down or bottom-up method.

The basic features of the theory of coherence as constraint satisfaction are as follows[16]. A coherence problem is a process of finding the most acceptable subset among the initial set of incompatible elements, according to the procedure: let E be a finite set of elements (e_1,….e_n). The (in)coherence relations between pairs of elements are referred to as positive constraints (C+) and negative constraints (C-). We need to divide the set E into two disjoint subsets, a subset of

International Conference on Artificial Intelligence and Law, *ICAIL 1995*, ACM, New York, pp. 185-194.

[12] Cf. D. HUNTER, *Out of their minds: Legal theories in neural networks*, in: *Artificial Intelligence and Law* 7**,** 1999, pp. 129–151.

[13] Cf. AMAYA, *Legal Justification by Optimal Coherence*, in: *Ratio Juris* 24, 2011, pp. 304-329; J.C. HAGE, *Studies in Legal Logic*, Springer, Berlin, 2005; A. PECZENIK, *A Coherence Theory of Juristic Knowledge*, in: A. AARNIO, R. ALEXY, A. PECZENIK, W. RABINOWICZ, J. WOLEŃSKI, 1998, *On Coherence Theory of Law*, Juristförlaget i Lund, 1998; A. PECZENIK, *On Law and Reason*, 2nd ed., Springer, (1st ed. 1989, Kluwer Academic Publishers, Dordrecht/Boston/London), 2008.

[14] Especially in P. THAGARD, *Coherence in Thought and Action*, MIT Press, Cambridge, London, 2000.

[15] Cf. AMAYA, *Formal models of coherence and legal epistemology*, in: *Artificial Intelligence and Law* 15, 2007, pp. 429-447; AMAYA, *Inference to the Best Legal Explanation*, in: H. KAPTEIN, H. PRAKKEN, B. VERHEIJ (eds.), *Legal Evidence and Proof. Statistics, Stories, Logic,* Ashgate, Surrey, 2009, pp. 135 – 160; T. BENCH-CAPON, G. SARTOR, *A Quantitative Approach to Theory Coherence*, in: B. VERHEIJ, A. LODDER, R. LOUI, A. MUNTJEWERFF (eds.), *Legal Knowledge and Information Systems. JURIX 2001: The Fourteenth Annual Conference*, IOS Press, Amsterdam, 2001, pp. 53-62; S. JOSEPH, H. PRAKKEN, *Coherence-Driven Argumentation to Norm Consensus*, in: *The 12th International Conference on Artificial Intelligence and Law, Proceedings of the Conference* (*ICAIL-2009)*, ACM, New York, pp. 58-67.

[16] For more detailed exposition please refer to P. THAGARD, *Coherence in Thought and Action*, MIT Press, Cambridge, London, 2000.

accepted elements (A) and a subset of rejected elements (R) so that the following two conditions are maximized:

If $<e_i, e_j> \in C+$ then $e_i \in A$ if and only if $e_j \in A$.

If $<e_i, e_j> \in C-$ then $e_i \in A$ if and only if $e_j \in R$.

Each constraint is assigned with a number w – the weight of this constraint. The sum of weights of all satisfied constraints is symbolized by W and is equivalent to the degree of coherence of the result set. Our task is to find the W-maximizing division.

Thagard himself seems to join both top-down and bottom-up approaches when applying his theory to the problems of explanation, analogy or ethics, but he seems to be more sympathetic towards top-down method when he tries to define different types of constraints and to present a kind of "principle lists" related to (in)coherence relations in these different fields[17]. Also as regards application of his theory to legal reasoning, top-down approach seems to be favored so far[18]. In this paper we show that the application method to the representation of a legal case is also possible within this framework and we compare its results with the top-down perspective.

3. The case of 22 Dec 2010, C-393/09 – the Graphic User Interface (GUI) case

The grounds from which the reference for a preliminary ruling lodged on 5th October 2009[19] stemmed had been a rather unusual claim[20] for an appointment of a collective manager of certain economic rights to computer programs filed at the Czech Ministry of Culture. During a very long procedure in which the claim has got in front of the Czech courts a couple of very serious doubts regarding interpretation of EU law appeared. These were expressed by the Czech Supreme Administrative

[17] See Ibid., p. 24.

[18] Cf. AMAYA, *Inference to the Best Legal Explanation*, in: H. KAPTEIN, H. PRAKKEN, B. VERHEIJ (eds.), *Legal Evidence and Proof. Statistics, Stories, Logic,* Ashgate, Surrey 2009, pp. 135-160; M. ARASZKIEWICZ, *Balancing of Legal Principles and Constraint Satisfaction*, in: R.G.F. WINKELS (ed.), *Legal Knowledge and Information Systems; JURIX 2010: The Twenty-Third Annual Conference* (2010), pp. 7-16.

19 Reference for a preliminary ruling from the Nejvyšší správní soud (Supreme Administrative Court) (Czech Republic) lodged on 5 October 2009 - Bezpečnostní softwarová asociace (Security software association) v Ministerstvo kultury ČR (Ministry of Culture of the Czech Republic).

20 Filed by Bezpečnostní softwarová asociace – Svaz softwarové ochrany in 2001.

Court in the reference for the preliminary ruling in the following way: "*Should Article 1(2) of Council Directive 91/250/EEC*[21] *of 14 May 1991 on the legal protection of computer programs be interpreted as meaning that, for the purposes of the copyright protection of a computer program as a work under that directive, the phrase 'the expression in any form of a computer program' also includes the graphic user interface of the computer program or part thereof?*" and "*If the answer to the first question is in the affirmative, does television broadcasting, whereby the public is enabled to have sensory perception of the graphic user interface of a computer program or part thereof, albeit without the possibility of actively exercising control over that program, constitute making a work or part thereof available to the public within the meaning of Article 3(1) of European Parliament and Council Directive 2001/29/EC*[22] *of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society?*"

In accordance with the Opinion of Advocate General[23] CJEU ruled that graphic user interface was not within the scope of the phrase 'the expression in any form of a computer program'. The sole reason for such a ruling was constituted by the fact that, unlike source code or object code, graphic user interface could not on its own lead to a creation of an identical copy of a computer program. However, CJEU added that graphic user interface was eligible for a general copyright protection as any other scientific work or work of art. In such a case it was also necessary to provide an answer to the second question even if the answer to the first one was not affirmative. Despite being protected by copyright CJEU ruled that television broadcasting of graphic user interface of a computer program did not constitute making a work available, for the essential property of graphic user interface – its role to facilitate communication between a user and a computer - was not made available by television broadcasting[24].

21 Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs.

22 Corrigendum to Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society.

23 Opinion of Advocate General Bot delivered on 14th October 2010 in Case C-393/09.

[24] See generally: J. ŠAVELKA, *Exploring the Boundaries of Copyright Protection for Software: An Analysis of the CJEU-Case C-393/09 on the Copyrightability of the Graphic User Interface,* in: *Medien und Recht – International Edition* 1, 2011, pp. 11-16.

4. Representation of the Case According to Top-Down Technique

The following representation of the case discussed in the previous Section is within the (revised) framework of CMLA.[25] As far as this is a top-down approach towards representing legal reasoning we first have to focus upon two issues: (1) admissible types of elements which can be found in the set E and (2) admissible types of constraints between these elements. However, as far as we are within the framework of constraint satisfaction theory of coherence and not within an axiomatic system of logic or abstract argumentation framework, (although the following is to large extent inspired by these approaches), we do not have to discuss extensively syntactic and semantic aspects of the structures discussed below.

The list of types of elements is determined by general structure of judicial reasoning. In consequence, the first necessary type of elements are Legal Conclusions.

Def. 1. Legal Conclusion. Legal conclusion LC is an atomic proposition ψ, providing an answer to the posited legal question.

In each CMLA constraint network there are exactly two LCs which are their mutual negations. In each division of the initial set of elements E one of the LCs must be in set subset of Accepted elements and its negation in the subset of Rejected Elements.

The next types of elements represent legal norms. In this respect CMLA is based upon the famous distinction between legal rules and legal principles.[26] In the proposal below we do not focus on the issue of application of principles because it is not relevant for the representation of the chosen case.

Def. 2. Rule. Rule R is a conditional proposition of the following form: $\varphi_1, \varphi_2,\ldots\varphi_n \Rightarrow \omega_1, \omega_2, \ldots \omega_n$, where $\varphi_1, \varphi_2,\ldots\varphi_n$ is the antecedent of R, $\varphi_1, \varphi_2,\ldots\varphi_n$ is the consequent of R, and $\Rightarrow$ denotes defeasible implication.

The fact that the conditional character of rules should be understood as defeasible implication and not strict implication stems from the fact that it is the computation of coherence which is ultimately responsible for accepting a rule's consequent. So it is possible that a given

[25] See the general outline in: M. ARASZKIEWICZ, *Balancing of Legal Principles and Constraint Satisfaction*, in: R.G.F. WINKELS (ed. by), *Legal Knowledge and Information Systems; JURIX 2010: The Twenty-Third Annual Conference,* 2010, pp. 7-16.

[26] The role of legal principles and balancing of values was discussed in Ibid.

consequent will not be accepted even if it is undoubtedly supported by a rule by means of a Modus Ponens – like relation which will be discussed below.

Some of the rules play a special role in legal reasoning and they can be referred to as Legal Grounds for a conclusion.

Def. 3. Legal Ground. A rule R is a Legal Ground (LG) if an only if it has a LC as its consequent.

LGs are privileged rules in the sense that at least one LG should be in the subset of Accepted elements in any acceptable division.

Def. 4. Basic Rule Based Constraint. Basic Rule-Based Constraint BRBC has the following form: $BRBC_x$ <LG, LC >, where x: <+, 0, ->. BRBCs represent the subsumption relation, which holds when the facts of the case can be classified as instantiations of predicates specified in the antecedent of the LG involved here. In such cases the chosen LC is supported by LG and the constraint is positive (+). If we are sure that the subsumption relation does not hold, then the constraint is negative (-). In the case of doubts the relation is neutral (0).

Of course, not all rules applied by the courts while deciding cases specify LCs as their consequents and the different rules may interact in constraint networks. This intuition is captured by the distinction between cumulation of arguments and chaining of arguments. Let us present schemes of these two distinct structures:

[Cumulation] "x because of (a, b and c)".

[Chaining] "x because of a, a because of b and b because of c".[27]

In the framework of CMLA , cumulation of arguments is represented simply by the number of positive constraints by which a given LC is related to its supporting elements. However, chaining of arguments cannot be represented in this way. In order to account for this phenomenon, let us introduce a new type of RBC constraint, here referred to as Chaining Rule-Based Constraint.

Def. 5. Chaining Rule-Based Constraint. Chaining Rule-Based Constraint (CRBC) has the following form $CRBC_+$ <R_i, R_j>, where the consequent of R_i is identical to the antecedent of R_j. This kind of constraint is always positive because it establishes the relation between legal predicates and this relation is independent of the facts of the case in question. However, whether the facts in question can be subsumed under the antecedent of R_i in CRBC bears on the quality of the

[27] See A. PECZENIK, *A Coherence Theory of Juristic Knowledge*, in: A. AARNIO, R. ALEXY, A. PECZENIK, W. RABINOWICZ, J. WOLEŃSKI, *On Coherence Theory of Law*, Juristförlaget i Lund, 1998.

constraint between R_j and another element (for instance, LC). Let us note the following facts concerning this issue:

Fact 1. If there is a constraint $CRBC_+ <R_i, LG_j>$ and the facts of the case can be subsumed under the antecedent of R_i then there is also a constraint $BRBC_+ <LG_j, LC>$, where LC is the consequent of LG_j and a constraint $BRBC_- <LG_i, LC'>$.

Fact 2. If there is a constraint $CRBC_+<R_i, LG_j>$ and the facts of the case cannot be subsumed under the antecedent of R_i then there is also a constraint $BRBC_- <LG_j, LC>$, where LC is the consequent of LG_j and a constraint $BRBC_+ <LG_i, LC'>$.

Let us now apply the framework presented here to the GUI case. The procedure of framework application consists itself of three steps: (1) identification of instantiations of element types in the text of judicial decision; (2) identification of instantiations of constraint types in this text; (3) computation of coherence.

For the sake of brevity of the presentation let us concentrate on the first question issued by the Czech Supreme Administrative Court. This question was asked in order to decide whether graphical user interface can be protected by a copyright. Therefore we obtain two mutually inconsistent LCs:

LC: [protected] (graphic user interface), and

LC': [not protected] (graphic user interface).

Let us identify the Legal Grounds for these conclusions. The main LG may be found in the Article 1(2) of Directive 91/250 and formalized in the following way:

LG_1: [form of expression of a program] (x) ⇒ [protected] (x).

However, in the course of its argumentation, the Court also found that there is another LG present in the legal context of the case, based on Article 2(a) of Directive 2001/29:

LG_2: [author's intellectual creation] (x) ⇒ [protected] (x).

On the basis of the decision it is also possible to identify the following rules which are not legal grounds:

R_1: [enables the reproduction of a program] (x) ⇒ [form of expression of a program] (x) (based on Article 10(1) of the TRIPS Agreement, although it should be noted that the formulation of the rule was a genuine construction of CJEU).

R_2: [its components permit the author to express his creativity] (x) ⇒ [author's intellectual creation] (x) (based on the opinion of the Advocate General).

Due to the elements types involved in our initial set we will have only Rule-Based Constraints here (except for an inconsistency negative

constraint between LC and LC'). Let us identify Basic Rule Based Constraints first:

$BRBC(1)_0$: <LG_1, LC>; $BRBC(2)_0$:<LG_2, LC>.

The quality of these constraints as such is neutral, because it is doubtful whether graphic user interface is a form of expression of a program (see antecedent of LG_1) or author's intellectual creation (see antecedent of LG_2). The case is undecidable on the basis of these constraints only. In order to gain decidability of the case it is necessary to introduce Chaining Rule Based Constraints, based on R_1 and R_2 as formulated above:

$CRBC(1)_+$: < R_1, LG_1>; $CRBC(2)_+$: <R_2, LG_2>.

Due to the properties of CRBCs summarized in Fact 1 and Fact 2 we have to agree that the quality of BRBCs mentioned above changes into negative one:

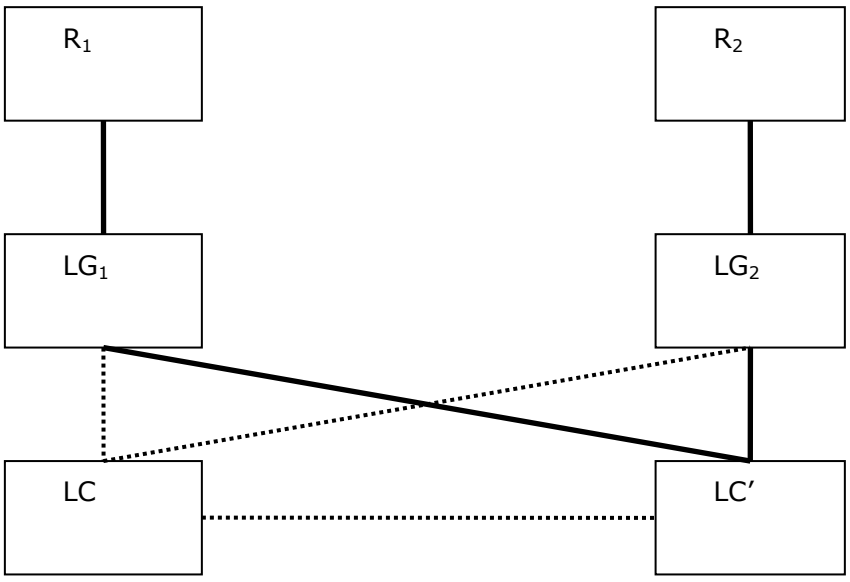
$BRBC(1)_-$: <LG_1, LC>; $BRBC(2)_-$:<LG_2, LC>.

and that the following constraints hold:

$BRBC(1)_+$: <LG_1, LC'>; $BRBC(1)_+$: <LG_1, LC'>.

Hence, we obtain the following constraint network for the Graphic User Interface case, where solid lines represent positive constraints and dotted lines represent negative constraints.

Fig.1: A constraint network for Graphic User Interface case.



From this network it is obvious that graphic user interface is not protected by copyright, because the LC representing the proposition that it is protected is not supported by any of the elements. Therefore, the computation of coherence is straightforward. Let us emphasize that is our top-down representation enables us to state that (1) only six elements are relevant for the choice of the case's conclusion and that (2) the decisive elements (R_1 and R_2) are not firmly grounded in any authoritative texts, but they are results of somewhat creative argumentation performed by the CJEU.

5. Representation of the Case According to Bottom-Up Technique

This section presents an alternative approach to judicial decision modeling within the framework of coherence as constraint satisfaction – the bottom-up approach. It differs from the top-down approach quite considerably which we demonstrate by creating a parallel model of the same judgment the model of which has been presented in the preceding section. The basic outline of the modeling is very similar and consists of two completely separate phases: (1) identification of admissible elements which become members of the set E and (2) modeling of constraints (symmetric relations that are members of sets C- and C+) between these elements.

Def. 1. Admissible Element. Admissible element $e_n('x_n')$ is a function with x being any string of consecutive letters (the string may also contain numbers and any other symbols which shall further be referred to altogether as letters) extracted from the text of the judicial decision and n a natural number denoting a position of the string within the text of the judicial decision in relation to the other strings.

Def. 2. Well-formed Admissible Element. Well-formed admissible element $e_n('x_n')$ is an admissible element that carries a specific meaning related to the decision.

Def. 3. Complete Set of Admissible Elements. Complete set of all admissible elements $D\{e_1('x_1'), e_2('x_2'), \ldots, e_n('x_n')\}$ is a set containing all the well-formed admissible elements that can be extracted from the judicial decision in such a way no individual letter is contained in more than one element.

INTERMEZZO. It is possible to extract the well-formed elements in many different ways and thus, a large number of different sets D may be obtained. Therefore, it is always advisable to define a set $R\{r_1, r_2, \ldots, r_3\}$ of rules specifying the method of the elements extraction to make the process of modeling more transparent.

Def. 4. Set of R-Excluded Admissible Elements. Set of R-excluded admissible elements R is a set of elements which have been explicitly designated as being irrelevant with respect to the model.

Def. 5. Set of R-Admitted Admissible Elements. Set of R-admitted admissible elements E is a complement of the set R to form the set D.

INTERMEZZO. Set of R-admitted admissible elements E is projected to the set E defined within the framework of coherence as constraint satisfaction.

Let us use the above definitions to create the set E that is then employed as the input in the bottom-up modeling of the CJEU reasoning when giving the answer to the first question as is done in the preceding section. First of all, the set R is defined with regards to the fact that CJEU practices its own method of partitioning the decision into individual paragraphs - every single one of them presenting a rather independent piece of information. If the aim is to model the reasoning of the court - as exposed within the text of the decision itself - it seems rational to define the set R as follows:

R{ 1. Adhere to the partitioning provided by the court.
2. Depart in situations in which the information carried by an individual element would be meaningless or too complicated. }

It is not possible to include the resulting set D[28] within this paper and thus it is only briefly commented on. By applying the r_1 and r_2 we have obtained the set D containing 163 elements $e_n('x_n')$. Among these 72 can be informally considered as aiming solely at organizing the information contained in the document – they can be informally referred to as structural elements (headings, paragraphs numbering). Additional 11 elements can be considered as carrying meta-information, i.e. information describing the document itself. Very similarly to those, 24 elements contain the citations of relevant international, EU and national legislation. These elements should indeed be part of the constraint satisfaction network modeling the reasoning of the court. However, every time any of the mentioned provisions is recalled the court explicitly restates it. The same applies mutatis mutandis to the 3 elements constituting the ruling of the court. Furthermore, there are 11 elements that contain information related to the proceedings in front of the national courts and the reference for the preliminary ruling, 9 elements describing the issue of the court's jurisdiction and 1 element dealing with costs of the proceedings. All the elements that have been already mentioned are irrelevant with respect to the model and thus

28 It can be accessed at http://is.muni.cz/www/134449/27186886/.

members of the set of R-excluded admissible elements R. Remaining 32 elements are directly related to the reasoning of the court in the substantive matters with respect to the questions referred for the preliminary ruling. However, 8 of them belong to the second question which is for the sake of brevity not being part of the model and are members of the set R. Following the def. 5. we are left with the following E set of R-admitted admissible elements (with 'x' substituted for its short description):

E{e94(is GUI a form of computer program within the meaning of the directive?), e96(non-existence of computer program explicit definition), e98(notion of computer program has to be explicated), e100(any form of a computer program protected by copyright), e102(term 'computer program' includes programs in any form), e104(source code and object code belong to the mentioned forms), e106(source code and object code are protected by copyright), e108(object of the protection is expression allowing reproduction), e110(preparatory materials belong to the mentioned forms), e112(object of the protection is expression allowing reproduction), e114(such form of expression must be protected that allows reproduction of the computer program itself), e116(definition of interfaces), e118(definition of GUI as an interaction interface between computer program and user), e120(GUI does not enable reproduction of the computer program), e122(GUI does not belong to the mentioned forms), e124(CJEU is entitled to rule beyond the question), e126(does graphic user interface enjoy general copyright protection?), e128(originality as necessary precondition for copyright protection), e130(graphic user interface can be protected if it is author's own intellectual creation), e132(decision on e130 is within the domain of national court), e134(guidance regarding performance of 132 by a national court), e136(guidance regarding performance of 132 by a national court), e138(guidance regarding performance of 132 by a national court), e140(GUI is not a form of computer program within the meaning of the directive but it enjoys general copyright protection)}

Def. 6. 'Is Claimed to Be Ground for' relation. If an element $e_i('x_i')$ is claimed explicitly by a court – or it is apparent from the text of the decision - to be ground for an element $e_k('x_k')$ then GF relation $<e_i('x_i'), e_k('x_k')>$ exists.

Def. 7. 'Is Claimed to Be Ground against' relation. If an element $e_i('x_i')$ is claimed explicitly by a court – or it is apparent from the text of

the decision - to be ground against an element $e_k('x_k')$ then GA relation $<e_i('x_i'), e_k('x_k')>$ exists.

Def. 8. 'Both Claimed to Be Ground for or against' relation. If an element $e_i('x_i')$ together with an element $e_j('x_j')$ are claimed explicitly by a court – or it is apparent from the text of the decision - to be both at the same time grounds for or at the same time grounds against an element $e_k('x_k')$ then GT relation $<e_i('x_i'), e_j('x_j')>$ exists.

Def. 9. 'Provides Definition for a Term Used in' relation. If $e_i('x_i')$ contains a definition or explanation of a term used in $e_k('x_k')$ DEF relation $<e_i('x_i'), e_k('x_k')>$ exists.

Def. 10. 'Answers' relation. If $e_j('x_j')$ contains a question and $e_k('x_k')$ contains an answer to that question then relation A $<e_i('x_i'), e_k('x_k')>$ exists.

INTERMEZZO. GF, GT, DEF and A relations are projected to the set C+ and GA relation is projected to the set C- defined within the framework of coherence as constraint satisfaction.

Following the above definitions we obtain from the set E[29]:

C+{<e94, e96>, <e94, e100>, <e94, e102>, <e94, e122>, <e94, e124>, <e96, e98>, <e96, e100>, <e96, e102>, <e98, e106>, <e98, e108>, <e98, e110>, <e100, e102>, <e100, e104>, <e104, e106>, <e106, e108>, <e108, e110>, <e108, e112>, <e108, e114>, <e112, e114>, <e112, e122>, <e116, e118>, <e116, e120>, <e116, e122>, <e118, e120>, <e118, e122>, <e120, e122>, <e122, e130>, <e122, e140>, <e124, e126>, <e126, e130>, <e128, e130>, <e130, e132>, <e130, e140> <e132, e134>, <e132, e136>, <e132, e138>, <e134, e136>, <e134, e138>, <e136, e138>}

C-{}

The emerged model[30] reveals several very interesting facts about the decision[31]. However, the most revealing of them is the key importance of the e112(object of the protection is expression allowing reproduction) element the whole decision is built around. However, the proposition carried by this element was heuristically manufactured by the CJEU observing the fact that all forms clearly considered to be within the meaning of the directive possessed certain property. Based on the assumption that GUI does not possess this property CJEU reached the

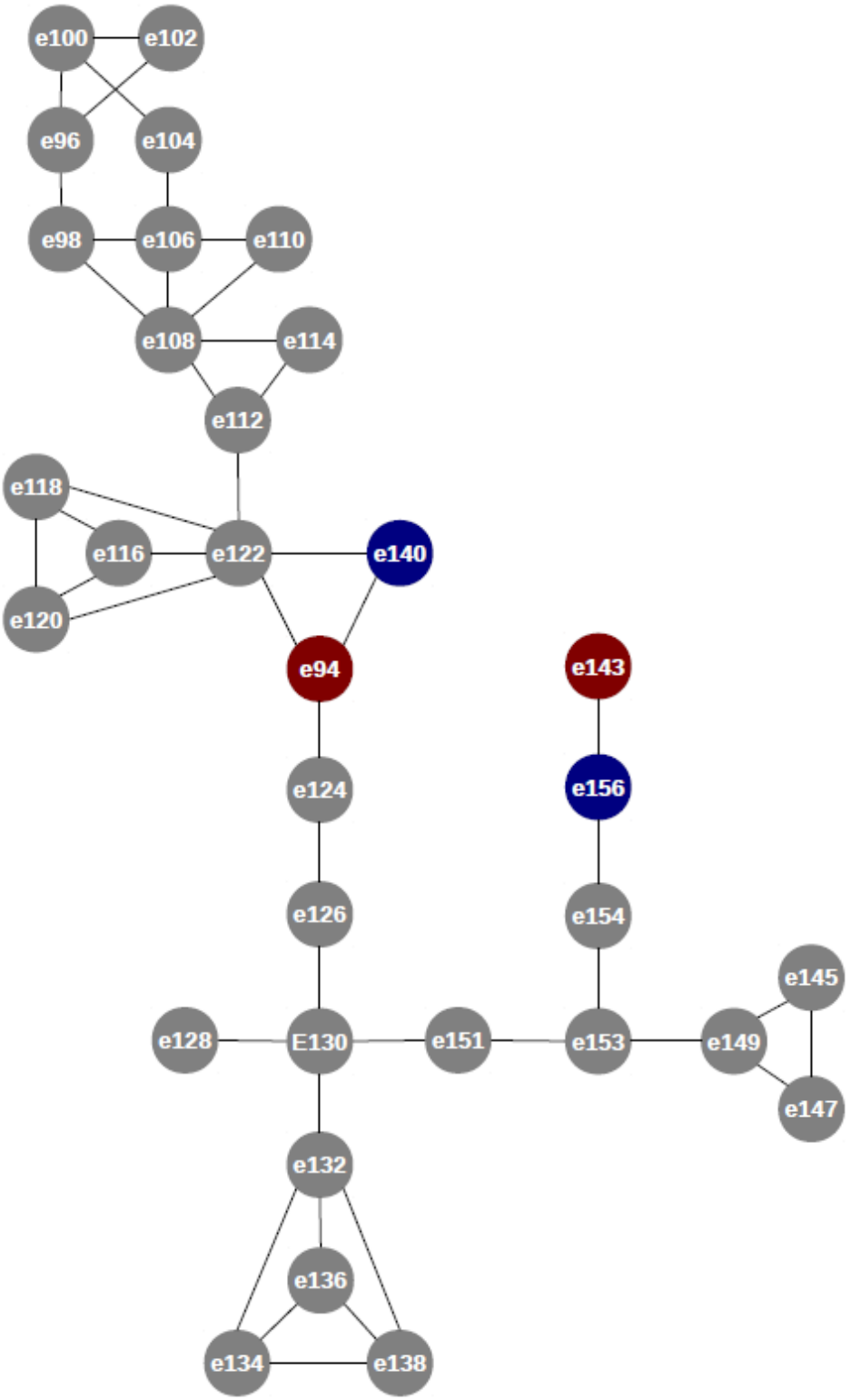
29 Detailed description of the relations can be accessed at http://is.muni.cz/www/134449/27186886/.

30 Graphic representation of the model can be accessed at http://is.muni.cz/www/134449/27186886/.

31 Detailed analysis can be accessed at http://is.muni.cz/www/134449/27186886/.

answer contained in e140(GUI is not a form of computer program within the meaning of the directive but it enjoys general copyright protection).

Fig.2: A constraint network for Graphic User Interface case produced with the bottom-up approach.



6. Conclusions

Both models suggest that the CJEU provides the interpretation of the term 'expressed in any form' without grounding it in the provisions of authoritative texts. This is somewhat disturbing considering the frequent citations of provisions of law. It either seems to be the case that there is a large portion of implicit reasoning both models fail to express or that the reasoning of the court is actually not grounded in authoritative text. If this is the case then the models can be used either as a natural starting point to improve the reasoning of the court or they can produce a competing reasoning leading to a different ruling.

In the discussion above both techniques led to similar results, emphasizing the role of certain elements in the Court's reasoning. This fact leads to a tentative conclusion that on the one hand the abstract features of the top-down model (the definitions of elements and constraints) are plausible and that in spite of the indicated deficiencies the reasoning of the CJEU is quite well structured and free of internal incoherencies. However, the apparent parallelism between the two approaches presented here ought to be verified by means of a larger base of legal decisions.

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