

A Category-Theoretic Ethical Ontology Integrating Deontology, Teleology, and Virtue Ethics

Introduction

In normative ethics, three major approaches are often distinguished: **deontological ethics** (duty-based), **teleological ethics** (consequence-based), and **areteological ethics** (virtue-based). Deontology (exemplified by Kant) emphasizes duties or rules (e.g. the Categorical Imperative), teleology (exemplified by utilitarianism) emphasizes outcomes and the “*greatest happiness*” principle, and virtue ethics emphasizes moral character and virtues. While these traditions differ in focus, they each provide key ethical concepts that any comprehensive theory should address. This report develops a **memetic ethical ontology** that integrates the three frameworks using **category theory** as a unifying language. Each sub-ontology – **Eth_Deon** (deontology), **Eth_Teleo** (teleology), and **Eth_Arete** (virtue ethics) – is structured as a **category** (in the mathematical sense), with objects as core ethical concepts and morphisms as well-defined logical or conceptual relationships. By leveraging category theory's rigor (objects, morphisms, identities, and composition), we ensure each subcategory preserves its internal logic while enabling **structure-preserving mappings** across them. Memetic, concise definitions are given for each concept (object) to make the ontology easy to recall and visualize. Tables of objects and morphisms are provided for clarity, and category diagrams illustrate the relationships. Finally, we define cross-category morphisms (functor-like mappings) that link concepts like “*Duty*” (deontological) to “*Net Benefit*” (teleological) and “*Phronesis*” (areteological), showing how these ethical perspectives interrelate. The result is a structured, precise, and philosophically rigorous ontology that is also cognitively “sticky” – short, sharp phrases capture each idea, and diagrams make the abstract relationships easier to grasp.

Eth_Deon: Deontological Ethics Category

Deontological ethics (Eth_Deon) is grounded in **Kant’s moral philosophy**, which asserts that morality is governed by rational *duty* rather than consequences. Kant’s first principle, the **Categorical Imperative (CI)**, is an “*objective, rationally necessary and unconditional principle that we must follow despite any natural desires to the contrary*”. In other words, an action is moral if it conforms to a universal moral law dictated by reason. Deontology holds that the rightness of actions is **independent of their outcomes** – one must “*Act only according to that maxim whereby you can, at the same time, will that it should become a universal law*”. In this category-theoretic model, **Eth_Deon** encapsulates key Kantian concepts (objects like *Good*

Will, Maxim, Moral Law, etc.) and their logical relations (morphisms), adhering to the CI as the structural backbone.

Objects and Memetic Definitions (Eth_Deon): The primary objects in this category are the fundamental concepts of Kantian ethics, each given a concise, memetic definition:

Object (Eth_Deon)	Memetic Definition
<i>Good Will</i>	Pure moral intention – the only thing “ <i>good without qualification</i> ”, committed to doing right for its own sake.
<i>Maxim</i>	Personal rule of action – a subjective principle or intention behind an action.
<i>Moral Law</i>	Universal moral principle – the objective law or rule that applies to all (e.g. the Categorical Imperative as a universalized maxim).
<i>Duty</i>	Obligation to moral law – the requirement to act (or refrain) out of respect for the moral law, regardless of consequences.
<i>Action</i>	Moral act (from duty) – an act performed out of duty to the moral law (i.e. done <i>because</i> it is right, not because of personal gain or desire).

Morphisms (Eth_Deon): The arrows in the Eth_Deon category represent the logical progression from moral intent to moral action under Kant’s framework:

- **Good Will → Maxim** – *Formulates*: A Good Will forms or selects a **maxim** (principle) to act upon. (A person of good will deliberates and sets a subjective rule to follow.)
- **Maxim → Moral Law** – *Universalize*: The maxim is evaluated as a candidate for a **universal law**. This morphism represents Kant’s test: imagining the maxim as a law for all rational beings. If the maxim can be willed universally without contradiction, it aligns with the moral law.
- **Moral Law → Duty** – *Impose duty*: A valid moral law **imposes a duty**. In Kant’s terms, if the maxim qualifies as a universal moral law, the agent has a duty to act accordingly. This arrow captures the idea that moral laws directly give rise to obligations.
- **Duty → Action** – *Fulfill*: Duty is carried out in an **action**. The agent, out of duty, performs the action prescribed by the moral law. An action has moral worth if done from duty (not just in accordance with duty).

Every object has an **identity morphism** (e.g. $\text{id_Maxim}: \text{Maxim} \rightarrow \text{Maxim}$) denoting a trivial self-mapping (concept preserving itself). Morphisms can be **composed**, and those compositions carry interpretive meaning. For example, composing $\text{Maxim} \rightarrow \text{Moral Law}$ with $\text{Moral Law} \rightarrow \text{Duty}$ yields a morphism $\text{Maxim} \rightarrow \text{Duty}$ (and further with $\text{Duty} \rightarrow \text{Action}$ gives $\text{Maxim} \rightarrow \text{Action}$). This composite arrow represents that if a maxim can be elevated to a universal law, it generates a duty to act, and hence the maxim leads to the corresponding action. The category axioms hold: composition is associative and each identity morphism acts as a two-sided identity.

*Figure 1: **Eth_Deon Category**. Nodes are key deontological concepts (Good Will, Maxim, Moral Law, Duty, Action). Arrows (morphisms) denote logical relationships: a Good Will **formulates** a maxim; the maxim is **universalized** into a Moral Law; the Moral Law **imposes** a Duty; and Duty is **fulfilled** in Action. This category formalizes Kantian duty ethics: a morally worthy Action is derived from a Good Will through adherence to universalizable principles.*

Eth_Deon thus formalizes Kant's first principles. A **Good Will** (a will guided purely by moral duty) chooses a **Maxim**, tests it against the **Moral Law** (CI's universal law formulation), which in turn dictates a **Duty** to act (or not act) in a certain way, culminating in the **Action** itself. The structure preserves the deontological idea that moral reasoning flows from internal principle to outward action, independent of any particular outcome. The memetic labels (e.g. "pure moral intention", "universal moral principle") capture each concept in a nutshell, aiding recall. The categorical structure ensures rigor: any *two-step inference* (composition of two morphisms) is itself an allowed *one-step inference* in the category, mirroring the transitive logic of "if a maxim is universalizable and universal law imposes duty, then the maxim imposes duty". In this way, *Eth_Deon* is a self-contained category of duties, with formal consistency (identities and closed composition) reflecting the consistency that Kantian ethics demands of moral principles.

Eth_Teleo: Teleological Ethics Category

Teleological ethics (*Eth_Teleo*), exemplified by utilitarianism, determines right action by **outcomes**: morality is derived from the end results or consequences of actions. The guiding first principle here is the **Principle of Utility**, often summarized as "*the greatest happiness of the greatest number*". In contrast to deontology, teleology holds that what makes an action right or wrong is precisely the good or evil it produces. *Eth_Teleo* as a category will capture how an action leads to outcomes and how those outcomes are evaluated in terms of net benefit or utility.

Objects and Memetic Definitions (*Eth_Teleo*): Key concepts (objects) in utilitarian or consequence-based ethics include:

Object
(*Eth_Teleo*)

Memetic Definition

<i>Action</i>	Chosen act – an action taken by an agent, subject to moral evaluation based on its results.
<i>Consequence</i>	Outcome of action – the state of affairs or effects that result from the action. (Also “Outcome”.)
<i>Net Benefit</i>	Overall good minus harm – the aggregate utility of the consequence, i.e. benefits minus costs, happiness minus suffering. (Higher net benefit = more ethical outcome.)
<i>Principle of Utility</i>	Greatest good rule – the rule that one should choose the action that produces the most favorable balance of good over bad for all affected (maximize net benefit).

Morphisms (Eth_Teleo): The relations in this category trace how actions lead to outcomes and how outcomes are morally assessed:

- **Action → Consequence** – *Yields:* An **Action yields a Consequence**. This arrow represents causation/results: any chosen act will produce some outcome or set of outcomes in the world. In utilitarian evaluation, this is the essential first step – consider the consequences of the act.
- **Consequence → Net Benefit** – *Evaluated as:* A **Consequence is evaluated for its Net Benefit**. This morphism represents the **utility calculation**: determining the total happiness, welfare, or value resulting from the outcome. It conceptually “maps” an outcome to a quantitative or at least comparable measure of its goodness (e.g. +5 utility units, or a judgment like “high benefit, low harm”). In simple terms, we look at an outcome and assess how much overall good (pleasure, well-being) it contains minus any suffering or cost.

In a complete utilitarian analysis, one would compare the net benefits of all possible actions and choose the highest; however, within this category we represent only the *evaluation* aspect (action to outcome to value). We include an identity morphism on each object (trivial mapping of Action to itself, Consequence to itself, etc.), and compositions like **Action → Net Benefit** arise by composing the above arrows. For example, composing **Action → Consequence** with **Consequence → Net Benefit** gives a direct morphism **Action → Net Benefit** capturing the idea that each action can be associated with an overall value outcome (its expected utility). The **Principle of Utility** can be seen as an external rule guiding choice: formally, it acts like a higher-order criteria linking back from *Net Benefit* to the decision about which *Action* to take (select the action with maximal net benefit). We can represent this decision-guiding role as a conceptual mapping from the *Net Benefit* value to the **Action** chosen (though not shown as a simple arrow in this category, it can be seen as a selection function picking the optimal action). Thus, Eth_Teleo is a category where the chain of reasoning is *Action → Consequence → Value*.

Figure 2: **Eth_Teleo Category**. Nodes represent an **Action**, its **Consequence**, and the **Net Benefit** (utility value) of that consequence. The morphisms indicate that an Action **yields** a Consequence, and a Consequence is **evaluated as** a Net Benefit (overall utility). Teleological ethics thus maps actions to their outcomes and measures those outcomes by utility. (For simplicity, only the core objects are shown; the Principle of Utility guides one to choose the action with the best Net Benefit.)

In Eth_Teleo, composition of morphisms aligns with the logic of evaluating an action's moral worth by its results. The category's structure encapsulates the utilitarian reasoning: if we have a morphism from Action to Consequence and from Consequence to Net Benefit, their composition is an Action → Net Benefit mapping, effectively an *evaluation* of the action's moral value. Identities and composition obey the category laws, ensuring consistency (e.g. evaluating an outcome's net benefit is a determinate step that can compose with other mappings). The memetic definitions keep the ideas crisp: "*overall good minus harm*" immediately conveys what Net Benefit means, and "*outcome of action*" and "*chosen act*" frame the scenario clearly. Teleological ethics' first principle – that "*duty or moral obligation [derives] from what is good or desirable as an end to be achieved*" – is reflected in this category by the fact that the arrow from Consequence to Net Benefit (the good achieved) ultimately informs which Action is considered right. In other words, the structure formalizes the motto that "*the ends justify the means*" within ethical constraints: the *means* (Action) is evaluated entirely by the *end* (Net Benefit).

Eth_Arete: Areteological (Virtue) Ethics Category

Areteological ethics (Eth_Arete), or virtue ethics, centers on **character and virtue** (*aretē* meaning excellence or virtue) rather than on rules or consequences. The fundamental principle here is that cultivating virtues – traits like courage, honesty, benevolence, justice – leads to human **flourishing** (eudaimonia). Virtue ethicists hold that *virtues and vices are foundational*, and other moral notions (rules, outcomes) are grounded in considerations of virtue. In this category model, we focus on how virtuous character is developed and how it results in *flourishing life*, guided by practical wisdom (*phronesis*).

Objects and Memetic Definitions (Eth_Arete): Key concepts in virtue ethics include the virtues themselves, the intellectual virtue of practical wisdom, and the telos of flourishing:

Object (Eth_Arete)	Memetic Definition
<i>Phronesis</i> (Practical Wisdom)	Wise judgment – the intellectual virtue of moral prudence; the ability to discern the appropriate action in context, balancing virtues (the "how" of being good).
<i>Action</i> (Virtuous Action)	Act in character – an action that reflects one's character and intentions. In virtue ethics, the focus is on acting as a virtuous person would.

<i>Habit</i>	Repeated practice – a settled tendency or practice of acting in a certain way. Virtues are formed by habituation (repeated virtuous actions).
<i>Virtue</i>	Moral excellence – a commendable trait of character (honesty, courage, etc.) that is cultivated by habit and guided by reason.
<i>Flourishing</i> (Eudaimonia)	Living well – the <i>telos</i> (end goal) of virtue ethics: a fulfilled, flourishing life of true happiness. It is not just momentary pleasure but a deep well-being achieved through virtue.

Morphisms (Eth_Arete): The relationships in Eth_Arete represent the Aristotelian path from reasoning to character to the good life:

- **Phronesis → Action** – *Guides*: **Practical wisdom guides action**. This arrow means that given a particular situation, phronesis enables an individual to choose the appropriate action that a virtuous person would take. It's the faculty of *moral insight* that tells us how to act virtuously here and now. (For instance, phronesis helps one find the *Golden Mean* – the right balance between excess and deficiency – in a given context.)
- **Action → Habit** – *Becomes*: A virtuous **Action becomes a Habit** through repetition. This represents Aristotle's notion that we become virtuous by doing virtuous acts consistently; each action, when repeated, reinforces a habit. Over time, individual good acts solidify into stable dispositions.
- **Habit → Virtue** – *Cultivates*: **Habits cultivate Virtue**. This morphism signifies that a pattern of acting well (habituation) develops into a genuine virtue – a firm character trait. For example, consistently honest actions build the virtue of honesty. The arrow captures the internalization process: what starts as deliberate practice becomes second-nature excellence.
- **Virtue → Flourishing** – *Leads to*: **Virtue leads to Flourishing**. Possessing and exercising the virtues is what fundamentally enables a person to live a *flourishing* (*eudaimonic*) life. This arrow reflects the teleological aspect of Aristotle's ethics: the ultimate end (happiness or eudaimonia) is achieved through virtue. A virtuous character naturally lives well, achieving "true happiness."

As with the other categories, each object has an identity morphism (Virtue → Virtue, etc.), and morphism composition is defined and meaningful. For example, composing **Phronesis → Action** and **Action → Habit** yields **Phronesis → Habit** (practical wisdom applied consistently over time fosters habit), and further composing with **Habit → Virtue** gives **Phronesis → Virtue** (showing that practical wisdom is integral to developing virtues – one

cannot form true virtue without wise judgment guiding the habituation). Likewise, composing the entire chain from Phronesis to Flourishing yields **Phronesis → Flourishing**, illustrating that practical wisdom ultimately leads one toward a flourishing life by guiding virtuous development and action. This reflects the virtue-ethical view that wisdom and virtue are intrinsically linked to the good life.

*Figure 3: **Eth_Arete Category**. Nodes are core virtue ethics concepts: **Phronesis** (practical wisdom), **Action**, **Habit**, **Virtue**, and **Flourishing** (eudaimonia). The arrows show the Aristotelian progression: **Phronesis guides Action**; repeated Action becomes **habit**; **Habit cultivates Virtue**; and **Virtue leads to Flourishing**. Thus, virtue ethics focuses on how character is built and how it achieves the human telos (flourishing life).*

Eth_Arete's categorical structure highlights that virtue ethics is about the **integration of being and doing**: who we are (character) and what we do (actions) develop each other. The memetic phrases encapsulate each step – e.g. “repeated practice” for Habit, “moral excellence” for Virtue – making the progression easy to recall. Notably, **Phronesis (wisdom)** is crucial at the start; it's needed to identify *what* the virtuous action is in each circumstance. Without practical wisdom, one might perform acts that mimic virtue but not achieve true virtue or might fail to balance competing virtues. The category's arrows enforce that full virtue arises only when wise choices become second nature. Virtue ethics does have a teleological flavor (flourishing is the end goal), but unlike utilitarian ends, eudaimonia is defined in terms of virtue itself, not just pleasure. The object *Flourishing* thus is an *internalized end*: a life well-lived through virtue. In category terms, we see that while Eth_Arete can compose all the way to *Flourishing*, the value of those end states is **inherent** in the virtues (the Virtue → Flourishing morphism is essentially the identity of a well-formed virtuous character, since exercising virtue *constitutes* flourishing). This contrasts with Eth_Teleo, where the goodness of outcomes is an external measure on consequences. Such differences will be explored via cross-category mappings.

Cross-Category Morphisms and Integration

Having defined each ethical framework as a self-contained category, we now **integrate the three subcategories** by establishing **cross-category morphisms** – mappings that relate concepts in one category to analogous or complementary concepts in another. In category theory terms, these can be thought of as **functors** between categories or as arrows in a meta-category where objects from Eth_Deon, Eth_Teleo, and Eth_Arete are all present. These mappings are defined in a **structure-preserving** way: they align concepts such that logical relationships (morphisms) are respected across frameworks. The goal is to show correspondences (and contrasts) between deontological duties, teleological outcomes, and virtues, thereby constructing a unified *memetic ethical ontology*. Below we identify key cross-category links and then illustrate them in a diagram.

Key Cross-Category Mappings: (Eth_Deon → Eth_Teleo, Eth_Deon → Eth_Arete, Eth_Teleo → Eth_Arete)

**Cross
Mapping
(source →
target)**

Relationship & Interpretation

Duty (Eth_Deon) → Net Benefit (Eth_Teleo)	Rule vs. Outcome as criterion: Maps the deontological concept of <i>duty</i> (moral obligation regardless of consequence) to the teleological concept of <i>net benefit</i> (maximized consequence). This highlights the classic tension: duty says “ <i>Do what is right (follow the rule),</i> ” whereas teleology says “ <i>Do what yields the best outcome.</i> ” By relating the two, we see that a deontological duty can be interpreted in utilitarian terms as a rule that presumably promotes net benefit, and conversely, utility can be seen as a duty to maximize good. This mapping preserves structure: if in Eth_Deon Duty → Action (duty leads to action), under the functor the image is NetBenefit → Action (one should act to achieve net benefit), effectively capturing the idea “ <i>act such that you produce the best consequences.</i> ”
Duty (Eth_Deon) → Phronesis (Eth_Arete)	Obligation → Practical wisdom: Connects Kantian <i>duty</i> with Aristotelian <i>practical wisdom</i> . While duty dictates <i>what</i> must be done, phronesis concerns <i>how</i> to do what is right in context. This mapping indicates that adhering to duty in real situations often requires practical wisdom to interpret and apply general duties without falling into moral rigidity. In the integrated ontology, this functor might send the morphism MoralLaw → Duty (universal law yields duty) in Eth_Deon to a morphism MoralLaw → Phronesis in Eth_Arete, suggesting that understanding and prioritizing moral principles is an exercise of wisdom. It preserves structure by acknowledging that the categorical imperative in practice demands a wise agent to navigate conflicts and exceptions. (This reflects how virtue ethics complements deontology: wisdom bridges principle and practice.)

Good Will (Eth_Deon) → Virtue (Eth_Arete)	Intrinsic moral quality: Maps Kant's concept of a <i>Good Will</i> (the disposition to do good purely out of respect for moral law) to the virtue ethical concept of <i>Virtue</i> (a cultivated excellence of character). Kant esteemed a good will as " <i>good in itself</i> ", and virtue ethics places similar value on virtue as inherently good. This mapping suggests that a Good Will is essentially a kind of virtue (or cluster of virtues like integrity, conscientiousness, and benevolence). It aligns the deontological emphasis on moral intent with the areteological emphasis on moral character. Structure is preserved in the sense that if Eth_Deon has GoodWill → Duty (a good will commits to duty), under the mapping Eth_Arete has Virtue → Duty or rather the idea that a virtuous character inherently fulfills duty. (Deontologists indeed define virtues as traits that make one fulfill duties reliably, which is exactly this correspondence.)
Moral Law (Eth_Deon) → Principle of Utility (Eth_Teleo)	Universal law → Greatest happiness law: Relates Kant's supreme moral law (the Categorical Imperative) to the utilitarian <i>principle of utility</i> . Both are universal principles intended to guide all moral agents – one focusing on form (universalizability of actions), the other on end result (maximize universal well-being). This mapping shows they play analogous roles in their systems as the <i>foundational imperative</i> . Under this correspondence, the deontological morphism Maxim → MoralLaw (test a maxim against moral law) parallels evaluating a plan of action against the utility principle (will this maximize happiness for all?). While one demands logical consistency and respect for persons, the other demands outcome optimality, a structured comparison facilitated by this mapping.
Net Benefit (Eth_Teleo) → Flourishing (Eth_Arete)	Outcome value → Well-being (telos): Connects the utilitarian notion of aggregated happiness (<i>Net Benefit</i>) with the virtue-ethics notion of <i>Eudaimonia</i> (<i>Flourishing</i> life). Both represent an evaluation of goodness of outcomes , but at different scales: net benefit is often a short-term or sum-of-parts calculus (e.g. total pleasure minus pain across people), whereas flourishing is a holistic, long-term realization of a good human life (including virtue, fulfillment, not just pleasure). Mapping these highlights where utilitarian and Aristotelian ends agree and diverge: eudaimonia includes the quality of character and meaning, not just quantified pleasure. Nevertheless, <i>happiness</i> in utilitarian terms approximates <i>flourishing</i> if we consider "true happiness" – indeed eudaimonia has been called " <i>the sort of happiness worth seeking or having</i> ". This correspondence can preserve structure by observing that if a Virtue leads to Flourishing (Virtue → Flourishing in Eth_Arete), and we map Virtue to those actions that produce high Net Benefit, then those high-net-benefit actions lead to Flourishing – effectively suggesting that virtue tends to produce the very outcomes

(happiness, well-being) that utilitarians seek. Similarly, pursuing Net Benefit in a wise manner could over time foster Flourishing for society.

*Figure 4: **Cross-Category Relationships**. This diagram illustrates how key concepts from the three categories correspond. Each colored cluster represents one ethical category (blue: deontology, green: teleology, orange: virtue). Dashed arrows (with two-headed arrows indicating bidirectional analogy) connect concepts: **Duty** (deontology) is juxtaposed with **Net Benefit** (teleology) as differing criteria for right action, and with **Phronesis** (virtue) highlighting the need for wisdom in duty's application. **Good Will** (deontology) connects to **Virtue** (arete) as analogous notions of intrinsic goodness in the agent. **Net Benefit** (teleology) connects to **Flourishing** (arete), relating utilitarian aggregate happiness to eudaimonic true happiness. These mappings (functor-like correspondences) align the structures of the subcategories, allowing concepts and their relations to be translated across ethical theories.*

Through these mappings, we create an integrated ontology where, for example, an **Action** in all three categories can be seen as the same underlying entity viewed through different lenses: Eth_Deon focuses on whether the action follows duty, Eth_Teleo on the consequence's utility, and Eth_Arete on what the action expresses about the actor's character. Indeed, we could define a meta-category where an object like "*Right Action*" is an amalgamated concept, and there are **natural transformations** between the perspectives: e.g. *RightAction_Deon* → *RightAction_Teleo* → *RightAction_Arete*, comparing what each theory considers a "right action." While we won't formalize that meta-category fully here, the cross-links we've defined serve as its scaffolding.

It's important to note that these functorial mappings are **structure-preserving**. For instance, the deontological composition **Maxim** → **MoralLaw** → **Duty** (a maxim yielding a duty if universalizable) could map to a teleological composition **Maxim (as plan)** → **PrincipleOfUtility** → **Decision** (a plan yielding a decision if it maximizes utility) – both sequences reflect filtering an action-guiding rule through a universal criterion (moral law or utility) to produce an imperative. Similarly, the virtue ethic composition **Habit** → **Virtue** → **Flourishing** could correspond to a consequentialist view of habits leading to reliably good outcomes which produce well-being. By preserving such compositions, the ontology respects each theory's internal logic while making them comparable. This answers to the *philosophical rigor*: we aren't mixing theories in a haphazard way, but rather aligning them on their fundamental *first principles* and derived structures.

Moreover, the integrated view sheds light on how **each approach can "make room" for the insights of the others**. As the Stanford Encyclopedia notes, "*each of the approaches can make room for virtues, consequences, and rules... any plausible normative ethical theory will have something to say about all three*". Our ontology illustrates this: deontology's **rules/duties** connect to virtue ethics' **virtues** (via Good Will → Virtue) and to consequentialism's focus on **outcomes** (via Duty → Net Benefit). Virtue ethics' focus on **character** connects to deontology's **principle of duty** (Virtue implies fulfilling duties) and acknowledges consequences (the virtuous

are mindful of outcomes, linking Virtue to Net Benefit/Flourishing). Teleology's **outcomes** link back to virtues (good outcomes often cultivate virtue and vice versa) and can inform duties (outcomes can justify certain rule-following heuristics). These cross-category morphisms thus not only map concepts but also facilitate a dialog between ethical systems: they show where they concur (e.g. a kind of *universalization* exists in both CI and utilitarian calculus) and where they differ (duty vs utility, happiness vs flourishing, etc.), all within a unified formal structure.

Conclusion

By modeling deontological, teleological, and areteological ethics as interlinked **categories**, we have constructed a unified ethical ontology that is both **memetic** and **rigorous**. Each subcategory stands as a valid category in its own right – with clearly identified objects (core concepts like Duty, Net Benefit, Virtue) and morphisms (relations like “imposes,” “yields,” “cultivates”) that obey identity and compositional closure – reflecting the internal consistency of each ethical system. The use of **concise, catchy definitions** for each concept (e.g. “pure moral intention,” “overall good minus harm,” “living well”) serves to distill complex philosophical ideas into memorable *memes* that can propagate easily in understanding and discussion. The category-theoretic approach ensures that these simplifications do not come at the cost of rigor: because we map out the relations formally, we preserve the **logical structure** of each theory (for example, the way Kantian duties follow from universal laws, or how utilitarian evaluation follows from consequences).

We then introduced **cross-category mappings** that function like bridges or functors between the categories. These mappings maintain structural integrity – they respect how compositions (logical inferences) correspond across theories – thereby enabling a coherent integration. This resulted in an ontology where one can **visualize** and trace how an ethical concept in one framework relates to an analogous concept in another (as shown in the diagrams and tables). For instance, one can see an ethical “*action*” from multiple perspectives: is it right because of a rule (duty), because of its outcome (utility), or because it expresses virtue? In our ontology, these questions are connected by formal arrows linking *Duty*, *Net Benefit*, and *Virtue/Phronesis* – providing a holistic answer rather than a fragmented one.

Philosophically, grounding the integration in the **first principles** of each tradition (Categorical Imperative, Greatest Happiness Principle, Eudaimonia) respects the depth of each while demonstrating that they are not mutually exclusive silos but rather different emphases within a potential larger ethical truth. The category diagrams make this intuitive: the shapes of the subcategories are analogous in form, and the cross-links show an overarching pattern. Importantly, our integrated model echoes the insight that a complete ethical theory likely involves all three dimensions – rules, outcomes, and virtues – and category theory provides the language to **compose** these dimensions without confusion.

In summary, this memetic ethical ontology offers a precise yet accessible map of moral philosophy's landscape. Each ethical system is a “module” (category) that can plug into the others via well-defined mappings, much like compatible components in a larger schema. This

not only aids visualization – one can literally draw diagrams to capture moral reasoning – but also aids retention and communication of ethical ideas. A student of ethics could remember, for example, that *Duty* → *Action* (deontology) and *NetBenefit* → *Action* (teleology) are different arrows leading into the same kind of node, or that *Good Will* in Kant is analogous to *Virtue* in Aristotle. Such memetic cues, backed by the formal rigor of category theory, make for a powerful synthesis of ethical knowledge. Ultimately, this approach highlights unity in moral diversity: **duty, utility, and virtue** are formally different yet deeply interconnected – much like three views of the same ethical terrain, each giving insight into what it means to act rightly and live well.